SCOMM
79:8

Representative Kay Brown ALASKA STATE LEGISLATURE

Legislative Information Office
3111 C Street #435
Anchorage, Alaska 99503
(907) 561-7627

During Session
P.O. Box V
Juneau, Alaska 99811
(907) 465-4998

TO: Representative Bill Hudson, Chair
House Oil and Gas Committee

FROM: Representative Kay Brown

DATE: February 6, 1992

SUBJ: HB 433/AO&GCC and the Definition of Waste

In anticipation of the House Oil and Gas Committee's consideration of HB 433, legislation concerning the Alaska Oil and Gas Conservation Commission and the definition of "waste," please find attached the following materials.

1. Sponsor Statement
2. Sectional Analysis
3. "Petroleum — An Overview of the Industry"
   Alaska Department of Commerce and Economic Development
4. Legal Opinion
   Frederick Boness/Assistant AG to Hoyle Hamilton/AO&GCC
5. Presentation to the House Finance and House Oil & Gas Committees
   Kevin Meyers/ARCO Alaska, Inc. & Dave Szabo/BP (excerpt)
6. News Articles —
   "Hickel plans to test market for gas"
   Anchorage Daily News (January 23, 1992)
   "Engineers warn against loss of Prudhoe oil"
   Anchorage Daily News (January 24, 1992)

It is my understanding that the Alaska Oil and Gas Conservation Commission will be preparing a fiscal note for this legislation and will submit that fiscal note under separate cover.

If you have any questions concerning this legislation, please let me know or contact Eric Myers of my staff at 465-4998.

attachments

2/6/92 Rep. Kay Brown

SPONSOR STATEMENT

House Bill 433 — AO&GCC and the Definition of Waste

House Bill 433

House Bill 433 expands the statutory responsibilities of the Alaska Oil and Gas Conservation Commission (AO&GCC) to address issues concerning the public interest in achieving maximum oil and gas recovery.

In determining whether "waste" exists, the AO&GCC shall specifically consider 1) the economic value of oil and gas that may be left behind in a reservoir; 2) the cost of recovering those resources; and 3) the public interest in achieving maximum recovery.

Consideration of Economic Factors Under Current Law

An advisory legal opinion issued by the Alaska Attorney General in 1977 concluded that the AO&GCC is allowed to consider economic factors in its establishment of conservation practices. (Boness to Hoyle, February 14, 1977). However, the opinion also suggests that further direction from the legislature would be appropriate to eliminate ambiguity regarding the AO&GCC's consideration of the public economic interest in maximizing field production.

In short, while it appears that AOGCC use of economic criteria is permissible under state statute, it is not present practice for the AO&GCC to expressly consider the public's economic interest in maximum field recovery.

The Public Interest in Maximum Oil & Gas Recovery

The public interest in maximum feasible and economic oil recovery from Alaska's oil and gas resources is compelling.

The economic significance of oil and gas development in Alaska is well documented. The petroleum sector accounted for more than a third of Alaska's state product in 1987. Oil and gas development and production activities account for a substantial fraction of total state employment. The petroleum sector directly employed over 10,000 workers in 1988 and accounted for 5% of the state's employment. The same year, it paid over $600 million, or 10 percent, of the state total in wages and salaries. Approximately 85% of the state's revenue comes from oil and gas royalties and taxes.

The public interest in Alaska petroleum development extends beyond the economic impact of oil and gas development experienced in the state. There are substantial national, even international, interests in Alaska oil and gas development. The Prudhoe Bay oilfield is by far the largest oil field in North America — it accounts for approximately 20% of U.S. oil production and more than 3% of world oil production. As evidenced by the U.S. war with Iraq, the continued supply and availability of hydrocarbon resources is a fundamental matter of national security.

Prudhoe Bay Natural Gas Development

As indicated during recent hearing sponsored jointly by the House Oil and Gas Committee jointly with the House Finance Committee, alternative Prudhoe Bay reservoir development strategies may significantly impact the maximum achievable recovery from the reservoir.

During those hearings, testimony was presented indicating that premature, large-volume natural gas sales from the Prudhoe Bay reservoir might adversely impact the long-term recovery of oil from Prudhoe Bay. As much as a billion barrels of recoverable oil could be left behind if large-scale gas sales started by 1997, according to industry experts who testified at the hearing.

There is a compelling public interest in assuring that development of the Prudhoe Bay reservoir achieves the maximum recovery that is economically and technically feasible. While there might be substantial short-term economic benefits that would result from sale of Prudhoe Bay gas and the development of a gas line project, the value of those developments should be considered in light of long-term recovery of all hydrocarbon resources from the reservoir. If a large volume of oil were to be "left behind" in the Prudhoe Bay reservoir as a result of large volume gas sales and reduced field pressures, the net benefit to the public of gas sales could well be negative.

House Bill 433 would provide the AO&GCC clear direction to safeguard the public's economic interest in reservoir development decisions.

2/6/92 Rep. Kay Brown

SECTIONAL ANALYSIS

House Bill 433 — AO&GCC and the Definition of Waste

Section 1

Amends AS 31.05.030(b) by directing the Alaska Oil and Gas Conservation Commission (AO&GCC), when examining issues pertaining to waste, to address issues regarding the public interest in achieving maximum oil and gas recovery. In determining whether waste exists, the AO&GCC shall specifically consider 1) the economic value of oil and gas that may be left behind in a reservoir; 2) the cost of recovering those resources; and 3) the public interest in achieving maximum recovery.

Section 2

Amends AS 31.05.170(14), the statutory definition of "waste" to include "abandoning oil or gas in a reservoir if the oil or gas could be feasibly and economically recovered."

Section 3

Effective date.

FEB 6 1992

Memorandum State of Alaska

Oil and Gas Conservation Commission

To: Landa Holton
Rep. Hudson's Office

Date: February 6, 1992

Telephone: 279-1433
Fax number: 276-7542

From: David W. Johnston
Chairman

Subject: HB433

Fiscal Note for H.B. 433

Petroleum Economist (1), Range 22	$75,000/Yr
Petroleum Reservoir Engineer (2), Range 24	$190,000/Yr
Engineering Assistant (2), Range 12	$90,000/Yr
Reservoir Simulation Hardware/Software	$300,000/Yr
Total	$655,000/Yr

The Commission advises that this estimate is based on a cursory examination of the overall intent of the proposed legislation. It provides a rough estimate of the costs required to approach the economic analysis necessary to make waste determinations.

PRESENTATION TO THE
HOUSE FINANCE AND
HOUSE OIL AND GAS COMMITTEES

KEVIN MEYERS, ARCO ALASKA, INC.

DAVE SZABO, BP EXPLORATION (ALASKA), INC.

JANUARY 23, 1992

Impact of Major Gas Sales

- **Major gas sales prior to waterflood/EOR completion (2015) do not permit simultaneous increase in field gas offtake**
  - **Continuing need for artificial lift prevails early in gas sales project**
  - **Deliverability (reservoir energy) of gas is limiting later**
- **Benefits of extensive field development activities implemented in 1990s to maximize liquid recovery are diminished with early major gas sales**

Major Gas Sales Date	Incremental Recovery, STB
2005	-0.4 billion
1997	-1.0 billion

STATE OF ALASKA
JAY S. HAMMOND, GOVERNOR
DEPARTMENT OF LAW
OFFICE OF THE ATTORNEY GENERAL
POUCH K – STATE CAPITOL
JUNEAU 99811

February 14, 1977

Mr. Hoyle Hamilton
Director, Division of
Oil and Gas Conservation
Dept. of Natural Resources
3001 Porcupine Drive
Anchorage, Alaska 99501

RE: ECONOMIC WASTE UNDER
AS 31

Dear Hoyle:

You have asked if AS 31.05 permits the Conservation Committee to consider "economic waste" as well as physical waste. It is my conclusion that the Conservation Committee is allowed to consider economic factors in its establishment of conservation practices but that the term "economic waste" must be defined and the question related to a specific regulatory decision before a more meaningful legal opinion is possible.

I.

Brief History of Conservation Regulation

It will be helpful to an understanding of AS 31.05 to review briefly the history of oil and gas conservation regulation by states.* This is appropriate and useful because Alaska's conservation statute contains many of the same clauses and provisions found in the IOCC model statute and/or other state conservation statutes.

---

*/ This review is taken principally from S. McDonald, Petroleum Conservation in the United States: An Economic Analysis (1971); see also, Interstate Oil Compact Commission, A Study of Conservation of Oil and Gas in the United States (1964).

Initial conservation legislation was designed to prevent damage to other resources caused by oil and gas production and to eliminate certain obvious and easily preventable losses of natural gas. These initial conservation statutes usually established regulations applicable to individual wells (rather than whole reservoirs) and prohibitted specific practices or conversely required certain specific practices, such as for example, requiring the proper casing and plugging of wells to prevent interchange of fluids among reservoir or the contamination of ground water supplies, or to prevent natural gas leaks. Later regulatory statutes usually retained the specific prohibitions of the earlier statutes but also included a general prohibition against waste which was defined in broad terms (or more often undefined). Thus, many state conservation statutes (including Alaska's) contain something of a collection of specific prohibitions and some rather broad, but undefined limitations.*

Conservation legislation, no doubt, was necessary because some operators in their haste to produce oil, employed poor production techniques and disregarded the impact of those practices on other resources (e.g. on ground water). However, another consideration was even more significant. Multiple ownership of the land overlying oil reservoirs combined with the rule of capture** to create an overpowering incentive for each owner of a lease to produce as

---

*/ AS 31.05.020 provides: "The waste of oil and gas in the state is prohibited." "Waste" is defined by AS 31.05.170(11) which because of its length is attached as appendix A hereto.

**/ The rule of capture says that whoever produces the oil owns it, regardless of where it is located underground. Railroad Commission v. Rowan & Nichols Oil Co., 310 U.S. 573 (1939).

much oil as rapidly as possible. This resulted in a number of production practices which frequently caused unnecessary capital expenditures and/or the loss of large quantities of oil. For example, since each producer was competing with other producers in the same reservoir, he would usually drill as many wells as possible and operate each well as long as possible. This meant that more wells would be drilled than were actually required to produce all the oil which could be produced from a reservoir; and even more significantly, it usually meant reservoir pressure would be rapidly depleted resulting in less total oil being produced from the reservoir than could have been produced if production had been coordinated. Similarly, large quantities of oil were lossed in above ground earthen storage reservoirs which were used because they were the fastest and cheapest way to store the rapidly produced oil. The more modern regulatory statutes (those enacted or amended after 1930) were intended to give state regulators more power to control production practices so as to prevent losses of oil and gas, resulting from the competitive race to produce oil as rapidly as possible from each reservoir.

The methods of production control employed by various state regulators have involved a number of overlapping and/or alternative approaches. One of the earliest approaches and also one of the simplest and most widely accepted regulatory methods has been to control the number and spacing of wells. Every state which has a conservation statute expressly authorizes the control of well spacing.* A second method of regulation has been to control directly the quantity of oil and/or gas produced. In practice, this type of regulation has

---

*/ IOCC, A Study of Conservation of Oil and Gas in the United States, at 180 (1964).

taken two distinct forms, each of which will be discussed in greater detail below. A third method of regulation has been to authorize voluntary or compulsory unitization, and a fourth method of regulation has been to require the use of secondary recovery techniques. Many state statutes authorize one or more of these methods (several authorize all four methods), with individual states relying to varying degrees upon each method.

Direct Control of Production and "Economic Waste"

In the early years of the industry, the price of oil often was very low because producers, in their haste to capture as much oil as possible, frequently produced oil far in excess of market demand. Low prices, of course, meant little profit for the industry and also little revenue for those states which depended heavily on royalty payments and taxation of the oil industry for their income. Out of this situation emerged the concept of "economic waste", that is, the production of oil (or gas) in excess of market demand. In 1915 the Oklahoma conservation statute was amended to prohibit "economic waste" (which was not defined) and on the basis of that language, the Oklahoma regulatory agency adopted a regulatory scheme which allowed the agency to establish a statewide production limit and allocate production back to each well so that total production would not exceed that limit. Although this method of regulation effected prices (many persons charged it fixed prices), limiting production to market demand was found by the courts to be a valid method of preventing waste. Julian Oil and Royalties Co. v. Capshow, 292 P. 841 (1930); Champlin Refining Co. v. Oklahoma Corp. Commission, 286 U.S. 210 (1932). In Texas, a 1929 amendment to the conservation statute expressly stated that the prohibition against waste was not to be construed to mean "economic waste."

After the 1929 amendment, suits were filed challenging Texas's policy of limiting oil production to market demand. In one case, the court held Texas' regulatory approach valid despite the statutory reference to "economic waste." Danciger Oil and Refining Co. v. Railroad Commission, 49 S.W.2d 837 (1932). In a second case, however, the court held that the Railroad Commission's orders were intended to prevent "economic waste", and that this was in violation of the 1929 amendment. Alfred Macmillan v. Railroad Commission, 51 F.2d.400 (1931). In response to the MacMillan decision, the Texas legislature repealed the reference to "economic waste" and authorized the prohibition of "production of crude petroleum oil in excess of transportation or market facilities or reasonable market demand". Since the MacMillan case, the practice has been to avoid use of the term "economic waste" in conservation statutes.* Rather those states which employ a market demand method of production control have adopted such a regulatory policy through the use of language similar to that in the Texas statute.**

In the light of the above legal history, it is my conclusion that the term "economic waste", when used in reference to oil and gas conservation practices, is best understood to mean regulation which limits production to market demand.***

---

*/ Only four state statutes use the term "economic waste." The Oklahoma and Kansas statutes each prohibit "economic waste", while the statutes of Illinois and Kentucky prohibit limitation of production to prevent or control "economic waste." IOCC, at 188-89.

**/ Ibid. at 176-79.

***/ One commentator has written: "Despite its apparent breadth, the term 'economic waste' is usually employed narrowly to mean the sale of oil or gas at a price below full cost or actual value and/or the use of oil or gas in ways which fail fully to exploit its intrinsic value". S. McDonald, Petroleum Conservation in the United States; an Economic Analysis 127 (1971).

II.

While the above discussion answers the question you have asked, I believe it might be helpful to discuss "economic waste" as the term might be defined or perceived by others. This discussion, because it is unrelated to any particular regulatory problem is general.

Direct Production Control and
the Maximum Efficient Rate of Production

In those states which do not employ a market demand method of production regulation, production is regulated on a reservoir-by-reservoir basis, with total production from a reservoir being limited to the maximum efficient rate (MER). Typically, the MER is determined with respect to engineering factors rather than economic considerations. Thus, the MER is that rate which will maximize the total output of oil (in an oil reservoir). A rate which causes total oil production to diminish (because, say reservoir pressure is dissipated too rapidly) will be in excess of the MER and will not be allowed. Once the MER is established, shares of production are allocated to each producer and/or well.

Although in practice, engineering considerations have dominated the determination of the MER, it is clearly possible that economic criteria could equally be used as the efficiency criteria. If this were done, the regulatory agency might establish rates designed to maximize total present value rather than total output. Thus, at a time of declining real prices for oil (or perhaps ever slowly rising prices) the regulator might well determine that the MER was at a rate which

sacrificed future oil production for increased present production.*

There is certainly nothing express in AS 31.05 which would prevent the Conservation Committee from implementing production control using economic, rather than engineering criteria, to determine the MER. Indeed, words such as "unnecessary", "inefficient", and "excessive" might well connote economic criteria (at least to an economist) rather than engineering criteria. Nevertheless, I believe use of economic criteria, rather than engineering criteria, would represent a drastic chang in regulatory practice in Alaska (and anywhere else for that matter) and thus, should only be undertaken in response to clear legislative directive in the form of amendments to the conservation statute.

Having noted that the regulatory practice in Alaska and elsewhere is to use engineering, rather than economic criteria to determine the MER, it should not go unstated that economic considerations are involved in many conservation decisions at least in a gross sense. For example, where the Conservation Committee is considering whether to require a water injection program, it certainly must compare the cost

---

*/ The most striking difference between the use of engineering criteria and economic criteria may occur where a reservoir contains both oil and non-associated gas, and the production of one results in a diminshment of the other which can be produced. In that case, engineering criteria might call for maximization of total hydrocarbons (BTU's) while economic criteria would call for consideration of the present and probable future value (price) of each and maximization of the present value.

It should be noted that this is not the regulatory problem you face with the Prudhoe Bay field, since (based on my understanding) hydrocarbon production can be maximized provided gas production is held within reasonable bounds (which bounds may be zero if water flood is not employed; however, in that event, the field can be blown down once oil production ceases). Thus, if one is willing to indulge the assumption that gas prices will increase at a rate at least equal to the discount rate, the MER will be the same using either engineering or economic criteria.

of such a program with the expected increase in recovered hydrocarbons. In doing so, the Conservation Committee need not adopt the economic criteria used by the producers, thus, a water injection program which the producer did not wish to undertake because the rate of return was too small (in their opinion) might still be required by the Conservation Committee. However, in the extreme case, where costs greatly exceeded any possible economic benefits to be derived, constitutional limitations likely would prevent the Committee from requiring an injection program.

Unitization of a Reservoir

One commentator has concluded that state conservation statutes "should require unitization of every oil reservoir within a reasonable time following discovery", and that such a statute "should supplant all present regulations (e.g. of well spacing and production rates) except those designed to protect other resources from damage by oil operations."*/ The conclusion is incorrect because it embodies a flase assumption (which will be discussed below) but it nevertheless highlights an important consideration. That is, by eliminating the competition among producers of oil from a reservoir, one eliminates most of the incentive to engage in "wasteful" practices. In a unitized reservoir, all producers will be better off if production is maximized.

If a unitized reservoir was unregulated, production rates would be determined in accordance with procedures adopted by the unit participants. In such case, one would expect the unit participants acting as profit maximizing entities to produce the reservoir in a fashion which

---

*/ S. McDonald, Unit Operation of Oil Reservoirs as an Instrument of Conservation, 49 Notre Dame Lawyer 305 (1973).

maximized the reservoir's present value.* Such rate of production likely would not correspond to the MER as determined by engineering principles. The public's interest interest in the production of nonrenewable oil and gas resources will correspond exactly with the producers' interest only in the hypothetical world of economists where competition is infinite and institutional constraints non-existent. In practice, the public's interest may be served by requiring the operators of a unitized reservoir to operate at a rate different from that which they would choose on their own. For example, the unit operators may decide against fluid injection because the anticipated rate of return is too low (in their view). The public's interest, however, might best be served by requiring an injection program. Or to give another example, where oil prices are controlled, maximization of present value by the producers likely will run counter to the public's interest.

Regulators of unitized fields have in the past required maximization of hydrocarbons while considering at least in gross terms economics factors. As before, regulators could well require maximization of other objective criteria. However, I would not advise such a course of action without clear Legislative direction in the form of amendments to the present conservation statute.

---

*/ For various reasons in practice production rates may not be such as to maximize present value. For example, integrated producers may be facing crude shortages and willing to sacrifice future revenues while others may face a glut situation. The actual rate may represent a compromise. Some producers may want to hold back production to speculate on future market conditions, while others may prefer to follow less venturesome corporate policies. In short, producers may each have different discount rates.

Sincerely,

AVRUM M. GROSS
ATTORNEY GENERAL

Frederick H. Boness

By:
Frederick H. Boness
Assistant Attorney General

FHB:bwd

PETROLEUM

An Overview of the Industry

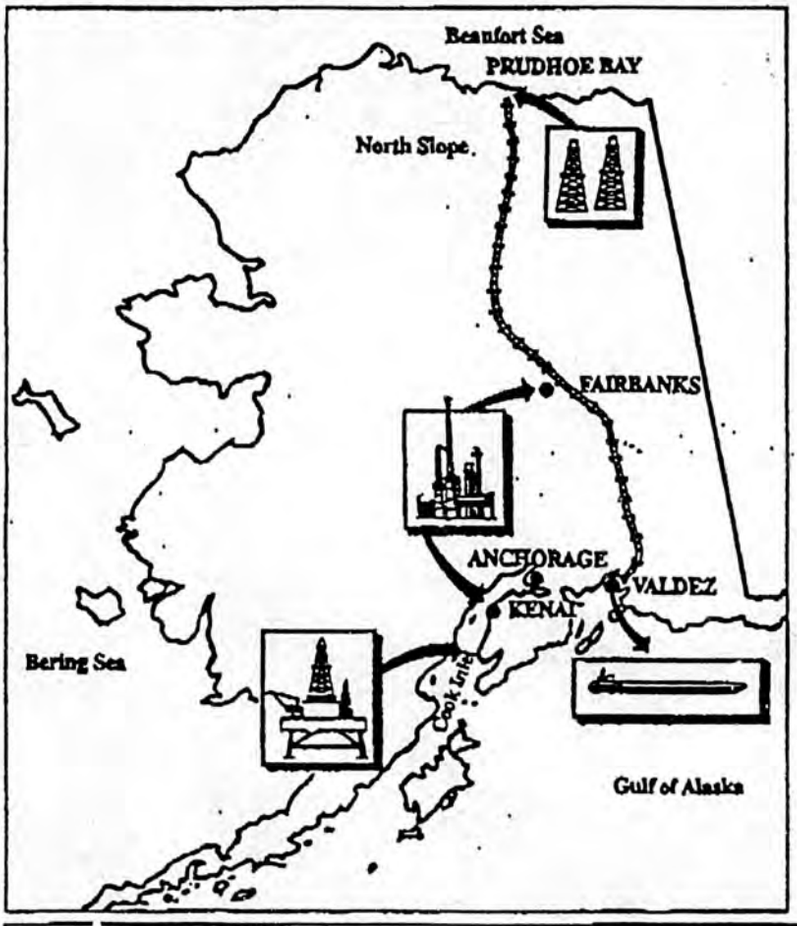
A synopsis based on *Petroleum: Sector Report*, a complete review of the economic data describing this industry from the Alaska Economic Database

The petroleum sector is comprised of industries which produce, transport, and process Alaska's crude oil and natural gas. It also includes exploration for new oil and gas fields and investments for developing or enhancing production.

This sector accounted for more than a third of Alaska's gross state product in 1987. The petroleum sector directly employed over 10,000 workers in 1988, second only to fishing among the resource producing industries, and accounted for 5 percent of the state's employment. The same year, it paid over $600 million, or 10 percent of the state total, in wages and salaries. Average annual wages per employee have consistently been highest in this sector: they are currently about twice as high as the state average.[1]

Although the petroleum sector's share of total wages and salaries is low, it makes other important contributions to the economy. In particular state government has derived about 85 percent of its revenues from petroleum taxes and royalties over the last decade. Most production occurs on land owned by the state from which it collects a royalty. About 25 percent of the royalties are paid into the state Permanent Fund and the rest go into the state general fund.

The petroleum sector extracts oil and natural gas on the North Slope and in Cook Inlet. By the end of 1988, 7.7 billion barrels and 4.5 trillion cubic feet of natural gas had been extracted from Alaska's reserves. The Prudhoe Bay oilfield on the North Slope is by far the largest—it accounts for 20 percent of U.S. oil production and more than 3 percent of world oil production. In 1988, Alaska produced 738 million barrels of crude oil, 98 percent of which came from North Slope fields.



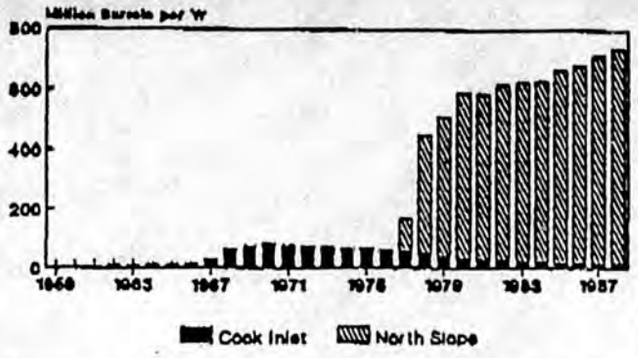
North Slope oil is transported via the trans-Alaska pipeline from Prudhoe Bay to Valdez, where it is loaded on tankers for shipment south. There are also several smaller oil and gas pipelines on the North Slope, in the Interior near Fairbanks and around Cook Inlet. Alaska has six oil refineries which make gasoline, diesel, jet fuel, and kerosene. Chevron and Tesoro refineries are located near Kenai; MAPCO and Petrostar refineries operate outside Fairbanks; and two small ARCO refineries process oil for use on the North Slope. Two facilities on the Kenai Peninsula which process Cook Inlet natural gas are the Phillips-Marathon liquified natural gas (LNG) and Unocal Chemical ammonia-urea plants.

Production

As shown in Figure 1, oil production began in Cook Inlet in 1959, and peaked in

Further information on the Alaska Economic Database is available from the Division of Business Development of the Alaska Department of Commerce and Economic Development. This database was prepared under the sponsorship of the Alaska Industrial Development and Export Authority and the Alaska Department of Commerce and Economic Development by the Institute of Social and Economic Research, University of Alaska Anchorage. This overview was prepared by Marybeth Holleman of ISER.

Figure 1. Annual Crude Oil Production Cook Inlet and North Slope Regions
1959-1988



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

1970 at an annual rate of 82 million barrels. Though it has gradually declined, Cook Inlet still produced 16 million barrels in 1988. North Slope fields began producing commercially in 1977, increased quickly to 700 million barrels in 1980, and slowly grew to 722 million barrels in 1988.

North Slope oil is taken mainly from the Sadlerochit field at Prudhoe Bay which, after 12 years of production, has now begun to decline. However, production from the Kuparuk River, Endicott, Lisburne, and Milne Point fields, developed in the 1980s, more than offset Prudhoe Bay's decline in the last three years. Sadlerochit oil production averaged around 1.6 million barrels per day (mmb/d) in 1988, but fell to less than 1.5 mmb/d by February 1989.

Cook Inlet oil production is dominated by the McArthur River field. All the producing Cook Inlet fields have been active for many years and are slowly declining as reserves are depleted. In 1988, Cook Inlet production ranged from 20 thousand barrels per day (mb/d) at McArthur River to 0.5 mb/d at Beaver Creek.

Alaska natural gas production averaged around 1,100 million cubic feet per day (mmcf/d) in 1988. About half this total was production on the North Slope and half was production in the Cook Inlet Region. Only about 516 mmcf/d, half the total, was marketed. Cook Inlet gas represents the major proportion of marketed natural gas production. North Slope gas is used primarily at the lease site for oil production operations, fueling pipeline pump stations, and reinjection.

Exports

Besides the petroleum processing for Alaska markets discussed earlier, a portion of Cook Inlet oil and some refined oil products such as heavy residual oil are exported to other countries. In addition, all liquefied natural gas (LNG) and much of the fertilizer produced in Alaska are exported to Japan. The value of all petroleum sector exports fluctuated between $300 and $400 million dollars a year in the late 1980s.

Exploration and Development

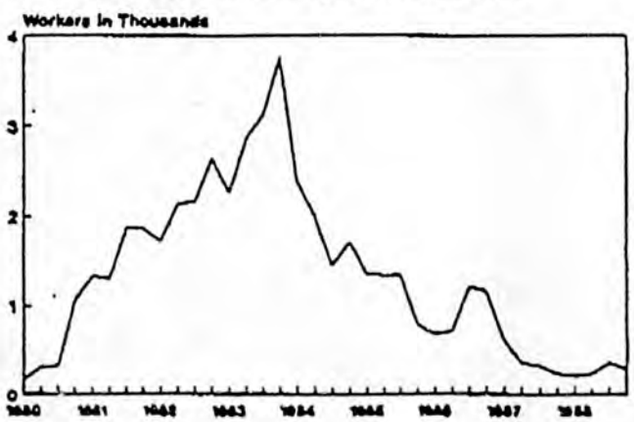
Exploration and development activities have dropped significantly since 1982. This is in part because of dropping oil prices, but also because development at several major North Slope fields has been completed. The primary indicators of exploration activities are the number of geological and geophysical crews operating in the field and the rate of exploratory drilling. For development activities, the primary indicators are the rate of development drilling and the number of people hired to build development facilities.

Exploration activity as measured by field crew months has been extremely variable. From 1958 through 1985, peak exploration activity immediately followed state and federal Outer Continental Shelf (OCS) lease sales. Lower oil prices since 1986 have discouraged exploration activity.

Throughout the 1970s and 1980s, most wells drilled have been development wells. Both exploratory and development drilling permits increased from 1970 to reach a peak in 1985 at over 300 wells, and then dropped to less than one-half that in 1987 and 1988. Exploratory wells averaged 15 to 20 per year, both onshore and offshore. In 1988, oil companies received permits to drill 12 exploratory wells. In contrast, nearly 150 permits were obtained for development wells that same year.

The volatile level of construction employment for drilling wells and constructing production facilities, pipelines, and pumping stations on the North Slope

Figure 2. Average Monthly Construction Employment, Prudhoe Bay Area, 1980-1988



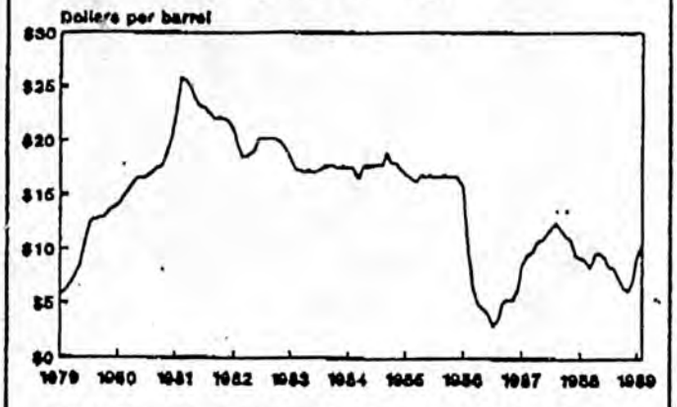
Source: Alaska Department of Labor.

is shown in Figure 2. The work force grew from a few hundred in 1980 to nearly 4,000 in late 1983, as large facilities were installed at Prudhoe Bay and Kuparuk. This number dropped back down to 1980 levels of around 300 workers by early 1988.

Prices

The price of Alaska's petroleum products is determined in worldwide markets for crude oil and its energy substitutes. Because Alaska contributes just over 3 percent of world oil production, Alaska's production has little influence on world prices. And because the cost of transporting oil by tanker represents only a small fraction of the product's value, oil produced anywhere in the world may compete with Alaska oil.

Figure 3. North Slope Wellhead Oil Price
January 1979 - February 1989



* Weighted average; estimated from severance tax returns.
Source: Alaska Dept. of Revenue, Oil and Gas Audit Div.

Figure 3 shows the wellhead price of Alaska North Slope oil from 1979 through early 1989. The wellhead price is the market price minus the transportation cost, consisting of both the tanker cost and the pipeline tariff. For North Slope oil, the pipeline tariff declined from $6 per barrel early in the 1980s to about $3 per barrel in the late 1980s when a legal dispute over the tariff was settled.

There have been three distinct periods in Alaska wellhead prices in the past decade. In 1979, the wellhead value of North Slope oil was about $5 per barrel. It then jumped to $25 per barrel by 1981, while price controls kept Cook Inlet oil prices down. From 1981 to 1985 prices were stable and high. Then, in 1986, world oil prices crashed, and North Slope prices fell below $5 per barrel. Prices between 1986 and early 1989 fluctuated between about $6 and $12.

On an energy-equivalent basis, world market natural gas prices have been close to oil prices. From 1979 through 1986, wellhead prices for Cook Inlet gas remained stable at about 70 cents per thousand cubic feet (Mcf) because producers had long-term, fixed-price contracts with utility companies in southcentral Alaska. These contracts have expired and new contracts have been set at higher, more flexible prices. Current Cook Inlet prices in 1989 increased to about $1.30 per Mcf, slightly higher than world prices.

North Slope natural gas prices do not reflect market conditions because, as noted earlier, the purchasers are also the producers. There is as yet no other market for the reserves in place there.

Employment

Figure 4 shows petroleum extraction employment. When Alaska production began in 1959, only a few hundred people worked in the petroleum industry. This grew to about 8,000 people by 1982, and has remained near this level even with dropping oil prices. Employment in the processing of oil and natural gas has steadily increased since the mid 1970s to just under 300 workers today.

Over 90 percent of Alaska's oil is transported to the Lower 48 states after passing through the trans-Alaska pipeline. Employment in the transportation of oil and gas declined from a peak of about 1,100 workers between 1978 and 1984 to just under 900 employees in the late 1980s. This figure excludes ocean tanker employment levels.

Wages

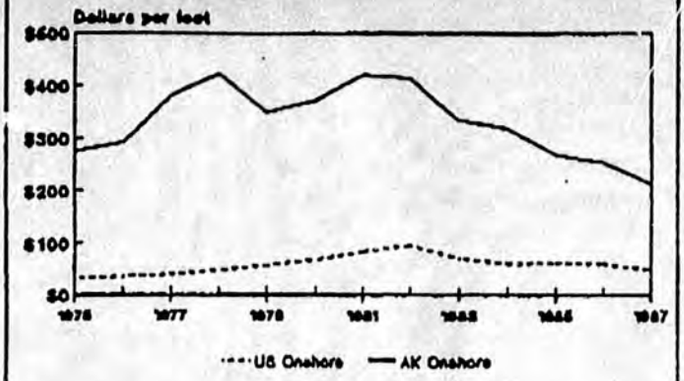
Oil field construction wages are an important cost of business for installing production facilities, pipelines, and processing plants. Average earnings of construction workers in the Prudhoe Bay area peaked at about $7,000 per month in 1983, and then fell 40 percent before stabilizing at roughly $4,500 per month in 1988.[2]

In contrast to construction wages, industry wages have continued a steady rise, from an annual average

Figure 4. Average Monthly Employment Alaska Oil and Gas Extraction 1959-1989

Source: Alaska Department of Labor, *Statistical Quarterly*.

Figure 5. Estimated Average Drilling Costs, United States and Alaska 1975 - 1987



Source: Joint Assn. Survey on Drilling Costs. American Petroleum Institute.

of $20,000 in 1974 to around $60,000 in the late 1980s. These average annual earnings reflect trends in operating and management costs.

Costs of Production

Alaska drilling costs reflect the cost of basic exploration and field development investments. As shown in Figure 5, Alaska onshore drilling costs averaged more than $400 a foot in the early 1980s, but had dropped to just over $200 a foot by 1987. Even with this sharp drop, Alaska onshore drilling costs remain well above the U.S. average, which was about $50 a foot in 1987. Alaska offshore costs, which have usually been closer to the U.S. average, vary widely by location and reflect sporadic activity, so do not serve as a reliable indicator of changes in costs.

The major costs of transportation are pipeline tariffs and tanker rates. The pipeline tariffs are particularly important for North Slope fields, and represent the revenues received by the Alyeska Pipeline Service Company. As discussed earlier, the pipeline tariff dropped by half in the late 1980s.

The primary state tax on the petroleum industry is the production or severance tax. Effective oil severance tax rates range from zero for most Cook Inlet fields to near 15 percent for Prudhoe Bay fields. But because these rates vary widely by field and by producer, an average tax rate can't be calculated. The rate for a particular field is determined by a formula that includes the average production per well as well as total field production. The other major taxes are the petroleum property tax and the special corporate income tax on petroleum.

End Notes

1. These numbers do not include indirect contributions evidenced in other sectors, including construction, transportation, wholesale trade, financial services, business services, utilitites, and state and local government.
2. These earnings data from the Alaska Department of Labor cannot be adjusted for changes in hours and overtime, so there is considerable variation.

INDUSTRY OVERVIEWS
Institute of Social and Economic Research
University of Alaska Anchorage
E. Lee Gorsuch, Director
Anchorage, Alaska 99508

Non-Profit Org.
U.S. Postage
PAID
Anchorage, Alaska
Permit No. 540

34
JEANIE HENRY
LIBRARIAN
LEGIS REF LIBRARY
AK LEGIS AFFAIRS AGCY
POUCH Y
JUNEAU AK 99811

The t. .pany now says just 31 barrels were lost. There are 42 gallons of oil to the barrel.

As recently as two weeks ago, pipeline manager Bob Williams said as much as 171 frozen pipe burst.

The release was estimated at 1,006 barrels of an oil and water mixture.

The National Oceanic and Atmospheric Administration said that about 40 percent of the oil had been recovered.

very roug. .timate, and Kenai Pipe Line agreed.

But DEC environmental specialist Mark Sienkiewicz said Tuesday the agency now thinks only about 16 barels of oil were picked up

That's 672 gallons.

The agency arrived at the figure after heating the collected oil and water mixture to separate the oil from the water.

Williams said demanding news organizations had

tion was rele. .d.

A first guess of the spill's size had been as much as 400 barrels, which is roughly 17,000 gallons.

That would have made it

Please see Page B-3, SPILL

c staff, directors els of fired chief

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

To Rep. Kay Brown | From Jeff Lawhead

Co. | Co. VPC

Dept. | Phone #

Fax # 465-2278 | Fax # 265-3180

...ollected clients. You don't ...therapeutic relationship ...quickly without an impact ...

Please see Page B-3, AKEELA

Hickel plans to test market for gas

Administration forges ahead despite pipeline setback, industry reluctance

By GEORGE FROST
Daily News reporter

The administration of Gov. Wally Hickel said it will announce today a plan to sell state-owned natural gas from the Prudhoe Bay oil field.

Harold Heinze, commissioner of natural resources, said his plan is to "test all potential gas markets, including Asia," with the state's share of the 30 trillion cubic foot bubble atop the field, the largest in North America. The state of Alaska owns one-eighth of the gas at Prudhoe Bay.

He made the statement in a letter Wednesday to Rep Kay Brown, D-Anchorage. Heinze did not return telephone calls to discuss his idea and the letter provided few details, but it did say Heinze will discuss the plan today at a joint hearing of the House finance and oil and gas committees.

The plan comes as a surprise to state regulators who must approve or deny it.

"This is all news to me. I don't know what he is saying there," said Dave Johnston, chairman of the Alaska Oil and Gas Conservation Commission, the state agency with the authority to approve or deny gas sales on the North Slope.

"It sounds like possibly he may be trying to do a gas sale. Or he may be trying to float royalty balloons."

As both private entrepreneur and as governor, Hickel has been the biggest promoter of building an 800-mile gas pipeline from Prudhoe Bay to Valdez, where the gas would be turned into a liquid and exported to Asia. Last month, the governor settled an ethics complaint from a special prosecutor by giving away his stock in Yukon Pacific, the company he founded in the early 1980s to build the gasline. The project has been stymied by the reluctance of the North Slope oil companies to sell gas, and by the reluctance of Japan, Korea and Taiwan to buy it.

Neither Arco Alaska nor BP Exploration (Alaska) — the two biggest North Slope operators — could be reached for comment late Wednesday, but both companies have said recently they don't want to sell any Prudhoe Bay gas before the year 2005, while the Hickel administration has been pushing for sales in the late 1990s.

The oil companies say they need the gas to inject into the reservoir to maintain pressure to pump oil. Gas is also increasingly used as a oil-dissolving solvent that over the life of the field will free up hundreds of millions of barrels of otherwise unrecoverable crude oil.

In his letter, however, Heinze maintains that selling gas would not substantially hurt oil production. He said that, by the late 1990s, "the earliest gas sales can start," about 2 billion barrels of recoverable oil will remain in Prudhoe Bay. As a result of gas sales, up to 15 percent of that oil might be lost due to "leaving lower pressured oil in the reservoir," he wrote.

Heinze said the pressure loss could be partially made up by flooding the reservoir with water. He said gas sales ultimately would increase the recovery of oil and gas by prolonging the life of the field.

Johnston said the three-member oil and gas conservation commission may schedule public hearings to consider the proposal. He said he doubted selling the state's one-eighth royalty share of the Prudhoe gas would in itself be enough to get the project going.

Engineers warn against loss of Prudhoe oil

Industry experts criticize Hickel plan to tap state's gas; commissioner disagrees

Daily News file photo
Harold Heinze

By RALPH THOMAS
Daily News reporter

JUNEAU — Oil recovery from Prudhoe Bay could fall by up to 1 billion barrels — nearly a quarter of the field's remaining recoverable reserves — if gas from the field is sold on a large scale by 1997, a pair of industry experts told state lawmakers Thursday.

But a top Hickel administration official said the industry estimate might be too drastic.

Timing of future gas sales has become a hot topic around the Capitol lately. During the past week, a pair of House committees has held three hearings focusing mostly on the same question: How will gas sales affect oil recovery at Prudhoe Bay and other North Slope fields?

Since his election in 1990, Gov. Wally Hickel has pushed hard for North Slope gas sales and a pipeline to carry the gas to Valdez. Some lawmakers are concerned, however, that removing the gas too soon might drastically reduce the amount of oil recovered.

The state now gets about 85 percent of its revenue from oil and gas activities, but most of it is from oil.

Oil companies use natural gas to maintain pressure that's needed to pump oil. Gas also is used as a solvent to free up substantial amounts of crude that would not otherwise be recovered. If the gas is sold instead of being pumped back down the wells, oil recovery will decline, industry officials say.

A pair of Prudhoe Bay engineers — Dave Szabo of BP Exploration (Alaska) Inc. and Kevin Meyers of Arco Alaska Inc. — told legislators Thursday that there are about 4.4 billion barrels of recoverable oil left at Prudhoe Bay. If gas were sold on a large scale by 1997, that estimate could fall to 3.4 billion barrels, they said.

Meyers prefaced his predictions, however, by saying such estimates are based

Please see Back Page, GAS

THE BACK PAGE

GAS: Engineers say too-early sale could cost Prudhoe billion barrels

Continued from Page A-1

on "highly uncertain science."

If North Slope oil held at its current low prices — about $15 per barrel — a 1 billion barrel recovery decline would amount to $15 billion less earned from Prudhoe Bay.

"The benefits from gas would have to be enormous to overcome that amount of lost oil," Rep. Kay Brown, D-Anchorage, said after Thursday's joint meeting of the House Finance Committee and the Special Committee on Oil and Gas.

By waiting until the year 2005 before making major gas sales, the decline in recovery would be about 400 million barrels, the industry officials said.

But Harold Heinze, Hickel's natural resources commissioner and former president of Arco Alaska, said he thought the industry estimates of recovery losses were too high, though he said the state has no estimate of its own.

Heinze urged legislators to support his plan to sell part of the state's gas royalty share at Prudhoe Bay as a way of testing markets.

"More is better; sooner is better," should be the state's credo as part owner of the gas, Heinze said.

The state owns one-eighth of the 30 trillion cubic feet of gas at Prudhoe Bay. Under Heinze's plan, the state would seek a buyer for half its royalty share and enter into a long-term contract.

Heinze said finding such a buyer wouldn't be enough to support a new pipeline, but he said it would be a start. He said the gas producers and the buyers — not the state — should pay for building a pipeline, which administration officials have estimated would cost $11 billion.

Szabo and Meyers said their companies want to sell their North Slope gas, but not until it makes economic sense. Meyers said Arco has made no projections of when that might be.

But both industry officials supported Heinze's proposal to put part of the state's gas up for sale as a way to test markets.

In a letter Heinze sent Brown on Wednesday, he said gas sales could occur by the late 1990s and that he didn't think it would substantially hurt oil recovery.

At Thursday's hearing, however, Heinze agreed with lawmakers that the state needs to get a better understanding of the Prudhoe Bay field and how gas sales will affect oil recovery.

The oil companies now have the only up-to-date models for projecting how the reservoir will perform, and those models are kept secret. Szabo and Meyers said the models are proprietary, but said their companies might be willing to share with the state some of the information used to create the models.

That wasn't good enough for Brown.

"I did not get a lot of comfort from what they said," Brown said. "I think it's unfortunate that the state has to rely only on the knowledge of the producers and that we don't have our own models. There's a lot at stake here; we should know some of this stuff."

Hickel and Heinze have estimated that selling North Slope gas could boost state revenue by up to $500 million per year.

"I can't bring you any other opportunity that starts to measure up to that potential," Heinze said.

Heinze said the state has not done a gas market analysis, but he frequently mentioned a "window of opportunity" for finding markets and getting a gasline built.

"I've got a boss who I think can get some doors open for us," Heinze said.

Until last month, Hickel was part owner of Yukon Pacific, the company he founded in the early 1980s to build a gas pipeline. He gave up his stock, however, to settle an ethics complaint against him.