



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

JUL 11 2001

Honorable Frank Murkowski
Ranking Member
Committee on Energy
and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Senator Murkowski:

Thank you for your letter of May 15, 2001. I am pleased to respond to the questions that you have asked about the resources and wildlife in the Arctic National Wildlife Refuge (ANWR). As the information provided below demonstrates, I believe that we can ensure that any exploration and development of the oil and natural gas reserves in the 1002 Area of ANWR can be conducted in a manner that is protective of the environment and minimizes impacts on wildlife in the area.

1. What is the Porcupine Caribou Herd's historic calving range?

The historic calving range of the Porcupine caribou herd (PCH) covers an area of approximately 8.9 million acres, extending across the arctic coastal plain, foothills, and northern mountain valleys from the Canning River on the west (in the Arctic NWR, Alaska) to the Babbage-Blow River region to the east and south (in Canada). Figure 1 shows calving distributions as determined during aerial calving grounds surveys done before 1982 (Skoog 1963, Clough et al. 1987). Figure 2 shows the extent of calving during 1983 - 2000. Concentrated calving occurred primarily outside of the 1002 Area in 11 of the last 18 years. When viewed together, these two figures provide a picture of historic range use. Surveys indicate that no calving occurred in the 1002 area in 2001.

2. Are there portions of the 1002 Area where core calving does not historically occur?

Yes. The maps attached in response to Question 1 indicate that the core calving area varies from year to year, depending in large part on snow melt conditions. In years where the snow melt occurs late in the spring, as it did this past year, the concentrated calving area tends to be further to the south and east into Canada, outside of the 1002 Area entirely. Furthermore, since 1983, the concentrated calving area has never extended to the undeformed area west of the Marsh Creek anticline in the 1002 Area. (See Figure 3). Approximately 83% of the oil in the 1002 Area is estimated to occur in this undeformed area.

3. What has been the impact of development in Prudhoe Bay on the Central Arctic caribou herd?

Prudhoe Bay and most other operating oil fields on the Alaskan north slope are within the historic calving grounds of the Central Arctic herd (Figure 4.) The Central Arctic Herd has grown since the beginning of oil field development from an estimated 5,000 animals in 1975 to about 20,000 animals in 1997. This rate of growth is comparable to other caribou herds in undeveloped areas. Parturition and recruitment data do not support the hypothesis that oil fields adversely affect caribou productivity. Between 1978 and 1992, the herd had cow/calf ratios within the range observed for three other herds in undeveloped areas. Within the Central Arctic Herd, from 1997 to 1999, parturition rates in the western range were greater or equal to those in the eastern range. During the same years, early recruitment rates (calves: 100 cows in late June) in the western range were also greater than or equal to those in the eastern

range. While displacement of some caribou from oilfield infrastructure does occur during calving, these local impacts have not resulted in negative population level effects.

When development expanded into the Kuparuk area during the early 1980s, industry worked to consolidate facilities and occupy less space. Separation of pipelines from roads and adequate elevation of pipes above the ground improved the ability of the caribou to move more freely in relation to these expansion areas although cows with young calves continue to avoid developed areas.

4. Over 1,000 miles of seismic exploration was conducted in the 1002 Area during the winters of 1984 and 1985. Concurrently, a well was drilled on Native lands over two winters in the area. Did this exploration have any negative impact on the Porcupine caribou herd?

There is no evidence that the seismic exploration activities or the drilling of the Kaktovik Inupiat Corporation exploratory well on Native lands have had any significant negative impact on the Porcupine caribou herd. The Legislative Environmental Impact Statement (LEIS) concluded that these activities "resulted in no apparent adverse effects on either [the Porcupine or Central Arctic Caribou herds.]" The LEIS also concluded that "winter oil exploration, including drilling, would not affect the Porcupine Caribou herd," and that "disturbance and displacement of the caribou herds from the activities of summer surface geology would be negligible."

Reserve Estimates

5. Based on best available data, what is the oil and natural gas potential of the 1002 area? Please include adjacent state lands and private lands within the 1002 area where development cannot occur absent Congressional authorization.

The U.S. Geological Survey (USGS) estimated in 1998 that the entire 1002 area, including Native lands and adjacent State water areas, contains between 5.7 (95% probability) and 16 (5% probability) billion barrels of technically recoverable oil with a mean (expected case) of 10.3 billion barrels. The volume of technically recoverable natural gas for the same area is estimated to be between 0 (95% probability) and 10.9 trillion cubic feet (5% probability), with a mean (expected case) of 3.8 trillion cubic feet.

6. USGS' most recent evaluation of the 1002 area developed a range of reserve estimates that assumed 37% of the reserve would be "technically recoverable." Applying the "technical recovery" rates from producing fields on the North Slope, including Prudhoe Bay and Alpine, what would be the range of oil and natural gas reserve estimates for the 1002 area?

The estimates for in-place oil resources for the entire 1002 area, including Native lands and adjacent State water areas, are between 15.6 (95% probability) and 42.3 (5% probability) billion barrels of oil with a mean of 27.78 billion barrels. The volume of in-place gas resources for the same area is estimated to be between 0 (95% probability) and 14.5 trillion cubic feet (5% probability), with a mean of 5.1 trillion cubic feet. As your question stated, the USGS arrived at its technically recoverable estimates by multiplying these figures by 37%. The recovery factor at Prudhoe Bay was about 60% and the Alpine recovery factor is estimated to be about 45%.

Application of recovery factors from Prudhoe Bay or Alpine to the anticipated reservoirs in the ANWR 1002 area is inappropriate because the reservoir rocks are fundamentally different. The main reservoir at Prudhoe Bay (sandstones and conglomerates of the Ivishak Formation) contains an exceptionally large porosity system that yields reservoir performance that is matched by few oil fields in the world. Thus, the

estimated recovery factor at Prudhoe Bay (~60%) is very large compared to most reservoirs in the U.S. The main reservoir at Alpine (Jurassic sandstones of the Kingak Formation) is a fine-grained, quartz-rich sandstone that contains an open and well connected porosity network. The operator of the Alpine field estimates that the recovery factor will be about 45%, which also is large compared to most reservoirs in the U.S.

In contrast, most of the oil estimated to occur beneath the ANWR 1002 area is in Tertiary aged, fine-grained, quartz-poor sandstones of the Brookian sequence. These sandstones are characterized by a porosity system that is not as well connected as the Prudhoe Bay and Alpine reservoirs. In addition, the Brookian sandstones contain much larger volumes of finely dispersed clay minerals, which tend to inhibit the flow of fluid through the reservoir. A good analogue is the Tarn oil field, located on Alaska State lands just east of the NPRA and also containing reservoirs in Brookian sandstones. The operator of Tarn estimates that the recovery factor will be about 35%.

In summary, the USGS applied recovery factors to the ANWR 1002 area assessment based on properties of the rocks that are present and thought to have potential to contain oil. These rocks are fundamentally different than the reservoirs at Prudhoe Bay and Alpine. Therefore, application of Prudhoe Bay and/or Alpine recovery factors would be inappropriate in estimating the volume of technically recoverable oil from the 1002 area.

7. How do these estimates relate to current estimated domestic oil and natural gas reserves?

1998 (most recent EIA data) U.S. reserves are 22.7 billion barrels of oil and 141.8 trillion cubic feet of natural gas. The entire 1002 area, including Native holdings and adjacent State waters, contains an oil volume that is approximately 46% of 1998 domestic reserves and a natural gas volume that is approximately 3% of domestic reserves.

8. How current are the USGS estimates of the cost factors which were incorporated into the "economically recoverable" estimates for the 1002 area? Do they reflect the evolving technology and cost models which characterize the latest developments on the North Slope? Does this have a bearing on the "economically recoverable" estimates?

The 1998 USGS estimate of ANWR 1002 area economically recoverable oil resources used the most current information that was publicly available in January 1996, and does not include the technological innovations that have been implemented by industry during the development of Alpine, Tarn, and other recent discoveries. The application of these innovations generally have resulted in reduced costs of developing oil resources. Current cost factors for Alaska North Slope exploration and development are difficult to obtain because technological innovations are advancing rapidly and information regarding the cost effects of those innovations are generally not released by industry. If more current cost constraints were applied to the estimates of technically recoverable oil resources for the 1002 area, it is likely that estimates of economically recoverable resources would increase because of these recent technological innovations.

Timing

9. Assuming Congress approved legislation now pending to authorize oil and gas development activities in the 1002 area and that a pipeline is available to transport any production, please delineate the sequence of events before production could occur and provide an estimate of how long such a process would take with compliance of all existing regulations and laws.

We have attached to this response a chart showing the timing sequence of events leading up to the leasing in the 1002 area.

Following Congressional authorization, the expected regulatory process would include: development of pre-lease stipulations for winter seismic exploration; administration of a winter seismic exploration program; development of leasing regulations; and review of leasing alternatives in an EIS. Once a decision is made to lease the ANWR 1002 area, we anticipate the need to conduct an environmental analysis to incorporate the substantial new data on the environment and technology prior to a lease sale. Subsequent steps include publication of leasing regulations and a Record of Decision to offer a lease sale. Assuming legislation is passed in 2001, the first sale can be held in 2004.

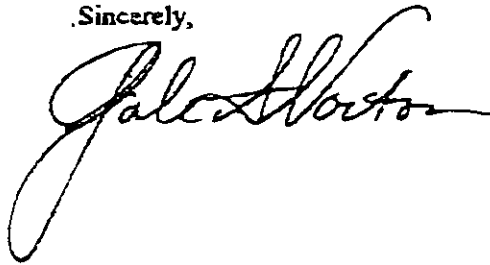
10. Are there any conclusions about timing of activities which might accurately be drawn from the Department of Interior's recent leasing of parts of the National Petroleum Reserve Alaska?

Much can be drawn from the timing of activities from the recent leasing the National Petroleum Reserve Alaska. Our experience in leasing in the National Petroleum Reserve Alaska has provided us with the specific measure or actions necessary for a balanced and environmentally sound approach to the development of oil and gas in an arctic environment. Assuming the leasing process in ANWR is identical to that of the National Petroleum Reserve Alaska, comparable steps can be taken. We therefore, have an extremely good indication of the time needed to perform pre-sale, sale and post-sale activities

11. Please provide a listing of National Wildlife Refuges where oil, gas or mineral activities are occurring or authorized.

Please see the attached Table.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gale Norton". The signature is written in dark ink and is positioned to the right of the typed name "Gale Norton".

Enclosures