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February 6, 1987

U.S. Fish & Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th & C Streets, N.W.
Washington, D.C. 20240

Re: Comments of Akhiok-Kaguyak, Inc.
on ANILCA Section 1002(h) Report

Dear Sir or Madam:

On behalf of Akhiok-Kaguyak, Inc., I provide the comments set out below on the subject Arctic National Wildlife Refuge ANILCA Section 1002(h) Report. Generally, Akhiok-Kaguyak, Inc. wishes to congratulate your Department on the preparation of a thorough and well documented report and concurs in the Secretary's recommendation for full leasing of the ANILCA Section 1002(h) area.

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The report provides a thorough evaluation of prospective impacts from oil and gas exploration and development. However, in identifying these potential impacts, the Report fails to acknowledge the substantial mitigative effects of existing regulatory programs of the federal, state, and local governments with jurisdiction over the Report area. Federal agencies such as the United States Army Corps of Engineers, the Environmental Protection Agency, National Marine Fishery Service, United States Coast Guard, in addition to the United States Fish & Wildlife Service each have important roles to play in regulating the activities which would occur in development. The Report points out that, for all intents and purposes, the entire area is classified as wetlands. Wetlands are subject to the jurisdiction of the United States Army Corps of Engineers. The operation of the Section 404 program of the Corps, by itself, involving direct participation by federal, state, and local agencies, will do much to minimize surface impacts directly and indirectly related to the placement of gravel fill in the area. The Environmental Protection Agency's authority under Section 402 of the Clean

Water Act will serve to minimize water quality impacts from operations in the area. The State of Alaska's Coastal Zone Management Program insures the involvement of local communities affected by the operations as well as the input of interested state agencies such as the Department of Natural Resources, the Department of Fish & Game, and the Department of Environmental Conservation. The North Slope Borough's local zoning ordinance provides local authority for regulation of project activities. Added to this, the direct management authority of the Fish & Wildlife Service over the area constitutes one more layer of insurance that impacts will be avoided or mitigated to the extent possible.

Specific seasonal restrictions listed in the Summary of Recommended Mitigation for the 1002 Area should be only applied to the extent necessary to prevent significant impact from occurring. Some seasonal stipulations may be impracticable from the standpoint of allowing continued operations, especially if such restrictions were to apply during the development phase.

With regard to the disposal of drilling muds, cuttings, and other wastes, there is a decided bias reflected in the Report in favor of reinjection, without explanation as to why the use of reserve pits is not appropriate. Reserve pits have been used for many years without causing significant environmental impact at Prudhoe Bay, Kuparak, and other areas throughout the State of Alaska. Reinjection of drilling muds, cuttings, and other wastes should be economically feasible as well as geologically feasible.

With regard to site rehabilitation, Akhiok-Kaguyak, Inc. recommends that applicable requirements be practicable, timely, and non-redundant. Reporting requirements should be kept to reasonable minimums so as not to burden both reviewing agency staff and operators unnecessarily with unproductive responsibilities in preparation and analysis of reports, proposals and other documents.

Akhiok-Kaguyak, Inc. recognizes the strategic importance of finding significant oil reserves within the United States. By the year 2000, when any production from the 1002 area might be just beginning, the United States will be at least 50-60% dependent upon the import of foreign oil for its domestic use. The present glut of oil in the international marketplace, with concurrent low prices, should not be assumed to be a bellwether for the condition of the market 13 years hence. If large scale reserves are found in the 1002 area, this country simply must find ways to both develop it and minimize environmental harm while doing so. The alternatives are not pleasant to imagine.

It is important to consider that if gross domestic shortages occur in the next ten years and petroleum prices have skyrocketed, the pressures for development of a highly perspective geologic area might become so intense as to overshadow the attention which can now be given to avoiding or minimizing environmental harm.

Akhiok-Kaguyak, Inc. supports the recommendation of the Secretary of Interior and requests that the above considerations be addressed in the final report to be prepared by the Department.

Sincerely yours,

GRUENING, BRECHT, EVANS & SPITZFADEN

By: Patrick Rumley

PR:afg

cc: Ralph Eluska, Manager, Akhiok-Kaguyak, Inc.

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Alaska Center for the Environment
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January 15, 1987

U.S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior Building
18 and C Streets NW
Washington, D.C. 20240

RE: Draft 1002 Report for the Arctic Coastal Plain

Dear Sirs/Madams:

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The following comments of the Alaska Center for the Environment are intended to supplement, amplify and/or reiterate the oral testimony we provided at the January 5, 1987 hearing in Anchorage on the Draft 1002 Report for the Coastal Plain of the Arctic National Wildlife Refuge. Although the Center has a long history of involvement in Alaska Lands Act questions, including the Arctic Refuge, in recent years we have generally deferred to the several Alaskan conservation organizations whose primary concern is federal lands so that we can focus on important hazardous waste, state land use, and local wetlands preservation issues which might otherwise be largely ignored. The fact that the Center is nevertheless participating actively in the debate over the fate of the Coastal Plain is a strong indication of the tremendous interest in this issue on the part of the entire Alaskan conservation community, including our members.

The exceptionally rich biological resources of the Coastal Plain are of regional, statewide, national and international significance. In a refuge blessed with biological treasures, the Coastal Plain is the refuge's most productive area. Lists of those valuable resources have been enumerated probably hundreds of times.

Contrary to what the oil industry so conclusively states, Prudhoe Bay has <u>not</u> demonstrated that oil exploration and development are compatible with the conservation purposes of the Arctic Refuge. Only minimal monitoring of the impact of those activities has occurred. We are just beginning to learn of possibly substantial air, water and toxics pollution at Prudhoe. The U.S.F.W.S. is only in the process of attempting to assess the impacts of oil and gas activities on wetlands and waterfowl. In spite of the fact that some bull caribou do not avoid the oil pipeline, we are not aware of any scientific reports by disinterested observers that conclude that impacts of Prudhoe Bay activities on caribou, especially on calving, are insignificant. In any case, for the reasons that we will give below, we do not believe that there is a need for any oil that might lie under the Coastal Plain sufficient to justify the impacts to wildlife that the draft 1002 Report says are likely to occur.

An issue that development interests have carefully sidestepped, however, is the impact of oil and gas exploration (alone, or with subsequent development) on the irreplaceable wilderness values of the Coastal Plain. We have not seen anyone from the development community willing to refute the assertion that leasing the Coastal Plain will destroy the wilderness values of the area. And to both Alaskan conservationists and millions of Americans in the lower 48, wilderness protection and wildlife conservation are co-equal goals in the drive to preserve the Coastal Plain for future generations.

The Arctic National Wildlife Range was established in 1960 in large part because of its wilderness values, unlike most national wildlife refuges where the primary goal is wildlife conservation. This is our last opportunity to preserve an arctic area that includes a full spectrum of ecosystems in their natural states, largely unaltered by man, and until now almost completely free from the destructive impacts of our most modern technologies. Wilderness designation for the entire Arctic National Wildlife Refuge is also the last great spiritual gift of its kind that we can leave to our descendants. It would be a reaffirmation of our hope and belief that we can learn from past mistakes, and that we are motivated by forces greater than greed.

It is not as if we need the Coastal Plain, where our chances of finding economically recoverable quantities of oil, even under the most optimistic--or unrealistic--assumptions, are less than 20%. Nowhere else has the Alaskan coastal plain been protected. Millions of acres of both onshore and offshore prospects are available or potentially available for oil exploration and development. In fact, the present administration has already flooded the nation with oil lease sales and driven the economic return to the nation to levels that are approximately half of what the previous administration received for the public's resources.

But more importantly perhaps, any reasonable national energy plan--should the federal government prepare one--could easily find ways of comfortably doing without any oil that might be found under the ANWR Coastal Plain. At the present time, however, the federal government has virtually no credibility in regard to energy planning after the president's recent veto of national appliance energy standards, which if enacted would have saved millions of barrels of oil, and its general policy of virtually ignoring even proven energy conservation measurers. The destruction of the nation's last great wilderness in these circumstances is unthinkable.

Nor have several technical or logistical questions been adequately addressed. The 1002 Report admits that we do not know where we will find the enormous amounts of water and gravel necessary for this project. Similarly, oil and gas exploration

and development would create a host of potentially very substantial hazardous waste and pollution problems which we are only beginning to recognize, identify and attempt to deal with. To date we have not shown that we can deal with them adequately.

We recommend that the Interior Department recommend to Congress that Alternative E, which is wilderness designation for the entire Coastal Plain, be adopted. We recommend also that the secret negotiations which could lead to substantial public losses on the Coastal Plain, and which are seriously compromising this reporting process and could preclude Congress' ability to choose from a full range of options for the area, be suspended immediately.

We are very happy to be able to provide comments to the Interior Department on this exceptionally important issue. We are deeply disturbed, however, that the department is grudgingly complying with the law and allowing public participation only after they were forced to by public interest groups who had to expend considerable amounts of time and money to secure this right. We are saddened by and ashamed of the Interior Department's actions in this regard.

Sincerely,

Cliff Eames
Issues Director

CE: dgh

Alaska Coalition for American Energy Security

P.O. Box 10-1515 Anchorage, Alaska 99510-1515 (907)561-8641

February 4, 1987

Director
U.S. Fish & Wildlife Service
Division of Refuges
2343 Main Interior Building
18th & C Streets, N.W.
Washington, D.C. 20240

Gentlemen:

The Alaska Coalition for American Energy Security is an umbrella organization formed for the single purpose to encourage the opening the Coastal Plain of the Arctic National Wildlife Refuge (ANWR) to oil and gas exploration, development and production. Coalition members include the Alaska Oil and Gas Association, Alaska State Chamber of Commerce, Alaska Support Industry Alliance, Anchorage Chamber of Commerce, Arctic Slope Regional Corporation, Associated General Contractors, Common Sense for Alaska and Resource Development Council for Alaska. The Alaska Coalition appreciates this opportunity to provide written comments on the Draft Coastal Plain Resource Assessment.

The Alaska Coalition strongly supports the report's recommended Alternative A, full leasing of the Coastal Plain of ANWR. There are many compelling reasons why the Secretary of Interior must make that recommendation to the Congress of the United States.

NATIONAL INTEREST NEED

Exploration for and, hopefully, development of petroleum on the Coastal Plain of ANWR is clearly in the national interest because of the dramatic and sustained drop in oil prices and the cumulative effect that it has had on domestic production, along with a steady rise in domestic consumption of oil and gas products. The United States is moving toward an ever increasing dependence on energy imports. The present oil surplus is predicted to evaporate in three to five years. Given the start up or recovery time required to rebuild needed domestic production, it is imperative that the industry be allowed to explore on highly prospective areas such as the Coastal Plain without delay.

In a recent study requested by the Secretary of Energy on the future supply and demand for oil and gas, it was found that:

> The positive trends of 1981-1985 towards reduced U.S. dependency on imported oil, particularly from the Middle East, are being reversed. Imports from the Middle East more than doubled during the first seven months of 1986.
>
> The recent drop in oil prices has resulted in significant reductions in U.S. exploration, production, and drilling activity; these reductions cannot be quickly reversed.
>
> Lower oil prices are encouraging growth in energy demand while reducing U.S. oil and gas production.

Finally, the Secretary concluded that, "Until oil prices increase appreciably, U.S. exploration will remain stagnant, our dependence on imports will continue to increase, and our vulnerability to oil price shocks and possible oil shortages or stoppages will rise to an excessively dangerous level. All of this could seriously affect our strategic and national security as well as our economic stability." With the long lead time required to bring an Arctic oil field from discovery to full production, typically 10 to 15 years, this study only reinforces the need to begin exploration activity in the Coastal Plain now.

From a national security perspective the Joint Chiefs of Staff and the National Security Agency has long pointed out that the most important corner stone of our nation's security is a stable and vital economy. Without considering the implications of energy shortages to our defense forces, which were dramatically illustrated in 1973 (the OPEC embargo), the exogenous shocks to our domestic economy will clearly be devastating.

It is essential that Congress and the President move quickly to encourage domestic exploration and production of our energy reserves. As the Secretary of Energy has pointed out, the down turn in domestic production as a result of depressed prices is not easily turned around.

As U.S. production continues to decline at an accelerating rate, our ability to supply our own energy needs will be increasingly impaired and our national dependence on imported oil will increase. Higher prices at best, and shortages at worst will be the inevitable outcome without the discovery and development of additional domestic reserves.

The single most important decision our Congress will make in the areas of domestic production and national energy security in the next eighteen months is the opening of the coastal plain of the Arctic National Wildlife Refuge to leasing for energy exploration and production. This relatively small area at the northeastern corner of Alaska holds the highest promise for significant domestic energy discoveries. Even with an affirmative

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decision to open this critical energy reserve it will take ten to fifteen years before a consumer product is available. Alaska has proven its capability in developing vital natural resources while being sensitive to fish, wildlife and habitat.

Currently, Alaskan oil and gas production represents about 20% of our total domestic production. That production will be in decline soon and will dramatically fall over the next ten years.. Without new discoveries and a dramatic change in domestic consumption there is little hope that we can avoid serious, national economic shocks. The nation is more dependent, than ever, on oil products and it cannot afford to ignore areas rich with potential oil resources.

ECONOMICS

By allowing for exploration, development and production on the Coastal Plain, the United States would receive a valuable resource which it would otherwise import from foreign producers at a tremendous cost to our national economy. The trade deficit for 1986 alone was $170 billion. It is estimated that about half of that imbalance is the direct result of foreign oil imports. It is interesting to note that Congress appears willing to take extraordinary measures to protect U.S. manufacturers from foreign trade competition, and yet the major problem is in the area of oil imports. The trade imbalance translates directly into lost jobs for U.S. workers. Assuming an average value of oil of $35 per barrel, the 3.2 billion barrels of oil which is estimated to be the most probable recoverable potential from the Coastal Plain, represents more than $100 billion in lost revenue to foreign producers. Not only would the loss of ANWR have an impact on U.S. workers, but it would impact the revenue deficit as well. More oil development by the domestic oil industry, means a greater return to the U.S. treasury from bonus payments, rentals, royalties, and taxes. This will help reduce the federal deficit.

RESOURCE POTENTIAL

As recognized in the draft report, the petroleum potential of the Coastal Plain is the most outstanding oil and gas frontier remaining in the United States. However, the reserve estimates for the 1002 area may be understated . The report indicates that only structural traps were considered in the reserve estimate, yet many of the plays expected to contain hydrocarbons are stratigraphic in nature. Were the potential stratigraphic traps considered, the reserve estimate for the Coastal Plain would be even higher than what is quoted in the report.

The report estimates the chance for a commercially developable field at approximately 19 percent. A 19 percent chance of commercial success indicates a considerable improvement over the historical chance of success in Alaska petroleum exploration which is typically a 2 percent chance of commercial success.

A reserve potential of this magnitude cannot and must not be ignored, and the Secretary is correct in recommending that the entire Coastal Plain be opened for leasing.

It is estimated that the oil potential of the Coastal Plain could be as high as that of the Prudhoe Bay fields. Prudhoe Bay and adjacent fields are presently providing approximately 20 percent of the United State's domestic oil production. A conservative estimate of the oil that will have been supplied by the known North Slope fields upon their exhaustion is roughly 13 billion barrels. This represents hundreds of billions of dollars for the cost of oil that would otherwise have been imported from foreign producers if those fields were not produced. Without this development, the U.S. economy would have been even more vulnerable to the inflationary effects that were generated by the high oil prices from foreign suppliers. North Slope fields have helped strengthen the U.S. economy and have contributed billions of dollars to the U.S. Treasury. ANWR has the potential of being an equal contributor to the U.S. economy.

ENVIRONMENTAL CONSIDERATION

While the overall area of the Arctic National Wildlife Refuge is quite large, that portion proposed for exploration and development represents only eight percent of the entire area. The actual surface impact to the resources of the Refuge in this small area would be minimal. The report's analysis and discussion of environmental impacts and effects on wildlife resulting from exploration and production do not adequately reflect the experience of exploration and ongoing production in areas of the Coastal Plain adjacent to ANWR. We see this as the most serious deficiency of the report, which may draw unwarranted opposition to the Department's proposal of full leasing.

The "worst case" speculation of potential impacts on the Porcupine Caribou Herd ignores much of what industry and the regulatory agencies have learned to date about the interaction between arctic oil development and caribou. The report should take an approach which looks at impacts that are "most likely to occur," based on North Slope experience. Such an approach would significantly alter the results of the analysis and yield realistic conclusions of negligible impacts to caribou populations.

The over-emphasis of the importance of a so-called "core calving area" in the 1002 area leads the report to dismiss past experience and studies which show that caribou populations thrive in the midst of oil field activity on the North Slope. Historical data on the Porcupine Herd presented in the report clearly show that the coastal plain from the Babbage River in Canada across the 1002 area to the Canning River has been successfully used for caribou calving. The Porcupine Herd has been observed in some years not to use the so-called core area at all. In some years, the herd has been observed to calve entirely outside the 1002 area. Thus, rather than a specific core area, calving habitat is a continuum across the Arctic coast from the Canning River to the Babbage River in Canada. Recognizing the wide year-to-year variation in calving distributions, it becomes increasingly clear that activities such as oil exploration and production which use only small portions of abundant habitat will not affect the calving success of caribou in ANWR. Caribou continue to use the area in and around the Kuparuk River oilfield for calving and that herd continues to increase at rates similar to other North Slope herds. The Department should re-evaluate the core calving area concept and de-emphasize the importance it plays in the conclusions in the report related to potential impacts from petroleum development.

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SUBSISTENCE

Preservation of the subsistence resource is one of the most difficult and important issues relating to opening ANWR to oil and gas development. In evaluating this issue, it is important to keep in mind the following points:

First, the oil and gas industry has a strong commitment to preserving subsistence resources, and an excellent track record in having done so. The oil and gas industry has worked on the North Slope and in western Alaska in close contact with Native communities and regulatory agencies seeking to preserve the subsistence resources which otherwise might be affected by oil and gas exploration and development. As a result, no significant impact upon any subsistence resource has ever been substantiated as a result of oil exploration and development in Alaska -- and it is our strong belief that this excellent track record will continue in ANWR. The industry is strongly committed to this concern and will closely cooperate with Native subsistence users.

Second, it is also important to take note that subsistence impacts can only occur if there are significant impacts upon the wildlife resources of the area. The primary subsistence resource in this area is the Porcupine Caribou Herd, along with waterfowl. The industry's excellent record in protecting

caribou and other subsistence resources from impact at Prudhoe Bay and Kuparuk is a further reason why subsistence resources will not be impacted in this area.

Third, the subsistence lifestyle requires access to cash, for purposes of obtaining three-wheelers, guns, ammunition, and related supplies. The villagers in the local area will be able to utilize job opportunities offered by oil development to enhance their subsistence activities.

Fourth, natives in the area, who are well experienced with the interactions between oil and gas development and subsistence, favor oil and gas development in ANWR. In fact, Jacob Adams, President of the Arctic Slope Regional Corporation, himself a whaling captain, has stated as follows:

> " We are convinced that experience gained by the exploration and development of energy sources within the last 20 years will lead to the development of new energy production facilities that can be operated very compatibly with the caribou and other living resources of the Coastal Plain. We know that it will require careful regulation and will increase project costs, but we believe a productive balance can be achieved."
>
> "Our own local governments and companies have brought their experience and knowledge to bear on the energy development process, resulting in sensitive and effective decisions. The lands we own within ANWR were cooperatively placed under a regulatory scheme and set of stipulations that has demonstrated the compatibility of living resources and energy development."
>
> "As a people reliant on our land its resources, we are sensitive to the long-term significance that development of the ANWR Coastal Plain may represent. We think that sound environmental studies and mitigation measures have been and will be successful in limiting the adverse effects of development. We are also confident that the existing and improving technologies can ensure the integrity of the environment during oil and gas operations."

WATER AND GRAVEL RESOURCES

The 1002(h) report indicates that water and gravel resources could be problematic with respect to their availability to support petroleum exploration and development in the Coastal

Plain. The Alaska Coalition offers the following comments and observations.

Water

There are many means to provide water for oil and gas operations. Snow melt by using snow collected by use of snow fences, temporary roads to deep lakes, desalinization can furnish water for early exploration. Water supply wells could and would be established fairly early if surface supplies are insufficient. Water from these wells would be in the form of treated formation water from deeper horizons below the permafrost. These methods are routinely used in the Prudhoe Bay development area to insure adequate water supplies.

Although as much as 15 million gallons of water may indeed be necessary for initial exploratory wells, the bulk of this water volume is needed not for the direct drilling of the well, but for the associated ice pad, ice road, and/or ice airstrip. Hence, much of the required water volume will decrease as permanent infrastructure replaces temporary annual ice structures.

For development and production, water supplies can be supplemented by artificial water reservoirs at gravel barrow sites.

Gravel

The report contains conflicting discussions on the availability of gravel resources within the 1002 area. The Executive Summary (page 6, column 1, paragraph 5) states that "...the water and gravel necessary for construction and development are in very limited supply on the 1002 area." Further, page 75 (column 2, paragraph 1) states that "Specific locations and sources of water and gravel for exploration and development activities have not been identified, and it is understood that these resources, especially water, are not readily available on the 1002 area." Page 84 (column 1, paragraph 1) states that "the availability of adequate gravel supplies on the 1002 areas is uncertain.

However, the description of the physical environment on page 20 (column 2, paragraph 4) states that "The valleys of larger streams are underlain by large quantities of course sand and gravel." Figure II-2 on page 16 indicates abundant surficial deposits of sand and gravel. Although Figure II-2 indicates surface materials only, it is unlikely that these gravel deposits are strictly surficial in nature, particularly since similar deposits are widespread and abundant across the entire North Slope Coastal Plain. Abundant gravel beneath the Coastal Plain was observed and reported by the seismic crews when

drilling thousands of shot-holes to depths of 75' the 1984 and 1985 seismic programs.

In fact, not only do abundant sources of gravel seem to be available in the 1002 area along the major stream valleys, but pages 99-100 indicate that the taking of gravel from areas such as river bars, river terraces, and cutbanks can be done with minimal adverse impacts. Furthermore, water reservoirs would be created, thus supplementing other water supplies.

One last point to be made with respect to both water and gravel resources pertains to the ability of the petroleum industry to overcome technical problems. The opening of the Coastal Plain should not be precluded solely on the basis of the potential technical obstacles. Historically, these kinds of problems have been overcome.

LEASING METHODS

The most basic action contemplated by Congress with respect to ANWR is leasing. However, a full discussion of the merits of this basic action is obscured by the debate about the environmental consequences of oil development. There are significant aspects with respect to the leasing program which should be developed with care.

The draft Environmental Impact Statement states, with respect to leasing systems, as follows as page 89, in its discussion of "Alternative A":

> Under the alternative of full leasing, it is assumed that Congressional action would allow all Federal subsurface ownerships of the § 1002 area to be available for development through a leasing program administered by the Department of the Interior. This action would also open to oil and gas development in production the private lands within the refuge. The exact terms of the leasing program would be developed in response to specific legislation passed by the Congress. If the Congress chooses to authorize leasing in the entire § 1002 area, the legislation would probably contain the important elements of the Minerals Leasing Act and the NPRA legislations, with special provisions to meet the unique needs of the Arctic Refuge.

It is crucial that no element of the NPRA legislation be used. The NPRA leasing program did not, for instance, contain normal provisions regarding unitization, for the maintenance of the

lease and the extention of the primary period by shut-in production, etc.

The Secretary should recommend to Congress that it adopt, with respect to ANWR, the ANILCA §§ 1008 (16 U.S.C. §3148) and 1009 (16 U.S.C. § 3149) onshore leasing program. The §§ 1008 and 1009 program is the competitive onshore leasing program utilizing the statutory authority and well developed procedures of the Mineral Leasing Act, as applied by ANILCA to the unique circumstances in Alaska. The important features of this program include procedures to provide significant environmental protection, and are intended to apply to game refuges in Alaska.

The procedures provided in § 1008 are similar to those contained in the Outer Continental Shelf Leasing Act (OCSLA, 43 U.S.C. § 1401 et seq.) including the preparation, pursuant to § 1008(f) of an exploration plan, and, pursuant to § 1008(g) preparation of a development and production plan. The Secretary retains the authority to monitor and modify the terms of such plans pursuant to § 1008(h), and if the Secretary determines that "immediate and irreparable damage will result from a continuation enforce of a lease," then the lease may be suspended or cancelled pursuant to § 1008(i).

Congress need not attempt to "reinvent the wheel." The preparation of an environmentally sensitive leasing program which applies to game refuges in Alaska has already been accomplished by Congress and all Congress need do is to implement it. In other words, the simplest action for Congress to take in this instance would simply be to revoke §§ 1002(i) (16 U.S.C. § 3142(i)) and 1003 (16 U.S.C. § 3143), and the §§ 1008 and 1009 program will automatically apply

INDUSTRY TRACK RECORD

The petroleum industry has a long and well demonstrated history on the North Slope of working closely in consonance with the physical and biological environment. A tremendous amount of funding and effort has gone into studying the environment and seeking ways to minimize adverse impacts. The lack of significant impact serves as a testimony to the ability of industry to operate in an environmentally safe and sound manner. Meanwhile, Arctic technology continues to be developed, assuring that future projects and developments are "state of the art."

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We are confident that the oil industry can operate in an environmentally safe manner and we urge the Secretary to recommend to the Congress that the 1002 study area be opened to leasing, development and production.

Sincerely,

BOYD BROWNFIELD, Chairman
Alaska Coalition for American
Energy Security

BB:tp:NS4:467

Alaska Friends of the Earth
Box 3847 Anchorage, AK 99510

Testimony on the Draft
Arctic National Wildlife Refuge, Alaska
Coastal Plain Resource Assessment
- - - - - - - - - - - - - - - -
Kaktovik Public Hearing
January 6, 1987

O-10

My name is Mike Holloway and I represent Alaska Friends of the Earth. Friends of the Earth is a international citizen-based environmental group. We believe continuation of traditional subsistence cultures is as vital to the diversity and richness of the earth as is the protection of plants and animals. We believe oil exploration and development of the coastal plain of the Arctic Refuge is a threat not only to international wildlife resources, but also to the subsistence way of life.

Every spring for thousands of years caribou have collected at the foot of the Richardson Mountains and traveled north to the coastal plain of Canada and Alaska to give birth to their young. The 1002 Report does not show the entire calving grounds of the Porcupine caribou herd, which includes the whole 1002 area. However, the select portion of the calving areas shown in the report emphasizes the high use of the area between the Hulahula and Aichilik rivers, in direct conflict with proposed oil actvities.

After the long migration, giving birth, and nursing a calf, caribou cows are at their weakest. At a time when they can poorly tolerate more stress, mosquitoes hatch out to agitate and drive herds of animals into a frenzy. When the insects are at their worst, caribou are almost continually on the move. They are easily stampeded. Insect season contributes to the high death rate for calves. Access to forage and insect relief habitat is crucial at this time. Any oil exploration and development activities would likely add to already high levels of stress and likely increase calf mortality. This could have a drastic effect on the continued health of the Porcupine caribou herd and should therefore be opposed by any agency concerned about the protection of wildlife.

According to the 1002 Report, oil development in the Arctic Refuge would include the construction of ports, roads, pipelines, and airfields, as well as thousands of people moving in. Elevated pipelines would discourage caribou access to coastal insect relief areas. All of this development and the associated air and road traffic would add unacceptable stresses and losses to the Porcupine caribou herd.

In village meetings in Alaska and Canada in the spring of 1978 elders agreed that development of oil within the coastal plain of the Arctic Refuge would be very harmful to the continued health of the Porcupine caribou herd, and thus bring hard times to those people who have lived in close relation to the caribou for tens of thousands of years.

Unlike Prudhoe Bay, water is scarce in the 1002 area. Here the coastal plain is narrow and sloped, not flat with lakes like Prudhoe. A lot of disturbance of the ground and river beds would be done to provide enough water and gravel for oil field development. Oil activities will certainly have an impact on water quality, especially considering the added problems of unavoidable oil spills and the storing of toxic drilling muds in reserve pits.

Of course, there are efforts to develop oil offshore of this area also. Water traffic and activity from all this development would effect marine mammals, especially noise-sensitive bowhead whales.

There are also the noted effects of loss of polar bear denning, musk ox habitat, and restrictions on subsistence hunting with the 1002 area. Page 129 of the report reads as follows: "Most important will be the likely decline or change in distribution of the PCH and the CAH and the harvest prohibitions near developed areas. These effects, in combination with adverse effects on other subsistence use species, disruption of traditional use sites, and likely psychological effects on a people accustomed to isolation, will result in a major adverse effect on subsistence uses within the 1002 area. Competition for resources and the potential for increasing restrictive hunting regulations may add to the severity of impacts on subsistence uses."

The 1002 report and the oil industry would have us all believe that we need to get the oil and gas out of the coastal plain as soon as possible, that pumping this area dry of oil and gas reserves is in the best interests of national economy and security. But at current rates of U.S. use, there would only be enough oil for several months. Energy conservation efforts could

easily save this amount.

The Arctic National Wildlife Refuge was established in 1960 to, in part, "conserve fish and wildlife populations and habitats in their natural diversity, to provide for continued subsistence uses by local residents and to ensure, to the maximum extent practicable, water quality and necessary water quantity within the refuge." In 1978 and 1980 the U.S. House of Representatives voted twice to make the coastal plain of the Arctic Refuge Wilderness, but the Senate necessitated this 1002 study and report.

The coastal plain is the most biologically productive part of the Arctic National Wildlife Refuge. It is the center of the cycle of life for caribou, birds, fish, and other animals. It must not be disturbed for the possibility of a few months oil supply.

To develop this area now for short term gain will destroy forever the wilderness characteristics of one of the most important biological areas in the entire Arctic. This is the only area of our Arctic slope now protected. Let it remain protected. We recommend the 1002 area be put into Wilderness with continued subsistence uses as protected in the Alaska National Interest Lands Conservation Act.

Thank you.

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Alaska Oil and Gas Association

121 W. Fireweed Lane, Suite 207
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(907) 272-1481

February 4, 1987

Director
U.S. Fish and Wildlife Service
Division of Refuges
United States Department of Interior
Room 2343, Main Interior Building
18th and C Streets
Washington, D.C. 20240

Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment

Dear Sir:

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The Alaska Oil and Gas Association (AOGA) is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. AOGA appreciates this opportunity to comment on the draft Coastal Plain Resource Assessment.

AOGA commends the Department of Interior on the overall completeness and adequacy of the report in the assessment of the resources of the ANWR Coastal Plain. AOGA strongly supports the Department of the Interior's proposed recommendation that the entire "1002" study area be authorized for oil and gas exploration, development and production.

As demonstrated since 1973, the United States is vulnerable to serious supply disruptions and price escalation because of its dependence on foreign sources of oil. The Free World's sources of petroleum are heavily concentrated in the Middle East where two-thirds of the proven reserves are located. Saudi Arabia alone possesses one-fourth of the world's reserves. Increased future dependency on politically unstable Middle East nations is highly undesirable from a national interest standpoint.

Domestic crude oil production from existing fields is forecast to decline from the 8.9 million barrels per day average of 1985 to 6.2 million barrels per day by 1991, if oil prices prevail at about $15 per barrel. Current domestic crude oil production has already fallen to about 8.5 million barrels per day as marginal fields are being abandoned. Domestic production may decline as low as 4 million barrels per day by the year 2000 unless significant new domestic reserves are found and developed. Without

significant new discoveries, our nation could be dependent upon foreign sources for 60-75% of its demand, almost double the present level of dependency, within the next 10-15 years. Because it takes 10-15 years to explore, develop, and bring Arctic oil and gas resources into production, the opening of the ANWR 1002 area for development is now of timely and critical importance.

All the geologic factors favorable for significant oil and gas discoveries exist in the 1002 area, including source rocks that generate oil and gas, thick sequences of reservoir rocks, large structures to trap petroleum and a favorable geologic history. The 1002 area is one of the most promising areas for major discoveries of oil and gas of all untested onshore areas of the United States.

Exploration, development, and production can proceed on the coastal plain with minimal environmental effects through reasonably applied mitigation measures. Clearly, the 18 years of exploration and development of Prudhoe Bay and other North Slope oilfields and construction of the Trans-Alaska Pipeline System (TAPS) has shown that proven and current industry practices can ensure that development can proceed in a manner compatible with wildlife resources and ensure that no unnecessary adverse environmental impacts occur.

AOGA strongly endorses Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest. Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise. Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling. Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C will only delay any eventual production from the area. Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the coastal plain.

Our more detailed written comments on the draft Coastal Plain Resource Assessment report are attached for your consideration (Attachment A). We have also attached copies of independent analyses on the report's biological portions, prepared by R. J. Jakimchuk (Attachment B), J. Curatolo (Attachment C) and A. T. Bergerud (Attachment D) at the request of AOGA. Also, attached is

AOGA's testimony presented at hearings held in Anchorage and Washington, D.C. (Attachment E). We submit our written comments as constructive input and urge the Service to consider them in preparing the final report for submittal to the Congress. Thank you for this opportunity to comment.

Sincerely,

WILLIAM W. HOPKINS
Executive Director

WWH:tp:NS4:477

Attachments (5)

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ATTACHMENT A

COMMENTS OF THE
ALASKA OIL AND GAS ASSOCIATION ON THE
U.S. DEPARTMENT OF INTERIOR (DOI) - 1002(h) REPORT

EXECUTIVE SUMMARY

Page 2, paragraph 1: The point from this paragraph is the bottom line conclusion of the entire 1002 study. We would like to re-emphasize our support for this position. We concur that adverse effects resulting from development can be minimized or entirely eliminated through proven mitigation measures, lessons learned and technology acquired from the Prudhoe Bay development and from construction of the Trans-Alaska Pipeline System (TAPS).

Page 6, paragraph 2: "The Department did not include gas in its recoverable calculations as it was determined that the gas resources were unlikely to be economic at any point in the 30-year period considered."

Given the quantities of gas estimated to exist in the area, we question the statement that the gas resources are unlikely to be economic during the next 30 years.

Page 6, column 2, paragraph 4: "Oil and gas discovery will lead to industrial development..."

There may indeed be development pressure, but adverse effects can be controlled or mitigated.

Page 6, column 2, paragraph 5: This paragraph states that "changes in wildlife habitat and wilderness environment could include displacement and reduction in the size of the Porcupine Caribou Herd (PCH). The amount of reduction and its long-term significance for herd viability is highly speculative." (Emphasis added)

We strongly agree that many of the subsequent environmental consequences are overstated and highly speculative. As currently written, many of the conclusions of severe impacts and concerns for caribou populations are stated as fact, when in actuality, they are speculations not supportable by the experience at Prudhoe Bay or elsewhere in the Alaska arctic.

Thus, we ask that the authors of the report reconsider these speculative, "worst-case" statements. At a minimum, we ask that the authors emphasize the highly speculative nature of the conclusions in the environmental consequences section by including appropriate caveats and cautionary statements to avoid further proliferation of these consequences as statements of fact.

CHAPTER II - Existing Environment and
CHAPTER VI - Environmental Consequences

Comment 1 - Often the NEPA-mandated EIS process is forced to predict environmental consequences of new developments with little or no previous field experience to guide the predictions. Clearly, for the ANWR coastal plain, the test case has already been run at Prudhoe Bay. Collectively, the experience of the regulatory agencies and industry is captured in the DEIS on page 2: "The evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources. Hence, it is reasonable to assume that development can proceed on the coastal plain and generate similar minimal effects." Jointly, the industry and regulatory agencies have expended literally millions of dollars and hundreds of man-years effort to characterize the interaction of fish and wildlife with the oil field development in and around the Prudhoe Bay area. Undoubtedly this is one of the most-studied ecosystems in North America. This effort has led to the development of tried and proven mitigation techniques to ensure the compatibility of wildlife and oil field interests.

Furthermore, we support the statement, also on page 2 of the DEIS, that "Most adverse effects would be minimized or eliminated through carefully applied mitigation, using the lessons learned and technology acquired from development at Prudhoe Bay and from construction of the Trans-Alaska Pipeline System (TAPS)."

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Indeed, we would like to point out that all of the environmental activists' unwarranted predictions of 15 years ago, prior to the construction of TAPS, have subsequently been proven false. The demise of major caribou herds, alterations in water quality and major losses of habitat simply have not occurred. Conversely, the development of Prudhoe Bay and TAPS have allowed Alaskans to enjoy a period of economic prosperity in harmony with a high quality environment and thriving wildlife populations.

Comment 2 - Numerous sections of Chapter II and VI are devoted to discussions of research on the behavior and movements of caribou in and around oil field development. The main problem this discussion and the conclusions drawn is that habitat is not a limiting factor for any of the stages of the caribou life cycle. Therefore, conclusions regarding displacement of maternal cows or bulls carry little if any significance for the continued growth and survival of the herd. Since habitat is not limiting, loss of access to small portions of available habitat due to oil field development is not biologically significant.

We readily agree that some degree of modified behavior and displacement has occurred in response to habitat alterations in the Prudhoe field. However, habitat is not limiting caribou population growth for any Alaskan herds at the present time. Therefore, a degree of habitat loss as a result of development on the

coastal plain will be inconsequential to growth and productivity of the herd.

In the management of wildlife populations, the concept of habitat carrying capacity is the key to defining management goals for a herd. It is an established fact that neither the Central Arctic Herd (CAH) nor the Porcupine herd approach the carrying capacity of their ranges. Indeed, Skoog (1968) stated the "It seems likely that the Alaskan caribou population has remained far below range carrying capacity and that the total habitat has never been fully occupied. In reality caribou populations seem to have maintained densities much lower than the maximum dictated by food alone, and hence the reduction in total range becomes less meaningful." Thus, we agree with Skoog's conclusion that habitat is not currently limiting the growth of the (PCH) and that the loss of habitat represented by likely development in the 1002 area will not impact growth or productivity of resident caribou.

Comment 3 - The "core calving area" is assumed to be critical to (PCH) herd demographics and therefore any displacement from this area would necessarily impact productivity.

The report places undue emphasis on a core-calving concept when, in fact, the historical data for calving use do not support fidelity to a "core calving area." Historical data for calving distribution clearly show that the coastal plain from the Babbage River in Canada, across the 1002 area to the Canning River has been used for calving. Thus, calving habitat is more correctly referred to as a continuum across the coastal plain rather than a specific core area.

Chapter II, page 28 correctly points out that wide year-to-year variations in calving distribution can occur due to weather influences and the arrival of spring snow-melt. This acknowledged effect of weather further erodes the core-calving area concept and points out the wide annual variability and adaptability of caribou. During 1983, 1984, and 1985, calving estimates were 74% to 35% and 82% respectively in the 1002 area. These data clearly show the adaptability of the PCH to yearly variations in weather conditions and point out that calving distributions do vary widely.

The "core calving area" for the PCH has been arbitrarily defined as an area where high density (50 caribou sq. mi.) calving has occurred for at least 5 of the last 14 years. For much of this area, high density calving has occurred in 9 of the 14 years, which still leads to the obvious conclusion that calving has occurred outside the "core calving area" during 5 to 9 years. An important aspect of the "core calving area" to consider is what percentage of the overall calving habitat it represents. From Table VI-5, the total "core calving area" is 311,000 acres, while total concentrated calving occurs over 2,117,000 acres. Thus, core calving represents 15% of all concentrated calving areas, and would represent an even lower percentage if peripheral calving

areas were considered. The conclusion is that the PCH has successfully calved over a very large area in the past and while the core area is obviously important to the herd, it is not necessarily critical.

The assumption is made that areas outside the "core calving area" have less important habitat values or higher exposure to predators. If this were so then reduced productivity should be apparent from the years that the herd used these alternative areas. This has not been demonstrated and it is known that the herd has grown steadily since the early 70's.

In considering the effects of displacement from traditional calving grounds, examples can be drawn from the literature. Davis et al., (1983) report that "in 1982, the Delta Caribou Herd was apparently precluded from calving in its traditional core areas because of persistent snow cover and instead used an alternate calving area roughly within the area burned in 1979, even though snow conditions were as favorable in unburned areas northeast, northwest, and west of the 1979 burn, where some calving occurs in most years. Calving in 1982 was quite successful, which suggests that caribou may have considerable flexibility in their habitat requirements." The CAH and Taimyr Herd in Russia also provide examples where industrial activity has had no measurable effect on herd productivity.

Skoog (1968) and Bergerud et al. (1984) believe that caribou are not limited by available habitat . Shank (1979) states that:

> "Stating that animals have no adequate habitat into which they can disperse is tantamount to saying that the population is being density controlled. In fact, northern large mammals (excepting sheep) are most likely not often resource limited suggesting that at least some degree of distributional alteration could be accommodated without drastic demographic consequences."

Therefore, conclusions regarding the relative importance of the Jago highlands as a core-calving should be de-emphasized throughout the report.

Comment 4 - In assessing the environmental consequences of possible oil and gas development in the 1002 area, the USFWS has chosen to apply its USFWS policy (46 Federal Register, p. 7644 - 7663, January 23, 1981) (1002 Report, p. 12). In so choosing, USFWS has focused their impact analyses on losses of habitat value and has quantified their impact conclusions in terms of acres lost. Then, assuming a direct correlation between acres of habitat available and the population sizes of resident species, USFWS has translated their projections of acres lost to population reductions.

This approach to resource management is justified primarily on the basis of the USFWS Mitigation Policy and has never been examined

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by USFWS for its scientific validity in the arctic. The foundation of the USFWS Mitigation Policy is the management of habitat as a means of managing the productivity of fish and wildlife populations. It is inappropriate, however, to use a habitat-based system to manage a population when habitat availability has not been shown to be a mechanism by which that population is regulated. The policy is particularly inappropriate in the arctic where habitat has not been shown to be a limiting factor for most species, and is particularly meaningless with respect to caribou. The published literature on caribou clearly supports the finding that herd productivity (and therefore size) is regulated by direct mortality due to predation and hunting. Continental caribou herds have not been shown to be limited by habitat availability.

Since habitat is not a limiting factor for many of the Arctic species, it is more biologically meaningful to focus on impact mitigation. The most biologically effective approach to assessing and mitigating effects of development on wildlife is first to determine systematically how project activities and structures will adversely affect a population and then to apply mitigative measures that will avoid or minimize the mechanism by which those activities and structures disturb the population.

The USFWS Mitigation Policy should not be the basis for either impact analysis or mitigation requirements in the arctic.

Comment 5 - The 1002 Report states on page 98 that "the mitigation policy recommends that legally designated or set-aside areas, such as National Wildlife Refuges, be given special consideration as either Resource Category 1 or 2."

The designation of USFWS Resource Category 1 for a portion of the caribou calving habitat is inappropriate. The habitat in question is not "unique or irreplaceable". It has not even been established that the PCH has a specific "core" calving area. The Porcupine herd's calving concentrations vary annually in number and location, in some years falling within the same general area, in other years separated by hundreds of miles. Calving occurs primarily in the uplands along the northern sides of the Sadlerochit, British, and Richardson mountains, a region extending approximately from the western boundary of ANWR at the Canning river to the western Mackenzie Bay area in Yukon Territory. This principal calving range encompasses an east-west distance of over 200 miles and an area exceeding 6,500 square miles, larger than Connecticut. In 1982, for example, the majority of the Porcupine herd calved east of the United States - Canada border in Yukon Territory, completely outside ANWR. Also, 1986, the herd calved almost entirely outside the 1002 area. In any given spring, there are usually several areas where densities of calving caribou cows are higher than elsewhere in the calving range. These concentrations may be several hundred miles apart, some in Alaska, some in Yukon Territory, and may vary greatly in location and number from one year to the next, while remaining inside the herd's principal calving range. The idea of a "core" calving area consisting of a specific tract of land with fixed boundaries, used consistently and predictably from year to year, is a misconception. Calving habitat

is more appropriately represented as a true continuum across the coastal plain. Thus, the "unique and irreplaceable" nature required for designation as Resource Category 1 does not pertain.

Comment 6 - The report confuses behavioral responses with demographic responses. That is, the report proposes that if a behavioral response is observed or predicted in an individual or group, then the species productivity has been or will be negatively impacted.

Shank (1979) discusses this confusion directly. He defines a behavioral disturbance "as any behavioral response to human-caused stimulus which results in actually or potentially reduced reproductive fitness. If human action results in an animal acting in a manner in which it would not otherwise have acted and if this alteration is thought to cause a reduction in that individual's capacity to produce a viable offspring, then behavioral disturbance has occurred. The issue is confused by the occasional unavoidable use of the term 'disturbance' to describe the human-caused stimulus itself."

Shanks further states "Behavioral disturbance becomes manifested in animals in three distinct analyzable modes: overt behavioral response, physiological response, and demographic responses."

There is a consistently blurred distinction in the 1002 report regarding what is a behavioral response and what is a demographic response. The discussion of effects on caribou and muskox are excellent examples of this confusion. In both cases observed behavioral responses (flight reactions or displacement) are used to estimate areas of affected habitat. Although habitat is not a limiting factor for either species, these avoidance behaviors are then equated to demographic responses. As Shank (1979) states:

> "What is commonly forgotten or ignored...is that disruption of normal behavior is not necessarily bad in itself. For behavioral disturbance to be of practical concern, it must be demonstrated that it does or does not, have demographic consequences. Failure to provide this link is, without question, the major failing of current research."

Comment 7 - Declines in all major predators are assumed to occur due to the hypothesized decline in caribou population.

The discussions of wolves, brown bears, wolverines and golden eagles all predict a "moderate" impact, largely due to a hypothesized 20-40% decline in the PCH. This reasoning is flawed for several reasons:

1. No alternative prey species are considered.

2. The 6-8 weeks of PCH availability to predators on the coastal plain would have to be a critical period for all species where the predators relied almost entirely on caribou.

3. No consideration is given to the fact that the high numbers of the PCH relative to the low numbers indicates that the predator - prey system is not in a stage of dynamic equilibrium where a small change in one population leads immediately to a change in the other.

As an example of the problems with the assumption that PCH numbers are now limiting the 4 predators discussed, wolves will be examined in detail below because wolf-caribou systems have been studied more extensively. The logic behind the argument applies to the other predators as well.

Population estimates for the PCH ranged from 100,000-106,000 for most of the 70's, which represents a decline slightly greater than the maximum 40% predicted by the 1002 report. Yet wolf numbers in the 1002 area are not estimated to have been significantly lower than the report's estimate of 5-10 wolves, and in fact may have been higher. "Wolf predation on caribou in the ANWR study area during calving and post-calving is probably low." (USFWS 1982) It is fairly safe to assume that wolf populations on the 1002 area have been held artificially low through rabies and legal and illegal hunting and that PCH population size is not a dominant factor.

Keith (1981) shows a direct relation between wolf population density and ungulate population biomass. However, the theory behind this relation cannot be applied to the 1002 area because:

1. Wolf densities are quite low relative to the available biomass of the PCH, such that Keith's relation does not hold. This suggests other factors control wolf populations in the 1002 area.

2. The PCH are only seasonally available to resident wolves, and then at a time when wolves are tied to denning sites to the south of the 1002 area.

3. The availability of the PCH occurs in summer, not during the more critical winter period, when resources are more scarce and wolves have fewer prey alternatives.

For the reasons discussed above it is not reasonable to assume that declines of 20-40% of the PCH population will have any effect on wolf numbers. Negligible to minor impact on other predator species would also be expected from the hypothetical worse case of a 20-40% decline.

Comment 8 - The standard for judging environmental effects is not discussed. Based on numerous examples documented in the specific comments section, it is apparent that the standard used in the 1002 report is "worst case". NEPA as now amended currently requires that a "reasonably foreseeable" standard be used.

Although the current 1002 report is a legislative EIS and not one occurring directly as a result of NEPA, most CEQ guidelines apply

to a LEIS as well. As stated above, the requirement to prepare a "worst case analysis" when faced with incomplete or unavailable information was rescinded in April, 1986. Since most of the environmental consequences result from worst case analysis, this approach requires modification. The large amount of study and experience on the North Slope allows for an analysis of "reasonably foreseeable" effects.

Page 23, column 2, last paragraph (also page 104): We feel that undue emphasis is placed on the plant, Thlaspi arcticum. Although the plant is known to occur in the 1002 area, its status and distributional ecology are not well understood. Currently, the plant has no status either as threatened or endangered, and yet it is treated as endangered status throughout the report. More information must be developed on the occurrence and distribution of this species before stipulations and set-back requirements can be promulgated.

Page 28, paragraph 1: "The long-term maximum and minimum population of the PCH and the carrying capacity of the PCH are unknown."

This is a key point not mentioned again in the entire report. We agree that the habitat and range carrying capacity for the PCH are indeed unknown. However, it is an accepted fact that the PCH and most circum-polar caribou herds do not approach the carrying capacity of their ranges based on food, calving habitat, insect relief or any other habitat basis.

Since habitat is not limiting growth, ample room exists to accommodate development interests in the 1002 area without potential for impacts on the size or growth of the PCH. This is a fundamental tenet of caribou biology and we would like this relationship to be much more strongly emphasized in the net conclusions of the 1002 report.

Page 28, paragraph 3: "The core calving area is a location to which pregnant cows have shown a strong fidelity as traditionally favored calving habitat. Those concentrated calving areas used in at least 5 years during the 14-year study were identified as the core calving area."

We disagree that use in 5 of 14 years illustrates "strong fidelity". Instead, we believe that a minimum of 1/2 of the historical record is necessary to suggest any fidelity at all.

Page 28, column 2, paragraphs 2 and 3: We are concerned that the report places undue emphasis on a core-calving concept when, in fact, the historical data for calving use do not support fidelity to a "core calving area." Historical data for calving distribution clearly show that the coastal plain from the Babbage River in Canada, across the 1002 area to the Canning River has been used for calving. Thus, calving habitat is more correctly referred to as a continuum across the coastal plain rather than a specific core area.

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low use for calving represents an historical distribution rather than a displacement of calving to other areas.

I do not disagree that cows with neonates are sensitive to disturbance. There is ample evidence to support this sensitivity not only for caribou but for other cervids and bovids as well. This sensitivity appears to be strongly associated with a behavioral repertoire in response to predation. I do not disagree, either, that developments such as roads with traffic and human activity, are disturbing to cows with calves, or that some types of barriers can physically exclude caribou from their ranges. I do, however, distinguish between the sensory disturbances associated with the Dalton Highway which have been documented, and the notion of avoidance or displacement along the TAPS corridor which implies a permanency that is not justified by the evidence. I feel that the pipeline itself is not a source of disturbance - most of it is buried in the Sag. River floodplain. Most of the existing disturbance comes from the traffic and hunting along the Dalton Highway. But even here, except for hunting mortality, I feel that the disturbances are temporary and are not instrumental in altering either the behavior or distribution of caribou along that corridor in any fundamental or permanent way. In short, I think that caribou are frequently disturbed by activity within the corridor but they do not avoid it for this reason.

Evidence suggesting that disturbances to date are temporary and sensory in nature is available from a broader review of the growth, distribution and movements of the Central Arctic herd (previous papers). There is no indication that there has been any change in distribution, life cycle patterns or the fundamental ecology of caribou resulting from the interaction with existing oil development. On the contrary, the herd has grown in size and has continued to use and occupy habitats in the region in a manner consistent with pre-development use. The best evidence for this is where pre-development baseline data exist, such as the Kuparuk and Milne Point developments. There are no overall effects on seasonal distribution, habitat use or numbers which can currently be attributed to petroleum development. The seasonal cycles of caribou in the Central Arctic region continue despite the development which only recently includes their major pre-development calving ranges.

As development continues and expands, it is important to monitor and document interactions with caribou and to assess their significance. If decisions are taken that any habitat alteration is deleterious and this forms the basis for permitting, it will be difficult to justify management oriented research because of the a priori conclusion that all changes are equally deletrious. The most important requirement for future research, in my view, is to identify where compatibility

exists between a viable caribou population and development, to document where development activities are incompatible, to identify the nature of the problem, and to develop means of effective mitigation.

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ATTACHMENT C

Southern Tier Services
P.O. Box 29
Beaver Dams, New York 14812
(607) 936-3324

Mr. William Hopkins
Alaska Oil and Gas Association
121 W. Fireweed Lane, Suite 207
Anchorage, Alaska 99503-2035

17 January 1987

Dear Mr. Hopkins:

Enclosed is a copy of my review of the ANWR report. I apologize for it being late; the Post Office lost my Express Mail package. Please feel free to contact me if you have any questions or comments. You can contact me at the above address if I can be of further assistance.

Sincerely,

James Curatolo
President

Enclosure

A REVIEW OF THE DRAFT REPORT

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,

COASTAL PLAIN RESOURCE ASSESSMENT

WITH RESPECT TO CARIBOU

Prepared by:

James Curatolo
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Prepared for:

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CP

I have reviewed the Draft Report Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment, solely for its content as it refers to the effects of oil development on caribou. All of my comments reflect my own opinion on this subject.

Overall, I thought the report provided a thorough examination of the various aspects of caribou biology as it related to oil development in the Arctic National Wildlife Refuge (ANWR). The report's final conclusion that a substantial decline in caribou populations would occur under a full leasing program, however, do appear to be extreme. In general, I believe oil development in the 1002 area would result in localized displacement of the PCH caribou during calving and localized changes in movement patterns during insect season. These changes would have a negligible effect on caribou productivity, however, because caribou would still have adequate habitat for calving and would still be able to access most of the insect relief habitat. The "core" calving area concept in the report probably overemphasizes the importance of a portion of the Porcupine Caribou Herd's (PCH) calving ground. It should be noted that the PCH's calving ground extends from the Canning River in Alaska to the Babbage River in the Yukon Territory. The PCH has calved successfully throughout this region.

Oil development in ANWR would be on the periphery of the Cetral Arctic Herd's (CAH) range. Effects of development in ANWR on the CAH should be minimal because the herd will rarely contact it. The CAH has shown a high degree of resiliance to the effects of oil development considering that two oilfields are presently within its home range, and the herd continues to increase.

The Secretary of Interior's recommendation to allow full leasing in the 1002 area of ANWR appears to be justified as far as its effects on caribou are concerned. The mitigative measures that were suggested would help minimize the intensity of potential disturbances, resulting in an increased rate of habituation and greater use of habitat near oil development. A phased leasing system will distribute disturbances over time and space, thus minimizing the extent of potential disruption to the herd. Once oil development is completed, a policy that maintains human occupancy of the oilfield to a minimum will allow, over time, a re-occupation of areas where caribou use may have declined during construction.

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Specific Comments:

1. P. 28, ¶ 3: Almost the entire basis for determining the magnitude of oil development impacts on the PCH lies in the identification of a core calving area. No rationalization is given for selecting greater than 36% (5 of 14 years used) as the cutoff point. Indeed, if a more logical criterion, such as 50% (7 of 14 years used), was chosen, then the core calving area is halved in size. No attempt is made to enumerate how many caribou were contained in the core calving area beyond the 50 animals/square mile minimum.

2. P. 28, ¶ 6: To put the calving ground in better perspective, the entire 14 years of data should have been summarized rather than only 1983 and 1984. There have been years when the entire herd calved in Canada.

3. P. 28, ¶ 7: Caribou cows are very sensitive to disturbance during the calving period. The disturbances caused by oilfield operation are mostly confined to the roadway system. Caribou can easily avoid the roadway system, resulting in localized displacement. Cows will then calve at a point where human activity is no longer preceived as a disturbing factor (1-2 miles). This is the case in the Kuparuk Oilfield.

4. P. 29, ¶ 3: This paragraph suggests that the major insect relief habitat for the PCH is the coast. However, in most years the majority of the herd travels inland (southeast into Canada) and uses the mountains for relief habitat.

5. P. 29, ¶ 9: Most caribou of the CAH that calve in the vicinity of the Canning River usually do so west of the Staines River. During an aerial survey conducted in the 1984 calving season few cows were found between the Canning River and the Tamayariak River.

6. P. 29, ¶ 9: The statement that "little or no calving has been observed since 1973" is misleading because no one looked before 1973. I was in the Prudhoe Bay area in the summer of 1972, before oilfield development, and did not see any calves. There is no evidence to suggest that a significant number of cows ever calved in the Prudhoe Bay area. A more appropriate comparison concerning oil development and calving caribou is found in the Kuparuk Oilfield where there are localized changes in distribution, but continued use of the area by calving caribou.

7. P. 98, ¶ 2: The concept that a specific area in a calving ground has a unique value is not supported by scientific data. The only known unique aspect of a calving ground is that caribou calve there. Caribou behavior has

evolved to minimize predation during calving by cows synchronizing parturition, aggregating during calving, and selecting relatively predator-free habitats in which to calve. The aggregation and synchronization results in a high density of calves over a relatively small time and area, which "overwhelms" the predators (the chance of any individual calf being caught is lower than that of other strategies). Caribou cows accomplish this strategy by returning to the same area, thus forming a " tradition". However, caribou are "dynamically traditional" because the exact location of a concentration in a calving ground varies from year to year. If, for example, a certain portion of the calving ground is made unavailable to caribou due to heavy snowfall, then calving will occur in another portion of the calving ground. The corollary to this is that if intense oilfield construction causes part of the calving ground to be "unavailable" to caribou, the cows may be displaced, but there should be no effect on calving as long as there is a sufficient portion of the calving ground remaining. The only universal attributes of a calving ground is that it is a relatively predator-free and has open space where concealing habitat is minimal.

8. P. 101, ¶ 4: The suggestion that the routes of the pipeline and road should be independent, allowing for a separation between the pipeline and road, is probably one of the most important mitigative measures that could be undertaken.

9. P. 105, ¶ 9: The 3000 to 4000 caribou from the CAH that use the 1002 area , do so infrequenlty. Large numbers of CAH caribou would probably use the 1002 area only during an extended movement due to mosquito harassment, which would last for several days or less. In most years, few CAH caribou calve in the 1002 area.

10. P. 106, ¶ 1: Comparison of the CAH in the Kuparuk Oilfield to the PCH in the 1002 area is reasonable. There is a calving concentration area within the Kuparuk Oilfield and nearly half of the herd repeatedly comes in contact with oil development during the summer. CAH caribou in the Kuparuk Oilfield probably encounter oil development more often the PCH caribou will.

11. P.107, ¶ 5: Displacement of the CAH from an historic calving ground has not been documented. It has been hypothesized that this occurred, although no data exists to show that caribou ever calved in the Prudhoe Bay area in any number.

12. P. 108, ¶ 2,5: The expectation that PCH productivity would decline if calving was displaced from the core calving area is not supported by data. Productivity was good in all years studied including those years when the entire herd calved in Canada or entirely outside of the core calving area.

13. P. 108, ¶ 7,8: This report states that caribou would be displaced two miles from oil development. However, this displacement would not be total, but would result in fewer caribou near the road system. The habitat values of the area would be diminished, not completely lost.

14. P. 109, ¶ 2: Barriers to caribou movements would not decrease calving success as long as sufficient calving habitat remained accessible and available. If the proposed mitigative measures were implemented, few barriers would occur.

15. P. 109, ¶ 3: There is little or no difference in the caribou reactions to a buried pipeline and a road without traffic. Large, mosquito-harassed caribou groups will cross elevated pipelines. It is only pipelines next to roads with traffic that can cause a significant decrease in crossing success.

16. P. 109, ¶ 6: It is highly unlikely that the PCH will refuse to cross oilfield development during insect season if mitigative measures are are followed (especially pipeline and major road separation). Suggesting that caribou avoid areas near oilfield activity (the two mile sphere of influence) during insect season is incorrect. The two mile sphere of influence refers to a partial displacement of caribou during calving and does not occur when caribou are harassed by insects. Failure of caribou to reach insect relief habitat is unlikely with proper mitigation (pipeline and road separation). Furthermore, the PCH has been exposed to overhead stimuli, as they usually winter in forested regions of Alaska and Canada. PCH caribou may react less severely to pipelines than CAH caribou, who live entirely on the tundra.

17. P. 110, ¶ 7: The total kill for the CAH in the winter of 1985-86 is probably substantially greater than the estimate of 800 given in the report. Actual postcard returns tallied 875 animals. Considering almost all of the kill was illegal it is not inconceiveable that many people would not report their take. The number of caribou killed in 1985-86 may be more than 10% of the herd and could be a significant factor in the CAH's population dynamics.

18. P. 111, ¶ 3: It does appear possible to mitigate the loss of caribou habitat in Resource Category I by decreasing potential disturbing factors so that fewer acres of that habitat type would be affected.

19. P. 111, ¶ 5: Mitigation Measure #1 suggests that ramps and elevated pipelines are the alternative to pipeline burial. If pipeline burial is not practical, the best alternative is elevated pipelines that are separated from roads (Mitigation Measure #5). Ramps are not an effective measure due to the extremely small size of a ramp with respect to an oilfield, and the relatively high cost of construction. Separation of pipelines from roads can be widespread in the area of coverage, and is potentially very cost effective (pipelines run straight, roads follow dry topography). In theory, placing mitigative measures in areas such as "natural crossings" sounds logical, but in practice it is nearly impossible for two reasons. First, caribou movements are variable, depending on insect levels, weather conditions, and the area selected for use during any particular time period. Second, and more importantly, the development of an oilfield will result in a localized change in caribou movement patterns, which cannot be predicted with any great degree of accuracy beforehand. The most reliable mitigation method is a generalized scheme where pipelines and roads are separated whenever practical. Over time, this would allow caribou to develop movement patterns through the oilfield and minimize loss of habitat due to inaccessibility. Separation of roads and pipelines will also decrease the intensity of disturbances that are present, which will increase the rate of habituation to the entire project.

20. P. 111, ¶ 7: Mitigation Measure #2 can be an important technique. Caribou will habituate to a disturbance much more readily if the disturbance is kept at low levels. Regulating unnecessary traffic in areas of high use by caribou can be very effective. A limited access road such as the Oliktok Road in the Kuparuk Oilfield is a good example. This discussion is also applicable to Mitigation Measures #4, 6, 7, and 10.

21. P. 111, ¶ 8: Mitigation Measure #3 is important and should be followed. The only major loss to the CAH population resulted from hunting along the TAPS haul road.

22. P. 111, ¶13,14: Monitoring the dynamics of the caribou herds during oil development will provide additional information for focusing on real problems rather than hypothetical ones.

23. P. 112, ¶ 2: The CAH and PCH will probably not reach the "carrying capacity" of the habitat contained in their home ranges . Caribou herds do not reach the carrying capacity of their range, except in certain island populations, because natural and human-caused mortality factors restrict herd growth before habitat limitations come into play. No free-ranging caribou herd has ever reached the carrying capacity of their habitat.

Mitigation only begins at 400 feet and the wider the separation, the better, depending on the specific circumstances involved.

(c) Ramps should not be used as a general mitigative measure. Their only effective use is in a "corral" situation where pipelines near a facility might completely encircle an area. Ramps are too site specific and do not work well near traffic, making them ineffective in most circumstances.

James Curatolo
President
Southern Tier Services

ATTACHMENT D

AN ASSESSMENT OF PETROLEUM DEVELOPMENT ON THE STATUS OF THE PORCUPINE HERD

by

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O-25

Prepared for the

Alaska Oil and Gas Association

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The U.S. Federal government has proposed that the 1002 lands of the Arctic Coastal Plain and in the Arctic National Wildlife Refuge, Alaska, be opened for exploration and full leasing for petroleum supplies. Included within the 1002 proposed lease area are 242,000 acres of 311,000 acres (78%) of the core calving area of the Porcupine Herd (core defined as areas used in $\geq$ 5 of 14 years) and 934,000 acres of 2,117,000 acres (45%) of concentrated calving area of the herd (areas with $\geq$ 50 animals/ mi^2). Also included in the 1002 area is the habitat where nearly the entire herd, now estimated at 180,000 animals, masses in early July to seek relief from mosquitoes. The herd leaves the 1002 area in mid to late July and does not return until the following May. I have been asked as a caribou biologist, by AOGA, to evaluate the impact of full leasing and development on the viability of the herd and specifically to critique the environmental impact statement prepared by the Fish and Wildlife Service on the proposed full leasing and development.

Background Theoretical Considerations

The environment of the caribou (Rangifer tarandus) can be segregated into: other animals, a place in which to live, food and weather (Fig. 1, Andrewartha and Birch 1954). The interactions of caribou with insects, open habitats, food and weather represent variable contingencies that result in facultative responses by caribou that can be modified relative to disturbance factors (Fig. 1). The interactions of caribou with other caribou and with wolves in open environments are consistent contingencies affecting reproductive fitness - these are obligatory responses that will respond to change very slowly, if at all, when habitats are modified.

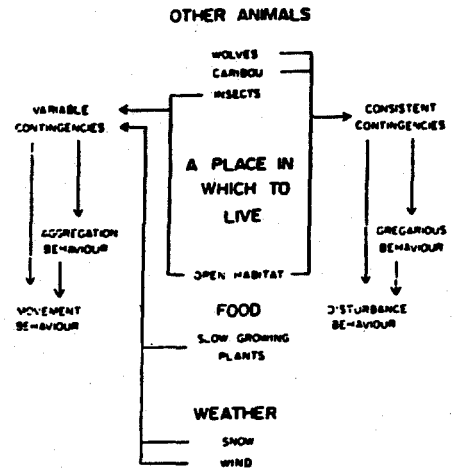

Figure 1. Diagram of the proposed manner in which the four components of the environment interact as variable and consistent contingencies in the development of movement, aggregation, gregarious and disturbance behaviour of caribou (Bergerud 1974b).

I feel that the major behavioral responses of caribou in the 1002 area are the insect x weather facultative responses and the predator x habitat obligatory responses. Unlike many biologists, I do not feel that food is a major factor in the calving and massing of caribou in June and July in the 1002 area.

Are Caribou Wilderness Animals?

Much of the concern for the well-being of caribou arises from the view that caribou are wilderness animals that cannot adapt to coinhabiting ranges with man. This concept has arisen, in part, because caribou are found on ranges far removed from major developments. Also, caribou herds have declined on the southern edge of their range as settlement proceeded (Cringan 1956). Thirdly, caribou are unwary and easily over-exploited. And lastly, caribou utilize slow-growing lichens that are many years in recovering following forest fires.

However, a closer examination of these facts suggests that they are not sufficient to define caribou as wilderness animals nor to imply that loss of wilderness per se will bring about the demise of herds. Obviously, mule deer (Odocoileus hemionus) and antelope (Antilocapra americana) were once far removed from European man in the 1700's, but they are not called wilderness animals today; they have adapted. The decline of caribou along their southern boundary was due to increased predation from man and natural predators, as well as from disease contracted from white-tailed deer (Odocoileus virginianus) (Bergerud 1974a) and not from outright habitat alteration. There is no evidence that herds abandonned their annual ranges because of an intrinsic aversion to man or man-made

structures. The nomadic life style of caribou and its propensity for shifting habitats makes it as adaptable to short term habitat alterations as it is to the slow succession of lichen following natural fires and regeneration cycles. The unwary nature of caribou means that they can coinhabit range with man if not overhunted. In fact, reindeer (Rangifer tarandus) are an important domestic animal in Eurasia. Several caribou researchers have noted that caribou are both highly adapted and adaptable (Skoog 1968, Bergerud 1974b, Roby 1978, Skogland, pers. comm.).

Resource-Limited by Food?

Another basic philosophy that influences how some caribou biologists view the impacts of development on caribou is the closely held belief that the carrying capacity of the habitat for caribou is determined by food resources, the slow growing lichens in winter, and green plants in the summer. It follows from this belief that if caribou are displaced by development and lose part of their range, then the potential carrying capacity is reduced. Another concern is that, if the animals are at a carrying capacity limited by food, then additional disturbance may stress the animals, thereby reducing reproductive rates and increasing mortality rates. A further refinement is that caribou select their calving grounds to maximize the quantity and quality of the diet - to optimally forage (Kuropat and Bryant 1980). Hence displacement from the calving areas should adversely affect the herd.

As an example of this type of thinking, Whitten and Cameron (Arctic (1984:293) said, speaking of developmental impacts, "For example, a series of mild winters might compensate for the negative effects of harassment or

habitat loss." Bergerud, Jakimchuk and Carruthers replied (Arctic 1984:295) "The supposition advanced by Whitten and Cameron...assumes:

(1) that winter conditions limit caribou numbers (this has never been substantiated in mainland North America);

(2) that harassment results in caribou mortality - never substantiated and the extreme case (Pot Hill data) given in our paper represents the best available contrary evidence pertaining to this assumption;

(3) that habitat loss (unspecified) has governed caribou numbers (greater evidence for the opposite case is available in the literature);

(4) that ranges are at carrying capacity - which is not the case for any of the herds we discussed;

(5) finally, that the supposition has some basis in fact. However, this supposition has never been researched."

Such a seemingly innocuous statement, as made by Whitten and Cameron, reveals a basic philosopy of food limitation, and is the cornerstone of many dire predictions of caribou demise with development.

But in fact, the carrying capacity of this herd is not limited by winter food supplies. The dynamics of the Porcupine Herd were modelled in a workshop at the University of British Columbia in 1978. The herd then numbered 110,000. The simulation model indicated that the herd was not limited by winter food supplies. Food would not be limiting until the herd reached about one million animals. The simulation even indicated that if no animals crossed the Dempster Highway and the entire range east of the road in the Ogilvie Mts was lost, the herd could still prosper if food resources were the only consideration. The same simulation, however,

indicated that the herd would be limited by wolf predation at densities far below those imposed by food resources (Walters et al. 1979).

Both reproductive and natural mortality rates of caribou are little affected by winter food supplies. Fecundity is relatively fixed at 1 calf/female/year for females $\geq$ 3 years-of-age regardless of densities (Bergerud 1971, Skogland 1986). Skogland provided an equation for recruitment for females $\geq$ 1 year in Norway, where there are few predators, where $R = 0.65 - 0.012\ Dw - 0.00013\ Dw^2$ where Dw = caribou/km^2. Even at a density of 10 caribou/km^2 of winter range, recruitment would equal 52 yearlings/100 females. At a density of 10 animals/km^2 the Porcupine Herd would number 1,800,000 animals; and even this density would not hold since this many caribou would have greatly expanded their range.

In North America, in herds coexisting with wolves, recruitment is commonly less than 25 yearlings/100 females and yet densities seldom exceed 2 caribou/km^2 (Bergerud 1980). This disparity in densities and recruitment between Norway and North America is due to predation in North America. Predation limits populations far below that provided by food supplies (Bergerud et al. 1983).

Carrying capacity has been defined as that point where recruitment = natural mortality (Caughley 1977). For caribou on mainland North America the carrying capacity is determined by the abundance of predators (Bergerud and Elliot 1986). Recruitment equalled natural mortality for 22 herds at 6.5 wolves/1000 km^2 (Bergerud and Elliot 1986) regardless of the density of caribou on the winter range.

Long Term vs. Short Term, Individual vs. Herd

Bergerud, Jakimchuk and Carruthers (1984) reviewed the demography of 8 herds relative to disturbance by human activities. They concluded that the major impacts were (1) the building of transportation corridors that permitted increased human harvests of caribou and (2) the improvement in calf survival when wolves were reduced. Caribou herds continued to cross roads, and herds such as those in Newfoundland, still prospered when habitats were altered by logging and flooding. The Central Arctic Herd in Alaska increased from about 5,000 to 13,000 (early 1970's to 1984) despite the Prudhoe Bay oil field.

The conclusions of Bergerud et al. (1984) were debated in letters to the editor by Whitten and Cameron (Arctic 1984:293), Klein and White (Arctic 1984:293-294) and Miller and Gunn (Arctic 1985:154-155). Rebuttals to all letters were provided by Bergerud and Jakimchuk (Arctic 1984:294-295, Arctic 1985:155-156). Klein and White agreed that the herds were increasing but thought that disturbance must be viewed on a long term basis. But this is a nonsequitur - if there are no effects of disturbance for a short term, how are they significant on a long term? The long term is the addition of short term intervals. Miller and Gunn agreed that the herds were increasing but stated that disturbance must be viewed on the basis of the individual, not the herd. Again, this is a nonsequitur - since individuals comprise herds, if the herds are prospering, then the individuals are also faring well.

Now, there are new arguments that the prosperity of the Central Arctic Herd in the face of development cannot be used to gauge the success of the Porcupine Herd when faced with similar development and the question

is, why not? The Central Arctic Herd spends its entire annual cycle quite close to the development zone - the Porcupine Herd spends only two months. All the animals now alive in the Central Arctic Herd have been born since development commenced; they have adapted. The basic reason that some biologists cannot accept that caribou can cope with development is their ingrained views that caribou are "wilderness animals" and that food supplies are limiting. The new research work planned for the Porcupine by the Alaska Fish and Game is proceeding on this basis. Now caribou will be radio-tracked by satellites and energy budgets calculated daily, perhaps hourly. It all flows from the unsupported belief that nutrients and energy will ultimately limit total numbers of caribou in this herd.

Biology of Calving and Aggregating Behavior

Before we can evaluate the potential impacts of development on the Porcupine Herd we must determine why the animals use the Coastal Plain in the 1002 area for calving and grouping after calving. Basically, what are the environmental factors that determine where caribou locate their calving grounds?

The calving grounds of the migratory herds in the Holarctic are usually located on the northern distribution of the herd's range in tundra habitats (Appendix I:Fig. 1). The cows leave the bulls and commence migration towards these areas generally in April before green plants appear. Some herds migrate northeast, others northwest, and two herds south of Hudson Bay even migrate east. The consistent factor in all these migrations is that cows cross the tree-line at right angles

(Appendix I:Fig. 1) Wolves in North America generally den near tree line (Appendix II). By migrating at right angles to the tree line the cows can maximize their distance from wolves, with the least effort. Caribou cows migrate and calve on the bleak inhospitable arctic tundra to reduce contact with wolves (Appendix II) and there are very few wolves on the calving grounds of the Porcupine Herd.

An alternative hypothesis is that caribou seek their northern tundra calving grounds to optimally forage, primarily on Eriophorum angustifolium (Kuropat and Bryant 1980). I was able to disprove this hypothesis in 1984 by comparing the nitrogen in fecal droppings and plants at the time of calving between cows on calving grounds and bulls still south of calving grounds. The bulls were feeding in more nutritious plant communities than the cows (Appendix I:Table 1). If the calving grounds were really unique in the quality of forage then the bulls should have been with the cows. If the cows were primarily "interested" in the quality of their forage, they should have stayed back with the bulls. The fact that cows commonly calve on Eriophorum tussock associations may be due to the particular microtopography of these habitats which results in little accumulation of snow and early snow melt (Benson 1969). That is not to say that caribou do not optimally forage within the constraints of selecting the best overall habitat to avoid predators. However, over all, the diet of the cows in late May and early June is not highly nutritious (Appendix I:Table 1) and this has resulted because of their own migratory behaviour.

The location of the calving grounds varies between years because of annual variations in snow cover. The caribou arrived on the calving

grounds of the Porcupine Herd on 5 May 1974 and 12 May 1975 when snow cover was light; they arrived 20 May 1976 and 24 May 1973 with medium snow cover and even later on 26 May and 30 May when winter snows had been heavy (Curatolo and Roseneau 1977). The calving ground of the Porcupine Herd is on the areas of reduced snow cover generally sandwiched between the foothills and the slightly colder coastal strip (Fig. 2). In an early spring, as in 1974, the animals will be farther west and north than in late years such as 1972 and 1973. In an early year, more caribou will calve in the 1002 area than in a late year. In 1982, the season was so retarded that the herd calved in the Yukon (ANWR Progress Rept FY 83-6). We can think of the annual variations as caused by snow induced limitations to the basic spacing antipredator tactic. But within this tactic, to maximize the distance from tree line, the animals also need to find brown substrates so that calves can be cryptic, especially to avoid predation from golden eagles (Aquila chrysaetos). Thus snow cover affects the distribution within the coastal plain but not the overall regional distribution.

We know less about the extrinsic and socialization factors in the massing of caribou in late June and July than we know about calving. In some years, such as 1976 and 1981, no large aggregations formed. But in all years, the animals concentrate on the 1002 lands. This occurred even in 1982 when the herd calved in the Yukon (ANWR Progress Rept. FY 83-6). We also know that the Porcupine Herd is unique that in some years the entire herd comes together for a few days in July. This represents the most spectacular aggregation of ungulates in North America and compares favorably with the aggregating of the wildebeeste (Connochaetes taurinus)

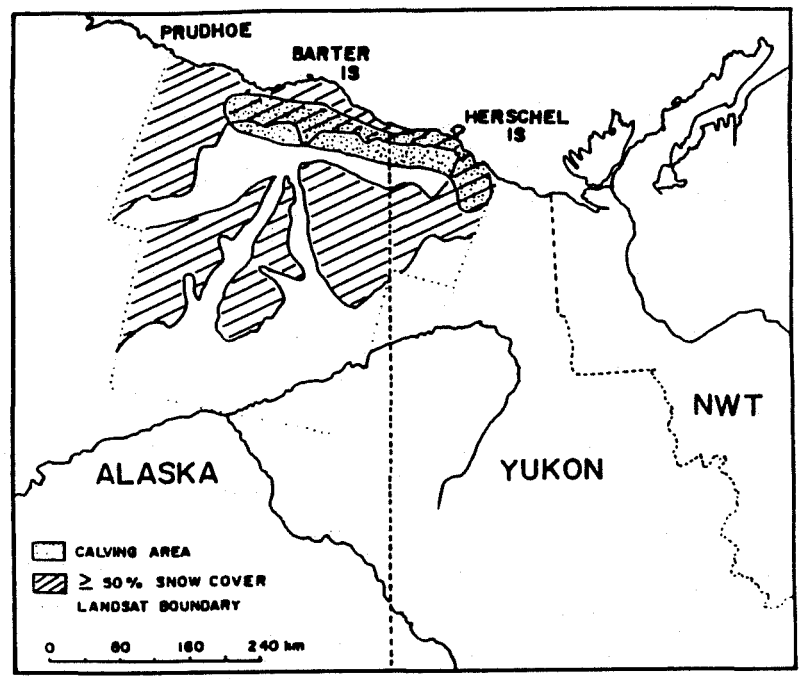

Figure 2. The snow profile of northeastern Alaska in late May 1978 (from Lent 1980).

on the Serengeti.

Initially, after calving, cows with their calves group together in the vicinity of where the calves were born (Lent 1966, Bergerud 1974b). This aggregating represents another antipredator tactic. A caribou calf will benefit if there is another animal between itself and a predator (the selfish herd concept) (Appendix II). Later, with the onset of the mosquitoes, the caribou in the Porcupine Herd move to the coast where cooler temperatures and fog provide some relief. The animals are usually concentrated in July south of Barter Island in the 1002 lands.

Why is this particular strip of coast selected? The animals may select the coast adjacent to Barter Island simply because the core calving area is near the Jago River, hence a direct route to the coast leads to Barter Island. In support of this view, in 1974, when the concentrated calving was along the Katakturuk River, the post calving grouping was at nearby Camden Bay. But to the contrary of this sequence, when the animals calved near Herschel Island in 1982, they still travelled up the coast after calving to the area adjacent to Barter Island (ANWR Progress Rept. FY 83-6). This fidelity to the coast opposite Barter Island could be due primarily to (1) tradition and socialization, or it might result because (2) the animals may, between the end of calving and the emergence of insects, follow the green phenology west, or, (3) the concentration at Barter Island may relate to some additional relief factor from mosquitoes. For example, a small herd of 2000 animals on the Hudson Bay Coast in Ontario aggregates in July on the tidal benches where there are large mud flats. In the absence of vegetation to hold insects, these caribou probably gain added relief from mosquitoes. This same situation

may hold for the tidal flats near Barter Island. Thus we don't know if the uniqueness of the gathering near Barter Island is because of its juxtaposition to calving locations or if the area, per se, has its own special attraction.

Critique of the Arctic National Wildlife Refuge-Alaska Coastal Plain Resource Assessment

My comments are limited here to the full leasing option and are restricted to caribou. This is the worst case scenario and many of my comments will reflect my view that caribou can adapt to full leasing and developing if the proper mitigating actions are taken. I will only discuss my major criticisms, which does not mean that I necessarily agree with sections not discussed.

2 mile limit: On several pages it is suggested that maternal cows will avoid a strip 2-miles out from major roads and development. This implies a 4-mile displacement when both sides of the road are considered. The reference for this avoidance strip is Dau and Cameron (1986). Based on this 2-mile rule, the report calculates the acreage lost to caribou from development. Firstly, the concern should not be the lost acreage as it relates to carrying capacity. The cows have not selected the coastal plain for it forage resources but to avoid predators. If wolves travel the haul road, as they did the TAPS highway (Roby 1978) it will be advantageous for caribou to avoid the habitat adjacent to the road. Secondly, Dau and Cameron (1986) did not show caribou avoidance of a 2-mile strip on both sides of travel routes. Dau and Cameron documented

a 50% avoidance of adjacent habitats at 2 kilometers from the road and no avoidance at 3 kilometers (p. 100:Fig. 4). Thus there should be 50% avoidance at 1.2 miles and no avoidance at 1.9 miles. Actually, Murphy and Curatolo (in press) show that caribou, including cows and calves, resume normal foraging and daily activities when 600 meters from active roads in the Prudhoe oil field. Therefore, a maximum statement is that maternal cows avoid about a 1½ mile strip on each side of the road; thus the displacement statements in the report should be reduced substantially.

If development proceeds in area 3 as shown on page 7 of the assessment statement, there would be 47 miles of road in the core calving area. We could expect maternal cows to be displaced from an area of 141 mi^2 or about 90,000 acres. However, the area between the two parallel roads in the hypothetical development would also probably be lost. Parallel roads to reach different objectives should be avoided. However, parallel roads to reach the same objective might be a way to re-direct traffic to minimize disturbance, depending upon which route has the most caribou nearby.

P. 28, Para. 1. "The lower levels of earlier estimates may reflect a truly smaller population, less accurate or less complete survey techniques,...". Because the Porcupine herd gathers in one or a few major aggregations, the census results of the herd by aerial photography is highly accurate. The herd has definitely been increasing. This increase has resulted from greater calf survival (Fig. 3). The increased calf survival occurred because wolves were reduced by rabies in the late 1970's and early 1980's. Jakimchuk and associates saw considerably more wolves in 1971 and 1972 than have been seen in recent years.

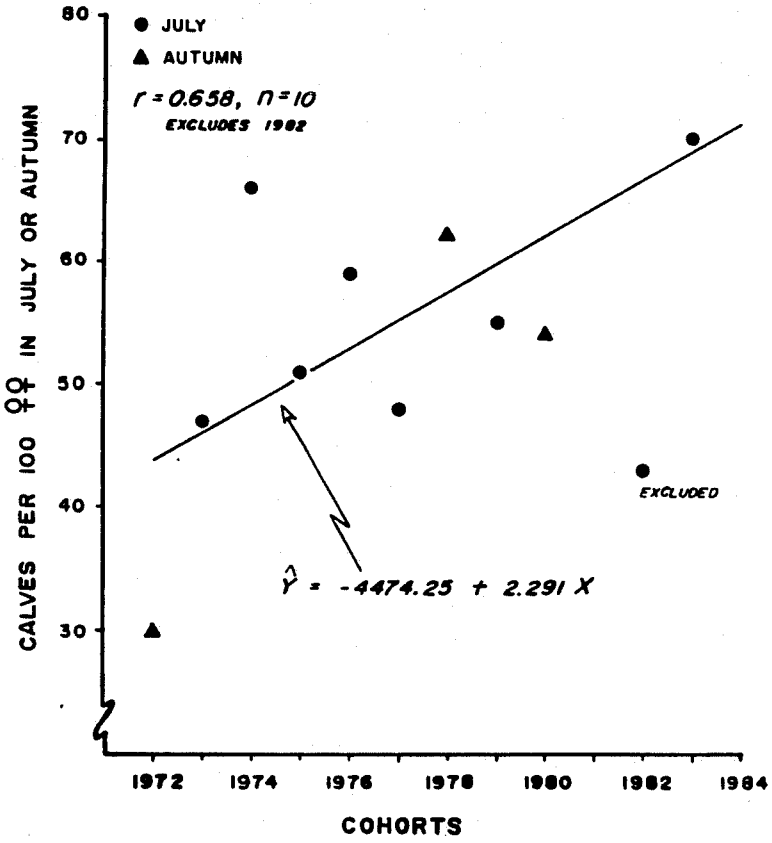

Figure 3. The regression of calf survival (calves/100 ♀♀) on year.

P. 29, Para. 4. "Access to insect-relief habitat and forage resources during this period may be critical to herd productivity." No one has documented that fecundity or calf survival have been affected by failure to reach mosquito relief habitat. There are no other large herds in North America that have access to a foggy coastal strip. Even if the animals could not use the coastal strip this would only put them on par with other herds. Note that there were an excellent 59 calves/100 cows in July 1976; in that year the animals did not mass on the shores of the coast. However, if caribou did seek the foothills for insect relief, reduced calf survival would be expected because of increased predation.

In this paragraph and throughout the report, the word "productivity" is used as a synonym for "recruitment". This is an unfortunate usage. To many ecologists, productivity brings to mind "to produce", the elements of reproduction, and for others it implies biomass as in the terms primary and secondary productivity. The use of the word "productivity" comes with the philosophy of a food carrying capacity. For many ungulates in the lower 48 states (where there are no wolves) the number of young born per 100 adult females does vary with nutritional conditions. In these southern ungulates, the final recruitment may indeed reflect the initial variations in pregnancy percentages. For caribou, we should use the terms "fecundity", "parous percentage", or "pregnancy rate" to describe the initial number of calves/100 cows at birth, prior to mortality. The emphasis thereafter should be on documenting the survival or mortality statistics; the final yearlings/100 females parameter at 12 months should be called "recruitment". "Productivity" is a catch-all and reveals a basic indoctrination that the resources of the land result

in cows being productive or not productive. Since fecundity is fixed in mature caribou the emphasis should always be on survival after the calves are born.

P. 29, Para. 10. "Riparian areas are used for travel corridors...". This does not sound feasible since wolves also use riparian areas for travel. Caribou in Spatsizi, B.C. avoid ambush cover in tall willows (Bergerud, Butler and Miller 1984). Also the streams are in flood in late May and early June and are not suitable for small calves. In Svalbard, T. Skogland (pers. comm.) indicated that bull caribou use the riparian communities and flood plains but cows avoid these dangerous areas. Curatolo (1985) also indicated that bulls used the riparian community but cows generally avoid them (see also Roby 1978).

P. 108, Para. 1. "Caribou select calving areas because of favorable... advanced new vegetation...proximity to insect relief habitat...". Caribou only select calving grounds to avoid predators (Appendix I,II). The report is too general in using the word "insect-relief". Generally, insect relief is meant to include both mosquitoes and oestrid flies, whereas the coastal habitats that the caribou seek are to escape only mosquitoes. Oestrids do not emerge until late in July, when the animals have left the 1002 lands.

P. 108, Para. 2. "Displacement of the PCH from a core calving area to a less desirable area would be expected to reduce productivity". Again, the word should not be productivity. If the development results in a

displacement of caribou farther south towards tree line it will result in increased predation (Fig. 4) and reduced survival. "Loss of important habitat has been shown to directly impact ungulate populations (Wolfe, 1978; Skovlin, 1982)". This is a general motherhood statement and these references are for ungulates living without wolves and are not appropriate for the Porcupine Herd. When caribou herds increase they expand their range and when they decline the range shrinks (Bergerud 1980). Calf survival drives numbers and hence range occupancy. "...Whitten and Cameron (1985) contend that the CAH has not experienced a reduction in productivity ... because (1) the CAH has been displaced from only a part of its calving grounds;...". The herd could be displaced from all of its calving area and still not decline if predator numbers were managed. The CAH herd increased 1972 to 1985 because of high calf survival since wolf numbers had declined with development. As their second point, Whitten and Cameron argued that the CAH did not decline with development because "...(2) suitable alternative high-quality habitat appears available...". The habitat at Prudhoe Bay is so poor that White et al. (1975) calculated some negative energy budgets and thought that the herd was energy-limited when it numbered a few thousand animals in the early 1970's. Again, the habitat was thought to be so poor from a forage standpoint that Skogland (1980) listed it as the area with the least plant biomass of 6 herds in the Holarctic. Yet today the CAH has grown to >15,000 animals. Point 2 of Whitten and Cameron (1985), referenced in the assessment statement, is an ad hoc hypothesis to explain away the herd's prosperity in the face of development. As their last point, Whitten and Cameron felt that the CAH

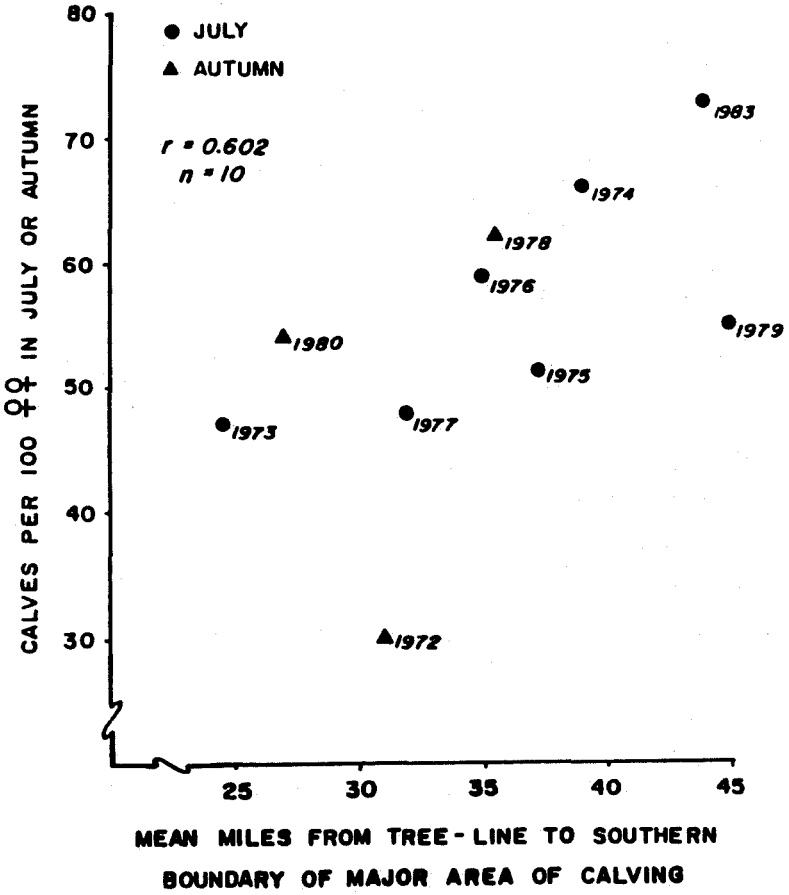

Figure 4. The regression of calf survival (calves/100 ♀♀) on distance of calving ground from tree line.

has not declined with development because the "...(3) overall density of CAH caribou on their calving grounds is much lower than that of arctic herds in Alaska". Again, this reflects Whitten and Cmeron's dogmatic opinion that forage determines numbers. The CAH calving ground is about 125 miles from tree line and the PCH, only 30-40 miles. Given the much larger "safe" space, the cows in the CAH are also able to disperse which is another antipredator tactic (Appendix II). The animals in the PCH herd, faced with less space, are more aggregated. Again this is expected, if the animals were dispersed, many would be nearer tree line and at greater predation risk. Since food supplies are not limiting for either herd, the greater densities for the PCH are not a problem. In fact the aggregating is a tactic to avoid predators; when animals face food problems such as in the high arctic or on Svalbard, the groups disperse and densities are low (T. Skogland and F. Miller, pers. comm.).

P. 108, Para. 3. "Both absolute..." This paragraph is irrelevant. One cannot use density figures (see above) to argue that the PCH will face greater consequences than the CAH from development. The CAH lives year round with development and has prospered; the PCH will only be near the development for 2-3 months. Densities are functions of aggregating behaviour and the lower densities for the CAH than the PCH mean greater forage as well as less space for the PCH, and in no way signify the density-dependent problems that Whitten and Cameron imply.

P. 108, Para. 4. "With the CAH calving density remaining low compared to other herds.... overcrowding and consequent habitat stress that might

result in reduced productivity have not yet occurred, ..." This statement is not correct; there is no habitat stress. The CAH cows have selected their calving range, with its low plant biomass, to avoid predators. Cows in other herds in North America are also prepared to sacrifice optimal foraging to avoid predators (Ferguson 1982, Bergerud et al. 1984).

P. 108, Para. 5. "The PCH is much more crowded..." They are not crowded - they aggregate to maintain maximum distance from tree line.

P. 109, Para. 2. This paragraph continues to discuss insect disturbance. But what is involved is primarily mosquitoes. Oestrid flies are not on the wing until the animals leave the 1002 lands. Helle in his publications was primarily concerned with oestrids and other flies and not mosquitoes. To quote their work in this context of causing mortality is stretching the argument.

P. 109, Para. 6. "Failure to obtain relief from insect harassment from either factor (barrier or displacement) could shorten foraging time, leading to poorer physical condition and subsequently to increased susceptibility to predation and reduced overwinter survival."
The 1976 and 1981 cohorts did not apparently use the coast line for insect relief and these cohorts did quite well. These animals are not on a fine edge in physical condition. No one has documented winter starvation in North America as a result of high insect years. When the insects abate in late August and September, the animals are able to recoop their losses

and fatten for winter. Remember that the Porcupine herd has a unique fog belt for insect relief that other herds do not have and even they (PCH) desert the mosquito relief habitat by mid-July. Murphy and Curatolo (in press) showed that caribou at Prudhoe Bay, away from the road, feed 53% of the day prior to mosquito emergence, 41% with mosquito harassment and 29% with oestrids on the wing. Oestrid flies harass caribou more than do mosquitoes and yet PCH animals contend with oestrid flies well inland in August.

P. 112, Para. 4. (and p. 132 as well) "These changes ... could result in a major population decline and change in distribution of 20-40 percent..." They have provided no data to show a 20-40% population decline. Neither was a concensus reached on the magnitude of any negative effects on the PCH population size or distribution by the 14 specialists at the Caribou Impact Analysis Workshop (ANWR) in November, 1985. I believe that the caribou will continue to use the 1002 lands with development, except near active roads. Even if there was some displacement, there is no need for the herd to decline if wolf populations are managed to provide positive recruitment or calf survival sufficient to balance natural and hunting mortality.

P. 112, Para. 5. "The population decline or distribution change would be 5 - 10 percent for the CAH throughout its range." There is no evidence to support such a decline. A change in distribution cannot cause a decline unless it changes the reproductive or mortality rates. Caribou, even in undisturbed populations, frequently exhibit range shifts,

including areas used for calving. Why can't the authors be objective? The empirical evidence is there for all to see; the CAH increased coincident with development because predator numbers were reduced. How can the field findings be twisted to fit preconceived ideas?

Impacts and Mitigation

The one guarenteed impact of the development of the 1002 lands will be that cows with young calves will avoid active roads for a distance of >1.2 miles. This is based both on theoretical considerations (Bergerud et al. 1984) and empirical observations (Dau and Cameron 1986). The loss of this habitat will not cause additional stress on the animals since they are not nutritionally limited. Nor will activity budgets be seriously altered by development activities (Murphy and Curatolo in press). It might be more serious if the animals remained near the road where predators may travel. We do not want these cows to habituate to traffic because this would suggest that they might become less wary to their natural predators.

An impact that might affect calf survival would be if the females in May failed to cross the east-west haul road because of the traffic and shifted their calving distribution closer to the foothills where there are greater numbers of wolves and bears. Such a barrier affect has not resulted from the TAPS corridor and haul road. The CAH animals have crossed the road and shifted their distributions between years, making use of habitats both east and west of the corridor. Presumably, these shifts relate to snow cover (Jakimchuk pers. comm.). The PCH herd, since it is both more migratory and larger than the CAH, should

cross a pipeline-road corridor more readily than the CAH. Also, the PCH caribou should cross rather than be funneled by the corridor because caribou should not be easily deflected when undertaking directional shifts to antipredator and mosquito-relief habitat.

Certainly, every effort must be made to allow the animals to continue to use all their potential space to avoid predators. Initially, until the impact of the corridor is understood, traffic will have to be prohibited in the period May 15-June 10 within several miles of cows moving west or north towards the road. Another effort to mitigate the effect of the corridor should be to reduce its visual impact as seen by animals entering the area (moving north and west). Once in the area, the animals will find their way out. If ramps are built they are more important on the south side of the road than on the north side. Murphy and Curatolo (in press) have shown that disturbance is greater when there is an active road combined with a pipeline. Theoretically, the vehicle appears as a predator - and the pipeline as the ambush cover. The pipeline and haul road should be separated by at least 1 km with the pipeline north of the road. Pipelines should be cryptic (painted green and brown), be motionless and scentless.

Another potential impact is that the road facilities will increase predator access to the herd. Wolves can be expected to move north down river valleys and then move laterally, using the road to cross rivers east and west. The cows, by calving between north-south river valleys, have in the past taken advantage of the rivers as potential barriers to east-west movements of predators, especially since the rivers are in flood in late May and early June. We do not want to increase the ease of

access to calving areas for predators by development (Bergerud 1985).

Even if the calving animals are displaced southwards by the corridor, the PCH can remain a viable herd if predator populations are managed. It is an incredible omission in this impact statement that predator management was not mentioned. The reduction of wolves is our major tool to improve calf survival. Wolves would not necessarily have to be reduced on the Coastal Plain. Control operations could take place on the winter range. The goal would be to have recruitment equal natural mortality + hunting mortality, which means, for the Porcupine herd, that about 12% of the herd should be yearlings in April-May (Bergerud and Elliot 1986). This oil development may provide advantages for predators. Once we disturb the status-quo, we must be prepared to manage the predators. This management is the fail-safe position.

I believe that the PCH will cross the haul road in seeking mosquito relief along the coast. The cow and calf that Curatolo (1986) radio-tracked in the CAH herd crossed the road 8 times in one mosquito season. Once a large herd starts across it will continue even if a vehicle approaches. Certainly large herds moving west and north will have to be monitored hourly as they approach the corridor and all traffic halted or rerouted. However, even if the animals did not cross and gain the coastal strip, I believe that the herd wuould be little affected in its vitality.

The one fact that we cannot escape is that the wilderness character of the coastal plain will be lost for decades. The post calving aggregation of the Porcupine Herd is the most spectacular large mammal display on the North American continent. We must do all that we can to

see that this massing does not become a memory as did the thundering buffalo herds of the plains. The animals should continue to mass in the undisturbed KIC lands, adjacent to the coast, in a wilderness setting.

Because I believe caribou can coexist in close proximity to an ethical man, I look forward to the day when I can go on a guided tour down the Haul road and view this massing of the mighty legions in July. The day will surely come when the old rigs will have been dismantled, the pipes disassembled, the scars left to heel, and the wind again sweeps unrestricted across the cotton grass plains. The caribou will still be there in uncounted numbers, coming as always down their ancestral tracks, and, we too will be there to see and marvel at the majestics of our fellow species.

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Migration and antipredator spacing in caribou/reindeer

by

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Advances in understanding the reproductive fitness of polygynous mammals have been rapid since Trivers[1] emphasized the different reproductive roles of the sexes. The fitness of females is enhanced by endeavors that increase the survival of young; while male effort is directed at activities that maximize advantages in intrasexual competition[2]. These different sexual strategies can help us evaluate the relative importance of antipredator tactics vs optimal foraging predictions in the divergent behaviour of the sexes. The data presented here suggest female reindeer/caribou (Rangifer tarandus) of both tundra and forest races seek environments away from predators at calving time. These environments commonly have low phytomass and late plant phenology. Males, to the contrary, in the spring seek environments of high phytomass and early plant phenology where they maximize growth and condition; such locations are generally nearer to predator travel routes than the locations the females select for calving. These two divergent strategies provide an explanation for spring migration and the segregation of the sexes in caribou and may have application to other ungulate species.

The females of the tundra races in North America and the USSR migrate 200-600 km in April and May to traditional calving grounds, generally on the north end of each herd's annual range (Fig. 1). The movements are directional and most important, perpendicular to the tree-line (Fig. 1). If the cows arrive early, they halt and remain until parturition. In the Northwest Territories, Canada, the growing season advances northeast in isoclines parallel to the tree-line. The bulls lag behind[3,4] following the green phenology north[5]. At the time the calves are born, the bulls are still >150 km southwest of the cows. For the cows farther north, the growing season doesn't commence until about June 24, or 2-3 weeks after

parturition.

A similar north-south progression in phenology is evident in Alaska, as well as strong altitudinal effects. I compared the diet quality of segregated males and females at calving time for three of these migratory herds in Alaska by means of fecal nitrogen analysis. Fecal nitrogen has been used as a gauge for dietary digestibility and dietary protein for several species[6-9]. Caribou select plants high in nitrogen in the spring[10-11]. The females on the calving grounds had a lower quality diet than the males who in all three herds were located at lower elevations or farther south (Table 1). Males and females did not differ in fecal nitrogen where they shared the same range in a non-migratory herd on the Slate Islands, Canada (Table 1). These results are consistent with the measurements of weight-gain and fat deposits that show males resume positive energy balance in the spring prior to preparturient females[12,13].

Calving grounds of tundra caribou are <u>not</u> optimum for females in regard to food resources or favorable weather for neonates[4,14-16]. The grounds are generally elevated uplands with reduced phytomass, exposed to storms and with colder temperatures and later phenology than surrounding locales. However, the calving locations generally have reduced snow cover because of topographic gradients[16,17]. These bare substrates provide a cryptic back-ground for newborn calves.

These calving grounds are only optimum, I believe, relative to predation risk. The migratory wolves (<u>Canis lupus</u>) that depend on caribou commonly den near tree-line or south of the calving grounds [16,18,19]. Dens are rare on calving grounds[16,20], which have a reduced diversity of alternative prey. Wolves whelp about the same time caribou calve. When caring for young, wolves have a reduced cruising radius and generally cannot reach calving grounds. Thus I believe cows should maximize their distance north of tree-line, where wolves and alternative prey including bulls, are more numerous. Yet females should go no farther north than the locations that still have snow-free substrates providing crypsis for neonates and foraging for females. Since these selected sites, the calving grounds, represent a small proportion of the total range, females aggregated there can reach densities >16 animals/km^2 [15,16]. Tactics of the selfish herd may be a factor in this aggregating[21] but wolves can surplus kill young calves when caribou are abundant[22]. The chief advantage of such remote locations is a reduced encounter rate with their major predators, wolves.

Since about 1976, radio transmitters have been placed on adults in 2-herds of forest caribou in North America (Fig. 1) and new information has been secured for these less known populations on movements and distribution in the spring. Like tundra animals, woodland females leave winter ranges up to 6 weeks before parturition and travel directionally 2 to 150 km at speeds of 2-9 km/day to calving sites to which they subsequently return in later springs[23-25]. Unlike tundra caribou, these females are generally solitary and dispersed at calving.

Three patterns of calving females have been described. (1) In mountainous areas, woodland females move upslope and disperse. They often calve above the alpine tree-line on brown substrates where the brown calf is cryptic[10,24]. These habitats, like tundra calving grounds, have increased exposure to weather, reduced food resources and a later growing season than habitats at low elevations[10]. (2) In non-mountainous regions with large lakes and archipelagoes, females seek small, scattered islands for

parturition, if the surrounding waters are free of ice[26,27]. These females remain on the islands throughout the summer and some islands can consequently become overgrazed[28]. (3) If neither mountains nor island refuges are available, woodland females scatter widely, densities of <.05/km^2 in homogeneous forest-bog complexes have been recorded[23,25].

Behaviour patterns common to all three dispersed patterns are (1) females are least aggregated during calving than during any other period of their annual cycle (Table 2), (2) females remain stationary (hiding) during and after calving, with small home ranges (Fig. 2), and (3) the calving locations are widely scattered[23-28](Fig.2). Woodland bulls, like tundra bulls, remain in early greening plant communities (lower elevations) with greater phytomass than calving habitats[10,24].

The forest/mountain females by moving upslope maximize the distance between themselves and wolves traveling in the valleys[10,24]. Further, moose (Alces alces) calve below tree-line and are encountered first by predators moving upslope searching. Cows on islands are extremely safe since they are widely spaced across barriers and have water for escape if discovered. Females in the more southern woodland populations do not have sufficient space above tree-line to migrate completely away from wolves and alternative prey (spacing-away), but they space-out to more remote habitats less travelled by predators. By being rare, they should reduce searching effort by predators.

Thus, I propose that the evolutionary or ultimate reason for the migration of females is not to reach a specific area (the calving ground) but rather to leave their predators behind. The proximate response is philopatry to a traditional calving location, solitary and dispersed in

forest animals (spacing-out) and aggregated and clumped in tundra animals (spacing-away). The environmental factors of available space and the distribution of their chief predator, wolves, have paced the divergence of these two tactics of a common anti-predator strategy. Lastly, I note that saiga (Saiga tatarica) females also make long migrations in the USSR to common parturition sites where predators are rare[29,30] and that the sexes of many other species of ungulates are segregated in the spring at parturition time. In these instances, the optimal foraging and predation risk hypotheses should be tested as possible explanations. I thank Jim Davis, Patrick Valkenburg and Heather Butler for their assistance.

Table 1 Percent nitrogen in feces and green plants being eaten compared at calving between females and males on the Slate Islands, Ontario (females and males not segregated) and three migratory herds in Alaska where females were segregated on calving grounds and males were at lower elevations seeking green plants.

Herd and Collection dates	Herd Location latitude, longitude & elevation ♀♀	♂♂	km between ♀♀ & ♂♂	Percent fecal Nitrogen ♀♀	♂♂	t-test of difference & P
Slate Islands	49°, 87°	49°, 87°	control 0	3.69 ± 0.074	3.76 ± 0.73	t = 0.671
early June	183-312 m			(28)*	(17)	not sign
Delta Herd, Ak	64°, 147°	64°, 148°	30	1.78 ± 0.041	2.32 ± 0.117	t = 4.369
May 17-26	1200 m	600 m		(22)	(16)	P < 0.0005
Fortymile, Ak	63°, 144°	64°, 143°	75	1.93 ± 0.032	2.18 ± 0.079	t = 3.238
May 27 - June 2	1050 m	725 m		(14)	(10)	P < 0.0005
Western Arctic, Ak	69°30', 160°	68°, 159°	150	1.98 ± 0.037**	2.18 ± 0.028	t = 4.2644
June 6-12	250 m	300 m		(25)	(29)	P < 0.0005
% Nitrogen in Green Plants*** seen eaten that day in Alaska				2.20 ± 0.246	3.30 ± 0.578	t = 2.152
				(7)	(7)	P < 0.05

*Sample size

**Fecal nitrogen for 3 nonparous yearlings on the calving ground was 1.96 ± 0.074

***Species included for males: Betula papyrifera, Salix spp., graminoid leaves, and Eriophorum angustifolium leaves and florescences; for females, Eriophorum florescences and leaves, Salix and Dryas integrifolia. Highest values for females were Eriophorum flowers, 2.35 (May 20, Delta), 2.86 (June 7, Western Arctic), and Dryas, 2.68 (June 2, Fortymile). Highest value for males were Salix, 4.46 (May 20, Delta), 3.03 (May 27, Fortymile), Eriophorum flowers, 2.38 (June 6, Western Arctic). Many males of the Western Arctic herd were eating rich Salix but leaves could not be collected.

Table 2 The mean aggregation size of spacing-away caribou in Canada during four seasons*

Area in Canada	North latitude	West longitude	Sample size	Mean Aggregation Size			
				Winter	Calving	Summer	Fall
Labrador	54°	62°	148	16.1	1.2	-	15.5
Central Ontario	48°	86°	176	2.9	← 1.3 →		-
Northern Ontario	53°	90°	326	11.5	1.3	1.3	9.8
Central Manitoba	55°	101°	239	4.6	2.6	1.7	3.2
Eastern Alberta	57°	113°	690	3.4	1.2	1.7	5.3
Western Alberta	54°	120°	82	6.5	1.6	1.9	3.6
Eastern Brit. Col.	53°	120°	284	6.5	2.6	5.2	5.6
Southern Brit. Col.	52°	120°	229	9.1	3.0	6.7	6.4
Eastern Brit. Col.	55°	121°	203	7.7	2.8	3.0	8.2
Western Brit. Col.	54°	126°	239	10.7	2.0	7.5	10.0
Western Brit. Col.	55°	128°	106	7.8	4.8	6.4	9.8
Central Yukon	65°	135°	?	10.8	3.2	36.9	large
Mean ± S.E.				8.3 ± 1.07	2.4 ± 0.29	6.7 ± 2.83	8.3 ± 1.20

*Table is compiled from a variety of sources, references will be provided by the author upon request.

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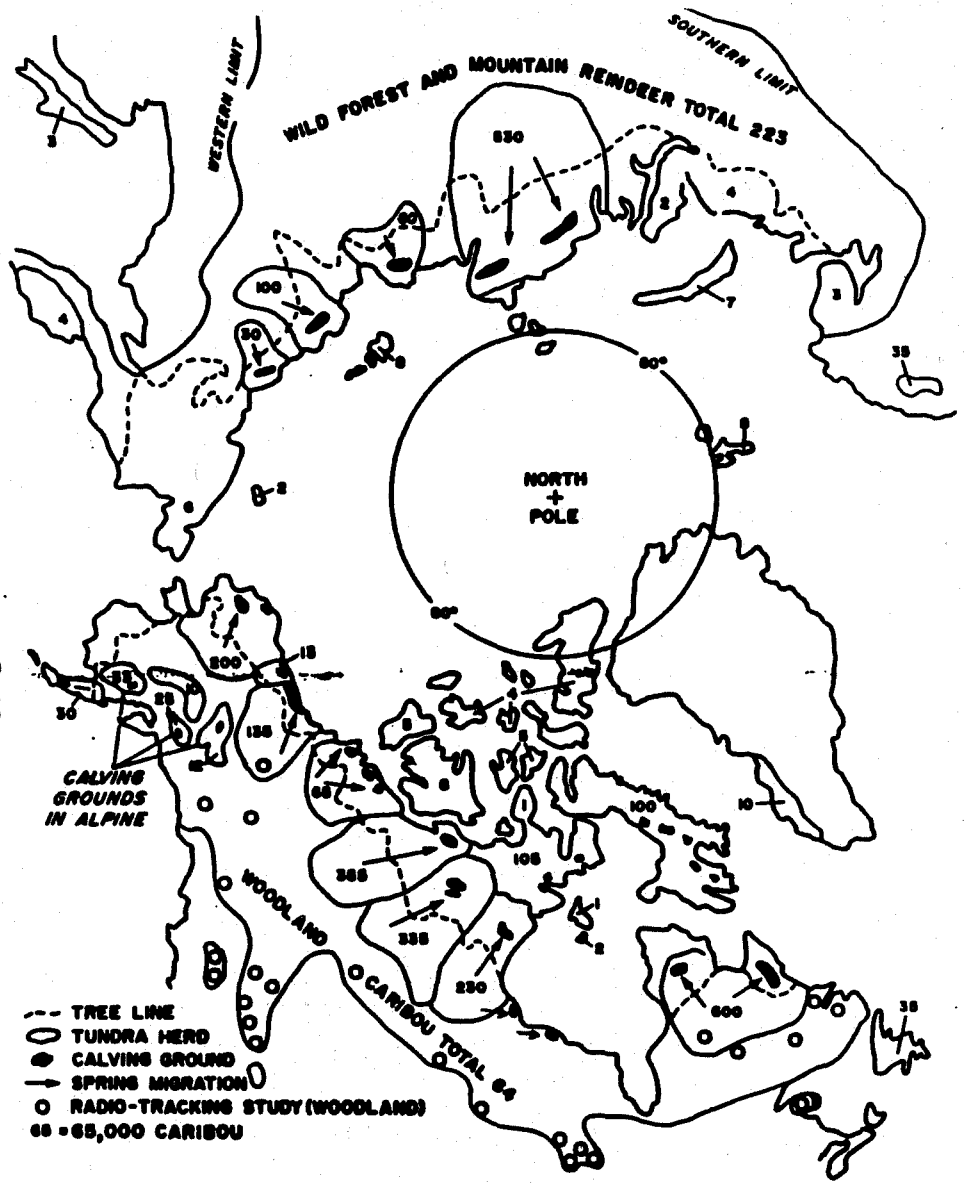
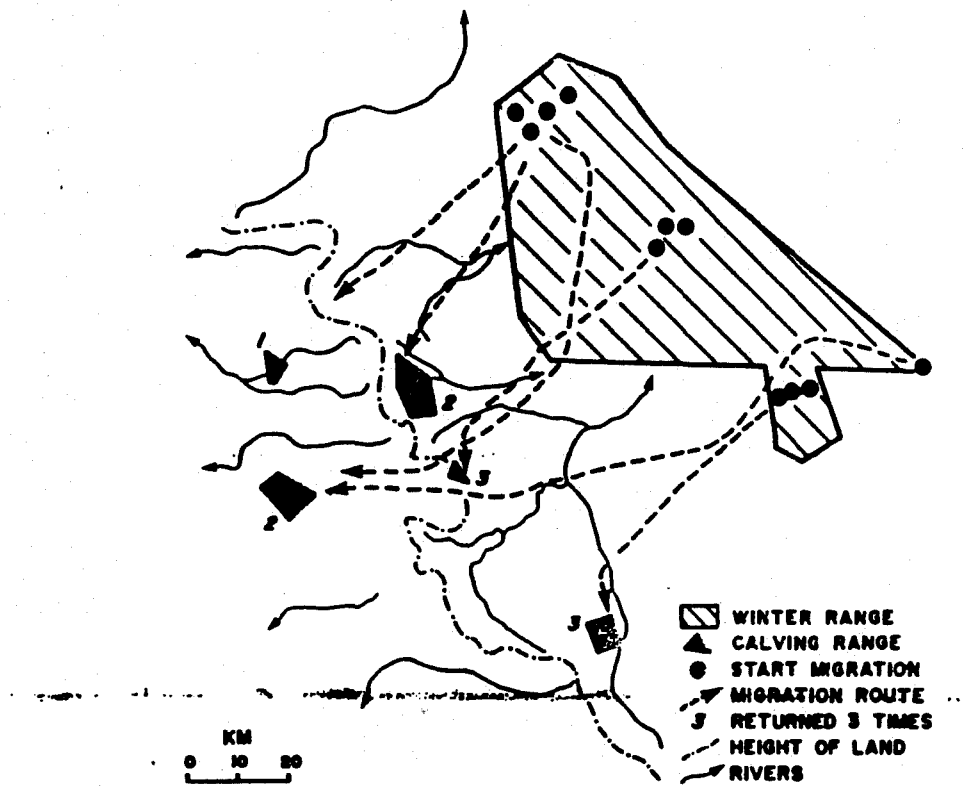
Figure 1. The migration of females in tundra herds in the spring is at right angles to the tree-line. Cows return to calving grounds on the northern edge of the population's distribution and generally beyond the range of wolves that den at or near tree-line (spacing away). Bulls remain farther south feeding on early greening plant growth.

Figure 1. Five woodland caribou females returned in spring migration to individual calving locations at high elevation. The cows were spaced-out from each other and had restricted home ranges. The bulls were at lower elevations feeding on new plant growth. The cows calved at maximum distances from alternate prey, moose, and wolves and bears hunting at lower elevations. Data are adapted from studies by Edmonds and Bloomfield[24] in Alberta.


WESTERN LIMIT
SOUTHERN LIMIT
WILD FOREST AND MOUNTAIN REINDEER TOTAL 223
NORTH POLE
CALVING GROUNDS IN ALPINE
WOODLAND CARIBOU TOTAL 64
TREE LINE
TUNDRA HERD
CALVING GROUND
SPRING MIGRATION
RADIO-TRACKING STUDY (WOODLAND)
68 = 65,000 CARIBOU


WINTER RANGE
CALVING RANGE
START MIGRATION
MIGRATION ROUTE
3 RETURNED 3 TIMES
HEIGHT OF LAND
RIVERS
KM
0 10 20

ABSTRACT

Survival of caribou (Rangifer tarandus) calves until 4 months of age was monitored for 8 years in 4 herds in northern British Columbia, Canada. The chief cause of mortality was predation by wolves (Canis lupus) and grizzly bears (Ursus arctos) and this mortality was correlated within years between all herds. More calves died in years with late springs when extensive snow patches remained during calving in June than in early springs when larger snow free areas existed. Cow caribou prior to calving and after birth sought to space-out on snow-free areas in small aggregations at high elevations above treeline. By being high, the females increased the distance between themselves and wolves and bears travelling valley bottoms as well as the main alternate prey moose (Alces alces) that calved only in forest cover at lower elevations. Also with early springs the reduced snow meant more space for dispersion. The variation in calf survival for 3 herds was negatively correlated with the heterogeneity of the calving area. Snow cover disappeared in smaller patches in more rugged mountains regardless of spring phenology therein providing a more constant search area for predators between years. More uniform mountains had either extensive areas of snow cover (late years) or brown substrates (early years), thus greatly varying the space predators had to search between years. As stochastic variation in snow cover at calving time alters the searching ability of predators, the aggregation responses of prey and the spatial overlap between predators and prey, it promotes short-term stability of the prey and lessens the probability of extinction.

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Displacement and Dispersion of Parturient Caribou at Calving as Antipredator Tactics

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INTRODUCTION

A central problem in predator-prey ecology is the behavioural responses of prey to the distribution of predators. Prey attempt to avoid areas where predators search (reviews by Stein 1979, Morse 1980, Sih 1982) whereas predators concentrate in areas of high prey densities (reviews by Hassell 1978, Cowie and Krebs 1979). If the predators are relatively mobile, the predator response should dominate. But what response should dominate if both predators and prey are mobile such as caribou (Rangifer tarandus) and wolves (Canis lupus)? With both prey and predators mobile the responses could cancel each other (Sih 1984). Yet another possibility could be that the extrinsic environment would intervene, at one time favoring the movement of the prey yet later the predator.

The paradox of why predators rarely cause the extinction of their prey in the real world as they do in the laboratory also remains of theoretical interest. Murdock and Oaten (1975) point out that laboratory experimental and mathematical modelling have outstripped empirical field studies. Field studies in turn have emphasized invertebrate systems where the predator is generally more mobile than the prey. Further, Murdock and Oaten in their review state (p. 13) "...we have no explanation for the stability of most systems...". This study should contribute to predation-stability theory as it pertains to a highly mobile, mammal predator-prey system.

We studied a wolf-bear (Ursus arctos) caribou-moose (Alces alces) system in northern British Columbia from 1976 to 1983. Pregnant caribou, in this system, leave valley bottoms which are travelled by wolves and bears just prior to calving and disperse into mountains as an antipredator tactic while nonproductive caribou remain at low elevations (Bergerud and Butler 1978, Hatler 1982, Bergerud et al. 1984, Page 1985). The calves of cows that moved to valley bottoms in June suffered greater mortality from wolf and bear predation than those that stayed high (Bergerud et al. 1984). We hypothesize that the success of the predator avoidance strategy depends, in order of importance, upon (1) the distance that the females can space from the travel routes of predators and alternative prey (displacement), (2) the dispersion of the cows, and (3) the extent of cryptic brown space (snow free areas) available for dispersion and crypsis. The main alternative prey, moose, scatter into forest cover at lower elevations at calving. The behavioural response of predators looking for caribou in turn should vary with the space they must search as it affects the relative profitability of hunting moose or caribou.

METHODS

Caribou in northern British Columbia traditionally gather on the plateaus above timber-line in the fall prior to breeding, allowing a near-complete aerial census. Four herds discussed in greatest detail are (1) Spatsizi - these animals congregate on Caribou Mountain and nearby Tomias Mountain (approx. 57°30'N, 128°W, see Boonstra and Sinclair 1984); (2) Level Mountain - 58°30'N, 131°W, (3) Kawdy - 59°N, 131°W - these animals also aggregate near Badman Point 59°N, 130°W and (4) Horseranch - 59°15'N, 128°30'W. All the herds calve high in the mountains. The distance between calving locations is approximately 80

km between Level and Kawdy, 240 km between Kawdy and Spatsizi, 200 km between Level and Spatsizi, and 15 km between Kawdy and Horseranch. Horserance was an experimental population where wolves were reduced for 3 years (1978, 1979 and 1980) (Bergerud and Elliot 1986).

We monitored the summer survival of calves in these four herds from 1976 to 1983 to investigate factors limiting population increase. Our basic technique was to measure recruitment when the new generation was ≥4 months-of-age in the last week of September and the first week of October. If a helicopter was available the animals were classified as to calves, cows, and bulls and recruitment was based on calves/100 ♀♀. If only a fixed-wing aircraft was available caribou were classified only as to calves, large bulls, and others, and recruitment was based on the percentage of calves of total animals. Radio-tracking investigations by Hatler (1985) have shown that males and females are least segregated at this time in the annual cycle.

To determine the causes of early mortality calves <3 days old were captured and radio-equipped with collars that sent a mortality signal if the calf was motionless for >4 hours. Ten calves were monitored at Spatsizi in 1979, a late spring, and 23 calves were monitored at Level Mt. in 1980, an early spring. The calves were weighed and notes taken on the birth site and the reunion sequence with the dam.

At Spatsizi in 1977 and 1979, we classified the reproductive status of females (≥ 2 years) from the ground in June by presence or absence of a distended udder and whether a calf was at heel. Females were similarly segregated from a helicopter at Level Mtn. in 4 years, from 1978 to 1981 at the end of calving about June 10.

A meterological statistic was needed as an index to the percentage of mountain slopes covered with snow during calving in early June. We wished to quantify the extent of cryptic backgrounds (brown substrates) available for the dispersion of expectant females spacing-out from predators. Landsat satellite photographs were available only in 1977 and 1978. Cloud cover obscured the ground in late May and early June in the other years. Our primary index was the April 1 water equivalent of snow pack measured at Dease Lake, B.C. (58° 26' N, 130° 01' W). We had to use the April 1 statistics since Dease Lake, at only 820 m elevation, never had snow remaining by June 1. Dease Lake is within 100 km of the mountains used by all but the Horseranch females. In 1980, a new snow station was established in the Eaglenest Mountains (57° 37' N, 129° 01' W) at an elevation of 1540 m. Some females that aggregate in the fall at Caribou Mountain calve in the Eaglenest Range at elevations of 1400 m and above (Hatler 1982). We compared these June 1 water equivalent readings from the Eaglenest with calves/100 females from 1980-83.

A seasonal snow statistic that we used to gauge the overall severity of the winter was the average snow depth remaining at the end of each month. We combined the readings from stations at Dease Lake, Iskut and Cassiar.

The wolf population near Level Mountain was censused in 4 winters from 1977-81 by D. Hatler (Bergerud and Elliot 1986). At Spatsizi wolves were counted in the winter of 1977-78 (Bergerud and Butler 1978) and again in 1979-80 (Page 1985).

RESULTS

Annual variation in calf survival

We found that there were large annual variations between years in the percentage of calves in the three control herds and these variations were correlated (Fig. 1). These variations held whether recruitment was expressed as either the percentage of calves of total animals or as calves per 100 females (Fig. 1). These variations were not artifacts of sampling since we generally segregated calves and adults in 50% or more of the entire estimated population so that percentages differing by >3% were statistically different based on finite statistics.

The large annual variations in recruitment were not explained by changes in reproductive rates. The mean percentages of females (≥ 2-year-of-age) giving birth to calves in 5 years was 84 ± 2.6% (CV = only 8%) for 2 of the study herds (Fig. 2).

However by 2 weeks after the first calf was born in these 2 herds there were only 38 ±8.5 calves per 100 females (CV = 54%) or a mortality rate of 55% by 1-2 weeks of age. We could not find the bodies of the missing calves and feel that the calves were completely eaten by bears and wolves. An analysis of the scats of bears and wolves showed that they contained hoof and skull fragments of calves suggesting 100% utilization of calf carcasses (Page 1985, Bergerud and Elliot 1986).

The major cause of death of calves in their first summer in British Columbia was predation by bears and wolves. We documented this by observing predator chases (Bergerud et al. 1984), scat analysis (Page 1985) and an experiment in which wolves were removed at Horseranch (Bergerud and Elliot 1986). When we visited the sites where the radio collared calves died we generally found only the bitten collars, calf hair, and small pieces of skin (Page 1985). Page (1985) estimated that probably 12 of the 17 deaths of calves with radios were due to predation.

One hypothesis we considered was that the viability of calves hence their susceptibility to predation, could vary depending on the previous winter's severity and maternal nutrition. To the contrary, the 34 young calves we captured struggled vigorously and generally weighed 8-9 kg which is approximately 3 kg greater than calves in the Arctic (pers. files). There was no significant difference in the weight of <1 day old calves between 1979, a hard winter and late spring, and 1980, a mild winter and early spring (8.0 ± 0.75 vs. 9.3 ± 0.55 kg, $t = 1.45$, $n = 16$).

An analysis of variance of the mean winter snow depths and the percentage of calves in the herds in the fall for all populations (the three control populations and Horseranch where wolves had been removed) was significant ($F = 4.26$, 24 df, $P = 0.0168$). However, the influence of the experimental removal was also significant ($F = 3.10$, 1 df, $P = 0.097$). That is, Horseranch, in contrast to the control herds, had practically the same proportions of calves regardless of snow depths in 3 winters when wolves were removed (16.7, 17.2, 16.1%) vs. greatly reduced percentages when wolves were present (6.3, 10.9, 4.2 and 6.0%). The significance of snow cover on calf percentages was improved with the removal of the variance from these three experimental cohorts ($F = 8.09$, $P = 0.0097$). The interaction of control and experimental populations was not significant ($F = 0.2193$). Thus, we rejected the hypothesis

that variations in snow cover acting through maternal condition and neonate viability were the explanation of variation in calf survival on the three control areas. In the absence of wolves there was little effect of weather on summer calf survival.

We could not explain the annual variations nor the correlations in the annual survival of calves between populations on the basis of changes in the abundance of predators or alternative prey. We saw grizzlies hunting calves in all years we were in the field. There was no obvious change in bear abundance. The number of wolves censused in the winter adjacent to Level Mountain were: 1977-78, 49-54; 1978-79, 43-44+; 1979-80, 44-46 and 1980-81, 46-50+ (Bergerud and Elliot 1986). We counted 72 wolves in Spatsizi 1977-78 and 43 wolves in 1979-80. The estimated moose density near Level Mountain was: January 1979, 0.34/km^{-2}, March 1980, 0.24/km^{-2} and February 1981, 0.18/km^{-2}. None of the values were statistically different (Elliot et al. 1984). The moose population near the Horseranch Range, also showed no statistical difference in two winter counts: 1979, 0.30/km^{-2}, and 1980, 0.48/km^{-2} (Elliot et al. 1984). Even if there were changes in numbers of predators and/or alternative prey, they could not explain the sequence of runs in calf recruitment we generally noted from 1977 to 1983 (Fig. 1). Moose, wolves and bears, do not have life history parameters that would alter their numbers quickly enough to be reflected in the annual perturbations in the survival of caribou calves.

Snow cover and survival

The annual changes in calf survival were correlated with the extent

of the snow pack of Dease Lake on April 1 (Fig. 3) and in the Eaglenest Mountains on June 1 (Fig. 4). Calf survival was higher following springs (1978, 1980 and 1983) with reduced snow cover than in years with more snow cover in the spring (1976, 1977, 1979, 1981 and 1982).

We tried to correct the water equivalent readings at Dease Lake for subsequent melt from April 1 to June 1 using the mean daily temperature. However these corrections did not improve the correlation between the April snowpack and calf survival shown in Fig. 3. In fact, the mean April-May temperatures were negatively correlated with the April 1 water equivalent readings, $r = -0.729$, $n = 8$.

In an early spring the extent of melted areas is considerably greater than in a late spring (Fig. 5). Hence parturient cows can displace and disperse themselves farther into the mountains away from the travel routes of wolves and bears (Figs. 4, 5, Table 1). The mean group size of cows with calves was less than that of animals without calves (Fig. 6) as expected from a dispersal to scattered snow-free areas at high elevations.

The annual variations in calf percentages within each of the 3 control herds was correlated with topography. When the mountains were uplifted as in Spatsizi (heterogenous) the variations in annual recruitment were less than when the mountains were volcanic (more homogeneous) as at Level Mountain (Fig. 7). The topography at Horseranch was also uplifted and the coefficient of variation in recruitment for the 4 years without control was 41%.

The topography should affect snow accumulation and residual snow cover at calving. The undulating topography at Level Mountain would

provide more wind swept surfaces and even accumulations of snow than would the more sheltered landscapes at Spatsizi. Thus in an early year the patches of brown substrate would be larger at Level Mountain than Spatsizi (Fig. 8) which would require that predators search larger areas to locate caribou (Fig. 9).

DISCUSSION

The maximum killing rate of a searching predator should depend on the product of three functions: the rate at which the predator encounters groups of prey, the rate of detection of groups of various size, and the probability of a successful capture of a calf from a group once detected (Taylor 1981). Maternal cows should take actions to reduce the success rates of wolves and bears in encountering, detecting, and capturing calves.

Tactics to reduce encounters (Displacement)

Regardless of group size, cows in mountains appear to space themselves maximally from predator travel routes along water courses (Bergerud et al. 1984, Edmonds and Bloomfield 1984, Hatler 1985). This spacing should also remove them from moose that are calving in forest cover at lower elevations and male caribou feeding at lower elevations. These strategies should increase searching time and decrease encounters with predators primarily hunting moose and nonproductive caribou (Fig. 9).

The movements of cows to alpine habitats to avoid predators resulted in these caribou grazing in habitats where the vegetational

phenology was several weeks delayed compared to that along watercourses at low elevations (cf. Edwards 1983). This selection of antipredator habitats that are suboptimal for foraging is well illustrated by satellite photography (Fig. 5). At the time of the photograph, on 3 June 1978, the cows had dispersed away from the forest habitats and were located on the highest bare spots immediately below the snowline. The cross hatched areas (originally red on the Landsat photograph) represent new, green, flushing vegetation, mostly willow (Salix spp.) along water courses at elevations below 600 m that the caribou have just left. This new, green growth is highly nutritious and a preferred food of caribou in the spring (White et al. 1975, Skogland 1980, Boertje 1981, Bergerud et al. 1984).

This altitudinal shift is contrary to Klein's (1970) view that caribou follow altitudinal gradients coincident with plant phenology to optimally forage. Cow caribou in British Columbia do move higher in the spring but this takes them away from the most nutritious food, to habitats where predation risk is reduced (Bergerud et al. 1984).

Tactics to reduce detection (Dispersion and Crypsis)

Caribou that calve in forest cover are widely dispersed in small groups with cows frequently alone (Shoesmith 1972, Fuller and Keith 1981). These small groups should reduce conspicuousness. In this study, the mean group size of groups with calves present was 2.4 (n = 52) at Level Mountain (calves excluded).

The group size of cows with calves did not change between 2 years in this study despite variation in the space for dispersion (Table 1).

This constant group size suggests an overriding need to remain inconspicuous. If groups size increased there would be a multiplicative loss of crypsis because of the need for cows and calves to communicate for identification. We noted that when barren-ground caribou move in large aggregations calling is continuous. Bears in the Arctic appear to orient to these vocalizations (pers. obs).

Cows were generally on the south side of mountains with larger areas of brown backgrounds than north slopes (Figs. 5, 9). Additionally, the prevailing southerly winds carried the scent of caribou to higher topography and away from the lower elevation where wolves were more common (Bergerud et al. 1984).

Cows with calves in the mountains were also sedentary. Five cows on Umbach Mountain at Spatsizi remained there an average of 6 ± 2.1 days, whereas 8 females in the valley bottom frequented by wolves stayed there only 2.9 ± 0.8 days (Bergerud et al. 1984). Reduced movement should reduce encounter rates with mobile predators, if an appropriate initial location has been chosen that minimizes encounters with those predators.

Enhancement between multiple predators, rather than interference, should occur in this system. Any hiding cow-calf pairs flushed by a predator would become more conspicuous to other predators, since the flushed caribou would leave scent trails and cross snow covered areas. Both bears and wolves hunt by searching large areas and can run faster than a young calf in rough terrain, hence, the hiding tactic would be partially abrogated by a functional predator response.

Tactics to reduce capture success

The chance of being captured when discovered should decline with an increase of group size because of shared-risk, mutual vigilance, and improved lead time for escape (Bergerud 1974b). The idea that an animal is safer when it can keep another animal between itself and its predator (the selfish herd concept) is now well recognized (Williams 1964, Hamilton 1971, Wittenberger 1981). However, cows with young calves in British Columbia never form large herds as is common for migratory caribou. This suggests that in the absence of complete displacement there is a need to remain inconspicuous and escape detection rather than to depend on eluding capture after discovery. Maternal cows were especially alert. We noted on several occasions that in an adult group where there was only one calf, it was the mother of the calf that remained standing when the herd bedded. These maternal cows also engaged in the most frequent "look-ups" when the groups fed.

If cows aggregated, it might increase the success of capture by predators. One behaviour of bears and wolves is to charge herds, cows and calves, in the confusion, have little time to reform maternal-filial pairs (pers. obs., F. Miller, pers. comm.) and calves can be left behind either sleeping or disoriented from their dams. In the small groups in British Columbia females did not take flight until they had their calf at heel. The cows generally knew where the calf was bedded and were able to reunite quickly when rushed by a predator.

General

We compare the primary tactics of moose and caribou to counter the success of mobile predators, such as bears and wolves in Table 2. Some

caribou populations aggregate at calving and others, such as those in northern British Columbia, space-out. The aggregating caribou are migratory, usually moving several hundred kilometers north of tree line prior to parturition. Wolves generally den near tree line (Kuyt 1972, Jacobson 1979, Fleck and Gunn 1982), thus, aggregations on calving grounds take place in an area of low wolf numbers (Kelsall 1968, Miller and Broughton 1974). We term this displacement response, spacing-away. For migratory cows, the tactics of sharing-risk, increased vigilance and swarming would not suffice if the majority of the wolves followed the caribou to the calving grounds. The few wolves that are present on calving grounds are able to kill calves at surplus levels (Miller et al. 1985). Miller et al. (1985) have seen one wolf kill three calves in 6 minutes of hunting on a calving ground. Handling time is not a restraint in the functional response. The primary antipredator tactic of these migratory cows is displacement to reduce the encounter rates with predators, many of which remain farther south with alternative prey, including bull and yearling caribou.

If these large herds also displayed dispersion they would be scattered nearer to tree line and abrogate the value of displacement. Spacing-away is most effective by being aggregated. It is the large space of the Arctic above tree line that permits the spacing-away option.

The caribou that space-out rather than space-away are the more sedentary woodland caribou. They do not have sufficient space above tree line for complete displacement; this incomplete displacement has lead to dispersion. Some herds even scatter in tree cover but the caribou in this study spaced-out in the open. Both groups that space-out

frequent areas where the major alternative prey of moose are relatively scarce (Fuller and Keith 1981, Bergerud et al. 1984, H. Cummings, pers. comm.). If predators hunt based on profitability theory (Royama 1970) then the spaced-out animals can reduce encounter rates if they are scarce enough to be unprofitable to search for. Again, the basic strategy is to reduce encounter rates.

A large animal such as caribou, even if fairly cryptic (Fig. 8), will have a difficult time avoiding detection if it is within the sensory range of predators in the open. However, vigilance can provide a long lead time and a reasonable probability of escape if detected. The animal can then make a rapid move to a new hiding area where there are few predators and possibly again escape encountering predators for some time before being rediscovered.

Moose, contrary to caribou, appear to rely more on avoiding detection than on spacing to avoid encounters; cows hide their calves in forest cover (Lent 1974) and defend their calves (Table 3). Moose should also benefit from reductions in kill rates when caribou are common, since caribou calves are much easier to kill than moose calves (Haber 1977). Wolves may switch from moose to caribou when caribou are common (Holleman and Stephenson 1981, James 1983). Predators would not search for both prey simultaneously because of their different habitats. Thus, this 2 species prey system should have greater stability than a caribou only system, consistent with theory (Southwood 1975, Murdock and Oaten 1975, Hassell 1978).

The study extends the principle, that habitat heterogeneity promotes stability in predator-prey systems (Huffacker 1958, Murdock and Oaten

1975), to mobile vertebrates. Caribou populations commonly show little population change when calf recruitment equals 10-12% of the herd (Bergerud 1974a, Bergerud and Elliot 1986). The mean percentage of calves for all three of our control study areas was 10-11% and the herds changed little from 1980 to 1983 (Bergerud and Elliot 1986). However, the mean annual deviations from 10% were only 3% at Spatsizi vs. 6% at Level and Kawdy. The more topographically diverse Spatsizi with enhanced patchiness had the most stable recruitment of the three study areas (> topography, > patchiness, > stability).

Density independent stochastic variations such as snow cover intuitively should not be stabilizing (Hassell 1978). However, stochastic variation may be less destabilizing than time lags (Bartlett 1957, May 1973). There have been long predator-prey oscillations in our system (Bergerud and Elliot 1986) and in other northern caribou-wolf systems (Skoog 1968, Haber 1977). These oscillations appear to result more from a numerical predator response than from changes in functional responses (Skoog 1968, Haber 1977). Snow cover, as it affects relative prey densities (hence searching time and efficiency), appears to cause considerable annual variations in calf survival about long-term density trends. Thus the stochastic variation adds noise to the system. But also, snow cover varies the distance between the subhabitats of moose and caribou, therein varying travel time and hunting profitability (promotes switching) for predators. In the sense that this stochastic variation alters the aggregating repsonse of prey and the spatial overlap of predator and prey, it promotes short-term stability and lessens the possibility of extinction (Hassell and May 1973, Murdock and Oaten 1975, Southwood 1975, Beddington et al. 1978).

ACKNOWLEDGEMENTS

We would like to acknowledge the fact that D. F. Hatler gathered the distribution, demographic, and wolf census data for Level Mountain for the four years 1978, 1979, 1980, and 1981. Donald Eastman and the Fish and Wildlife Branch provided logistic support. T. Skogland and Frank L. Miller provided helpful reviews.

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Table 1. Comparison of the locations of females at calving time on Level Mountain between a June with below normal snow and a year with average snow conditions.

Displacement and Dispersion, groups with & without calves	Extent of Snow: Below Normal 10 June 80 mean ± SE	Extent of Snow: Average 9 June 81 mean ± SE	Differences 1980-81
Mean elevation (m):			
With calves	1703 ± 44.7 (16)	1533 ± 47.3 (13)	170[1]
No calves	1596 ± 31.7 (14)	1488 ± 29.3 (21)	108
Average distance from wolf routes (km):			
With calves	17.4 ± 1.19 (16)	13.2 ± 1.22 (13)	4.2[2]
No calves	13.5 ± 2.25 (10)	12.6 ± 1.26 (16)	0.9
Mean number adults/group:			
With calves	1.9 ± 0.37 (18)	2.0 ± 0.49 (12)	0.1
No calves	3.8 ± 0.95 (13)	2.7 ± 0.39 (18)	1.1

[1] $t = 2.599$, $P < 0.05$

[2] $t = 2.456$, $P < 0.05$

Table 2. Tactics to reduce the rate of predation.

Species and grouping	Tactics to Reduce: Encounter Rate	Detection Rate	Capture Rate
Moose dispersed	Space-out, use islands	Use forest cover & hide calf	Defend calf, use cover and obstacles
Caribou aggregated (spaced-away)	Migrate away from predators & alternative prey, including noncalving caribou, remain mobile	Calve on brown substrates, spaced-out briefly at parturition	Share-risk & vigilance plus swarming, long flushes
Caribou dispersed in open (spaced-out)	Space away from travel routes of wolves & alternative prey, remain sedentary	Calve on brown substrates, spaced-out, remain upwind	Remain vigilant for long lead time, flee uphill
Caribou dispersed in forest (spaced-out)	Shift to habitats with low numbers of predators & alternative prey, remain sedentary	Give birth spaced-out in forest cover	Use cover & predator obstacles, water barriers

LIST OF FIGURES

Figure 8. The volcanic mountains at Level Mountain (above) were more undulating, with reduced snow cover, compared to the uplifted mountains at Spatsizi (below). These mountain caribou are quite brown, blending with brown substrates but contrasting with white backgrounds.

Figure 9. Spacing model. (above) When caribou are spaced-out and total numbers are low it is not profitable for a predator to search for caribou. When caribou are aggregated and total numbers are high predators know where the animals are and an increase in density does not result in an increase in searching effort. (below) Snow cover can alter the space for dispersion and can change relative densities and the searching effort of predators. In an early spring caribou can disperse higher into the mountains and away from alternate prey and the travel route of predators in valleys than in a year with greater amounts of snow in June. In late springs wolves denned on Level Mountain but probably not in early springs (1978 and 1980).

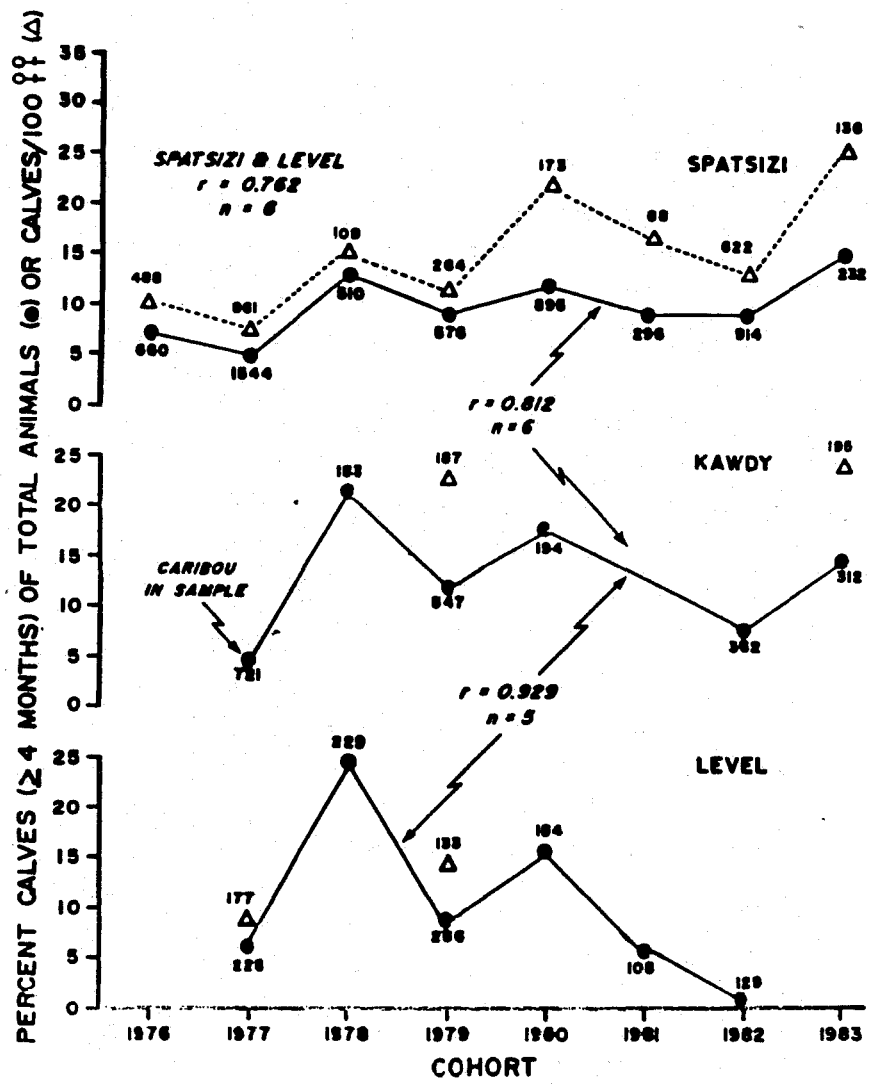
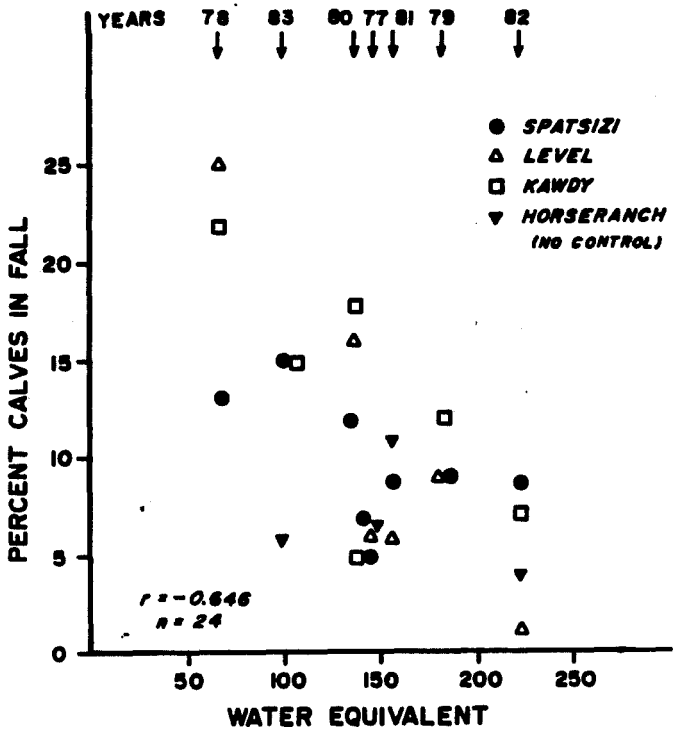


FIGURE 1



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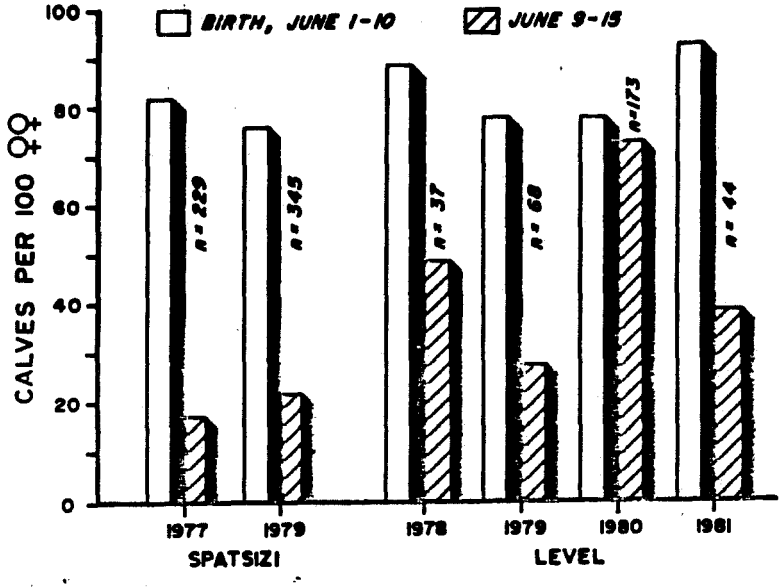

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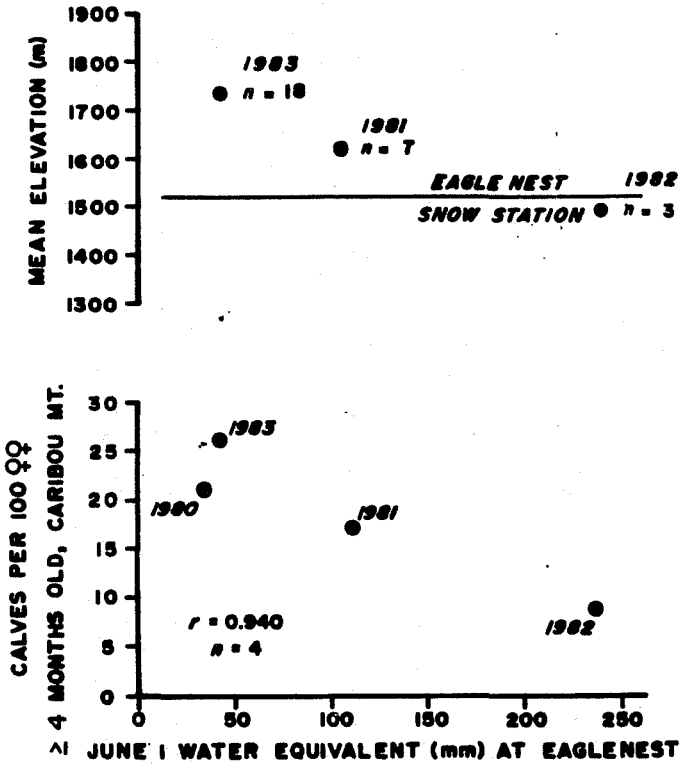

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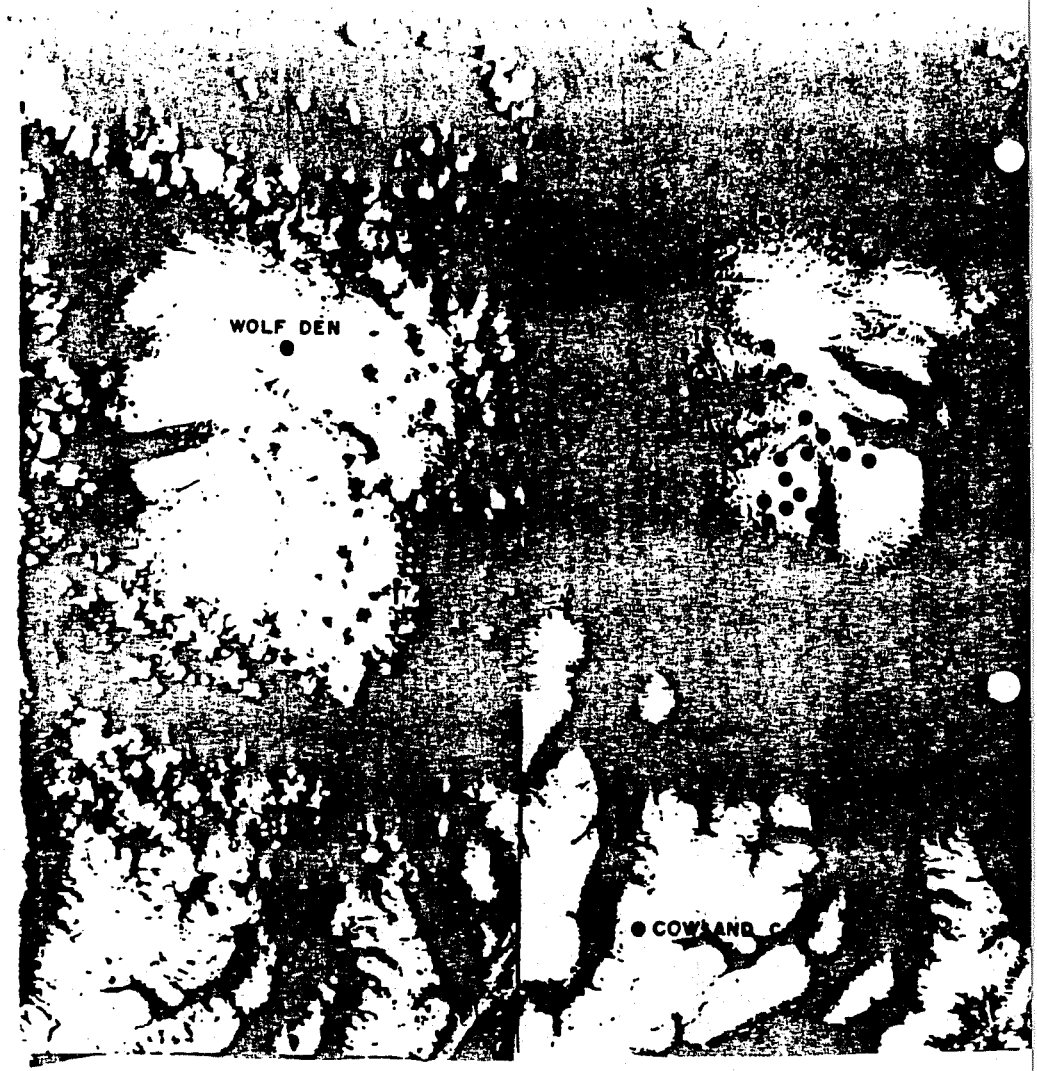

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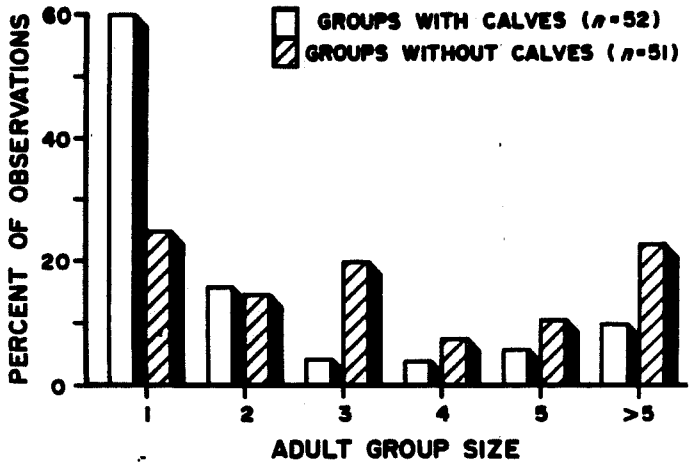

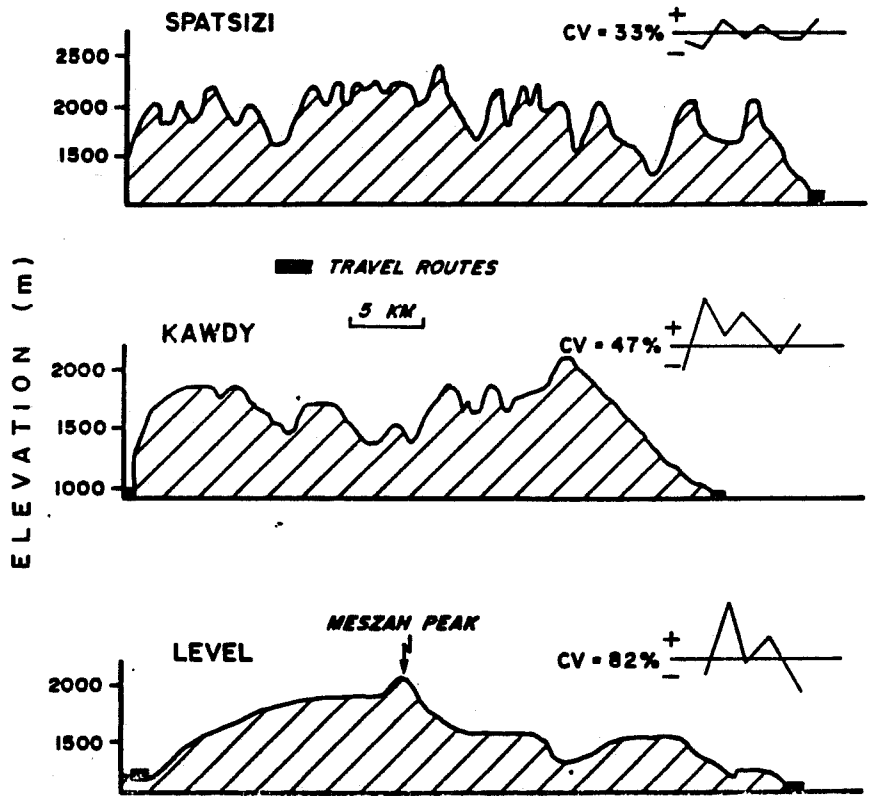

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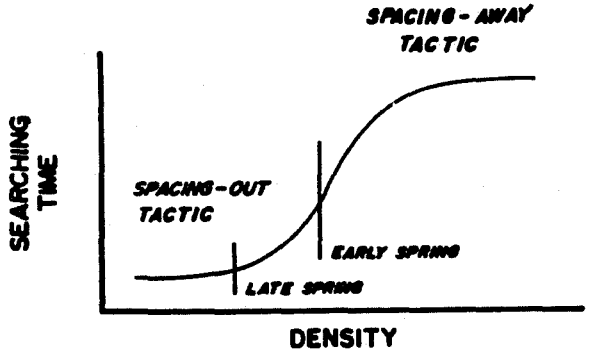

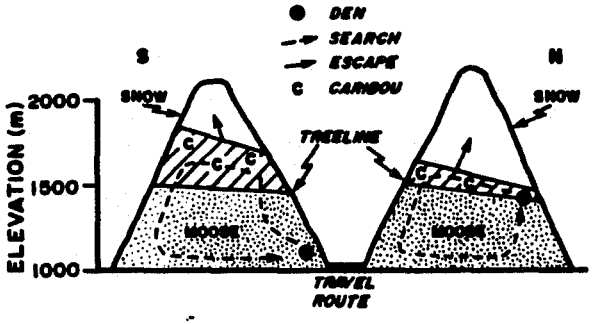

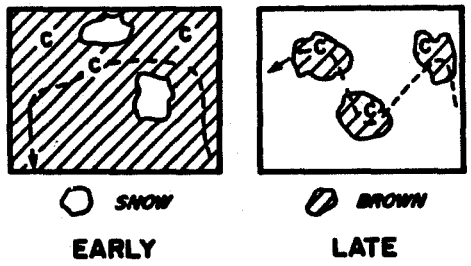

FIGURE 9

FIGURE 9

ATTACHMENT E

TESTIMONY ON THE
DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
Anchorage, Alaska
Presented by the Alaska Oil and Gas Association (AOGA)
January 5, 1987

I am Tom Cook, Alaska Exploration Representative for Chevron U.S.A. Inc. Today I am appearing before you on behalf of the Alaska Oil and Gas Association. AOGA is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. Let me say at the outset that AOGA strongly supports the Department of Interior's proposed recommendation that the entire "1002" area, also known as the Coastal Plain, be authorized for oil and gas exploration and production. We have restricted our comments today to three aspects of the "1002(h) report", but will submit detailed written comments on the entire report before the January 23, 1987 deadline specified in the Federal Register Notice.

Mr. Mike Bradshaw of Conoco will first address the national interest in developing the petroleum resources discussed in Chapter VII, then Mr. Mark McDermott of ARCO will comment on the biological content of Chapters II and VI. I will conclude our statement with comments on the recommended stipulations applicable to the area, together with an endorsement of the proposed full leasing Alternative A selected for recommendation by the Assistant Secretary for Fish and Wildlife and Parks, William P. Horn.

Comments on National Need for Oil and Gas (Chapter VII)

Thank you. For the record, I am Mike Bradshaw, Operations Director-Alaska for Conoco Inc. There are many factors that are relevant in determining why opening the ANWR Coastal Plain to oil and gas leasing, exploration and production is in the national interest.

- The U.S. is rapidly depleting its domestic reserves of oil and gas.
- Domestic crude oil production from existing fields is forecast to decline from the 8.9 million barrels per day average in 1985 to 6.2 million barrels per day by 1991, if prices remain at $15 per barrel. Current domestic production has already fallen to about 8.5 million barrels per day. Domestic production is forecast to fall as low as 4 million barrels per day by the year 2000.
- Currently Alaska supplies our nation with approximately 20% of the total U.S. production.

- Barring new domestic discoveries to replace depleted reserves, and assuming the demand for petroleum does not increase, the U.S. may need to import 12 million barrels per day by the year 2000. Thus, without significant new discoveries, our nation could be dependent upon foreign sources for 60-75% of its demand, within the next 10-15 years, almost double the present level of dependency.

Currently the U.S. consumes more than 25 percent of worldwide petroleum production even though it has less than 4 percent of proven worldwide reserves. Policy decisions which slow or prohibit replenishment of domestic reserves only exacerbate this problem. Opportunities to explore for and develop new reserves must be forthcoming.

As we have seen in recent years, the U.S. is vulnerable to serious supply disruptions because of its dependence on foreign oil. Foreign sources of petroleum are concentrated largely in the Middle East where two-thirds of the proven reserves of the non-communist world exist. Saudi Arabia alone possesses over one-fourth of the free world's reserves. Increased future dependency on these politically unstable Middle Eastern areas is highly undesirable from a national interest viewpoint.

As domestic production continues to decline, and imports continue to rise, U.S. vulnerability to supply disruption will increase. A reliable domestic energy supply is a key factor in maintaining a viable foreign policy.

It is in the national security and economic interest to encourage exploration for new domestic reserves wherever the potential exists, on the Coastal Plain of ANWR and other promising areas. Any decision to delay that search is a step toward increased dependency on foreign supply. Lead times to develop frontier Alaska oilfields are very long, typically 10 to 15 years from discovery to first production. If a major discovery were made on the Coastal Plain today, first production would not be likely before the year 2000.

Increasing consumption, decreasing domestic production, and rising imports, coupled with delay in opening promising new areas to exploration and development are all factors which collectively will contribute to the likelihood of a future energy crisis. 1986 was a year of drastic change throughout the oil and gas industry. Exploration is currently at a near standstill, marginal and uneconomic fields are being shut-in, and research and development have been drastically reduced. Continuity of exploration and development are necessary to replace depleted reserves. Delays in the exploration process today will cause greatly reduced future production.

Those who oppose oil resource development argue that the reserve potential of the Coastal Plain may represent only a few months supply of oil to the nation. This statement, though misleading,

illustrates very well the significance of such a reserve if it is discovered and produced from the Coastal Plain. A few months is indeed significant when compared on the same terms with the 18 month supply in the largest oilfield ever discovered in North America - Prudhoe Bay. But, the statement is misleading for two very important reasons. First, no oil field can be fully produced in a few months. Prudhoe Bay, for example, may produce oil and gas for at least 30 years. Second, the statement assumes a reserve estimate which would offset total daily consumption rather than an offset to imports during the life of the field. From a national security perspective, offsetting imports is a more important comparison. Prudhoe Bay, on average, could offset approximately 13% of foreign oil imports for 30 years (assuming 10 billion barrels recoverable reserves and 7 million barrels per day imports).

The report estimates a 19% chance of finding economically recoverable oil on the Coastal Plain. This promising outlook for success helps explain industry's high interest in exploring the Coastal Plain because it is a ten-fold increase over the statistical industry success rate in Alaska. Historically only one out of fifty, or 2%, of the exploratory wells drilled in Alaska has ever resulted in a commercial discovery

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Economic benefits of further North Slope development to the nation are extremely significant. In addition to the direct benefits to the State and Federal governments from bonus payments, rentals, royalties, and taxes, the discovery of large new reserves would significantly reduce oil imports and the associated national trade deficit. Nearly half of the U.S. trade deficit today results from imported oil.

Oil development on the North Slope of Alaska has provided hundreds of billions of dollars to the U.S. economy, representing a benefit to all of the 50 states. Therefore, petroleum development from the Coastal Plain, especially on the order of magnitude of Kuparuk or Prudhoe Bay, would promote economic development not only within Alaska, but also throughout the United States. Jobs would be created as the demand for goods and services increase and the positive impacts would be felt well beyond the petroleum industry.

If highly prospective areas such as the Coastal Plain are placed off limits to petroleum exploration, the nation may experience a future energy crisis which will make the 1973 embargo and the 1979-1980 price escalation seem mild by comparison.

In summary, we believe it is clearly in the national interest to open the Coastal Plain of ANWR to leasing and development.

I will now turn the microphone to Mark McDermott with ARCO who will comment on the biological aspects of the draft report.

Biological Review Comments

My name is Mark McDermott and I am a Senior Environmental Coordinator for ARCO Alaska, Inc. Following a detailed review of the LEIS Chapter II - Existing Environment and Chapter VI - Environmental Consequences, the Alaska Oil and Gas Association strongly endorses the DOI recommendation to lease the entire "1002" Coastal Plain area for oil and gas exploration, development and production based on the following points and conclusions:

Prudhoe Bay Region/TAPS

Often the National Environmental Policy Act (NEPA)-mandated EIS process tries to predict environmental consequences of new developments with little or no previous field experience to guide the predictions. Clearly, for the ANWR Coastal Plain, test cases have already been run at Prudhoe Bay, Kuparuk, Milne Point, Lisburne, and Endicott, and with the Trans Alaska Pipeline. Collectively, the experience of the regulatory agencies and industry is summarized in the LEIS on page 2: "The evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources. Hence, it is reasonable to assume that development can proceed on the Coastal Plain and generate similar minimal effects."

Furthermore, we support the statement, also on page 2 of the LEIS, that "Most adverse effects would be minimized or eliminated through carefully applied mitigation, using the lessons learned and technology acquired from development at other North Slope oilfields and from the construction and operation of the Trans-Alaska Pipeline System (TAPS)".

Indeed, we would like to point out that all of the dire predictions of environmental degradation made 15 years ago, prior to the construction of TAPS, have subsequently been proven to be unfounded. The predicted demise of major caribou herds, deterioration in water quality and major losses of habitat simply have not occurred. Instead, the development of Prudhoe Bay and the TAPS have allowed Alaskans to enjoy economic prosperity in harmony with a high quality environment and thriving wildlife populations.

National Environmental Policy Act

We understand that the draft document is a legislative EIS largely following the requirements of the National Environmental Policy Act. We would like to point out that many of the environmental consequences predicted to occur for the 5 alternatives appear to be based on "worst case" evaluations. In April 1986 the NEPA-EIS guidelines were changed from requiring a "worst case" assessment to one of "most likely to occur." We feel that many of the major conclusions of significant effects carry the earlier "worst case" assessment to an extreme and thus we ask that the authors reconsider many of their conclusions in light of the "most likely to

occur" assessment of impacts. The standard for the "most likely to occur" case exists in the experience from other North Slope oilfields. Many of these specific points will be detailed in our written comments.

Caribou

We agree that caribou, both from a standpoint of numbers and distribution, is the specie most likely to encounter developmental activities in the "1002" area. The LEIS quote from page 6 states that "Changes could include displacement and reduction in the size of the Porcupine Caribou Herd. The amount of reduction and its long-term significance for herd viability is highly speculative" (emphasis added). We ask that these acknowledged qualifications be presented throughout the environmental consequences section to ensure that all readers of the document are fully aware of the highly speculative nature of some of the hypothesized impacts.

Carrying Capacity

In the management of wildlife populations, the concept of habitat carrying capacity is key to defining management goals. It is an established fact that the Porcupine Herd does not approach the carrying capacity of its range. Indeed, former Alaska Fish & Game Commissioner, R. Skoog, in his Doctoral dissertation (1968) stated that "It seems likely that the Alaskan caribou population has remained far below range carrying capacity and that the total habitat has never been fully occupied. In reality, caribou populations seem to have maintained densities much lower than the maximum dictated by food alone, and hence the reduction in total range becomes less meaningful." Thus, we agree with the conclusions that habitat is not currently limiting the growth of the Porcupine Herd and that the small loss of habitat represented by likely development in the "1002" area will not impact growth or productivity of caribou. Consequently, we disagree with the speculation that a reduction of caribou population is likely to occur as a result of small reductions in habitat availability and value.

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"Core Calving Area" Concept

Significant year-to-year variability in calving distribution has been recorded for the Porcupine Herd all across the Arctic coast from east into Canada and west to the Canning River. Concentrated calving has been observed across the entire so-called core calving area during only 5 of the past 14 years. Therefore, calving habitat is more appropriately represented as a true continuum across the Coastal Plain including portions of the Arctic coast outside the "1002" study area. The Porcupine Caribou Herd has demonstrated numerous times in the past, including this past year, that it can and will successfully calve miles from the (quote) "core calving area" (unquote). Thus, the "unique and irreplaceable" nature required for designation as Resource Category 1 does not apply.

While AOGA embraces the responsible use of mitigation procedures in the Arctic, it is inappropriate to emphasize habitat loss alone without consideration of actual effects or lack of effects on wildlife populations from development.

Muskox

We feel that the conclusions regarding potential impacts of development on muskox are unnecessarily severe and unfounded. While it is true that very few data characterizing muskox responses to oil field development are available, it is also true that the muskox have shown ready adaptability to human presence and have even been semi-domesticated in several areas. This adaptability to human presence will significantly reduce the "worst-case" conclusions stated in the LEIS.

Mammalian Species

We feel that it is important to point out that the remaining mammalian species including moose, dall sheep, wolves, arctic fox, wolverines and brown bears are present on the Coastal Plain in relatively low population densities or for relatively short periods during the year. Thus, we support the conclusions of minimal or negligible impacts on these species.

Fishery Populations

We support the conclusion that only minor to negligible effects on coastal fishery resources or fishery habitat will occur. Experience at Prudhoe Bay and Endicott has provided a significant volume of data to support this judgment.

Threatened and Endangered Species

We also support the conclusions of minor to negligible impacts on endangered and threatened animal species such as bowhead and grey whales and the peregrine falcon. We feel that the transient nature of their presence on the Coastal Plain and the history of developmental interaction in the Prudhoe Bay field clearly demonstrate the lack of meaningful impacts on these species. Regarding the plant, Thlaspi arcticum, we feel that conclusions and set-back stipulations based on the presence of this specie are overly restrictive because the plant has not been determined to be threatened or endangered.

Recreation

We would like to underscore the extraordinarily low use of the Coastal Plain as a recreational area. History indicates that only a small number of individuals have actually utilized the Coastal Plain for recreation in the form of hunting, fishing, camping or hiking. It is extremely expensive to reach the area; a trip from

the contiguous states costs thousands of dollars and requires an air charter flight to reach the Coastal Plain. Wet and moist ground conditions make hiking difficult during the 8-10 week "summer." Extreme cold and darkness during most of the year further reduce recreational use of the Coastal Plain. For most of the year this is an extremely harsh and hostile environment.

While there is no reason to believe that leasing and development would lead to a permanent loss of aesthetic values, over 30 miles of Coastal Plain from the "1002" area east to the Canadian border are already classified as wilderness, thus preserving the complete spectrum of arctic ecosystems represented in the Arctic Refuge.

Summary

Before I ask Mr. Cook to conclude our statement, I would like to acknowledge the 5 years of extensive field investigations, data collections and analyses by over 50 trained professional scientists, including wildlife and fishery biologists, botanists, zoologists, chemists, geologists and resource specialists who contributed to this draft report. We consider the factual basis for the scientific analysis to be adequate and the conclusions to be reasoned. However, we cannot support some of the speculation on environmental consequences found in the report which result in an over estimation of potential impacts.

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Concluding Remarks

As previously stated AOGA supports the full leasing of the ANWR Coastal Plain under reasonable measures for environmental protection. Except for a few provisions, the proposed stipulations found in the report and the land use stipulations found in the Agreement Between the Arctic Slope Regional Corporation and the United States of America (incorporated into the report by reference), appear reasonable. The proposed mitigation measures are generally consistent with current and proven industry practices for the protection of wildlife and the environment. The application of reasonable mitigation can ensure that development is conducted in a manner compatible with the purposes of the Refuge and ensure that no unnecessary adverse environmental impacts occur. Our written comments will address in detail, those measures that we believe are unduly restrictive.

AOGA strongly endorses Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest. Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise. Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling.

Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C would just be another delay in the eventual production from the area. Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

We fully support the proposed recommendation on page 169 which contains the following statement: "even though the billions of barrels of oil reserves have been brought on line and the infrastructure developed to bring that oil to U.S. markets, the fish and wildlife resources of the Prudhoe Bay area remain extremely healthy. The Central Arctic Caribou Herd has increased substantially during the period that development has occurred within the heart of its range. Estimated at about 3,000 animals in 1972, the herd now numbers more than 13,000. Similarly, important waterfowl species continue to successfully nest and rear their brood within the developed area. Although circumstances within the "1002" area may be somewhat different, the evidence derived from the Prudhoe Bay experience leads one to be quite optimistic about the ability to explore for and develop the hydrocarbon potential of the "1002" area without significant deleterious effects on the unit's wildlife resources."

Thank you for this opportunity to comment.

TESTIMONY ON THE
DRAFT LEGISLATION ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
Washington, D.C.
Presented by the Alaska Oil and Gas Association (AOGA)
January 9, 1987

I am Wayne Smith, District Manager of Amoco Production Company and President of the Alaska Oil and Gas Association (AOGA). I am appearing before you today on behalf of AOGA which is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. AOGA strongly supports the Department of the Interior's proposed recommendation that the entire "1002" area, also known as the Coastal Plain of the Arctic National Wildlife Refuge (ANWR), be authorized for oil and gas leasing, exploration and production.

Currently, Alaska supplies our nation with approximately 20% of its total domestic production. Lead times are long in frontier Alaska regions--at least 10 years from discovery to first production, but more likely to extend as long as 15 years in the case of the ANWR Coastal Plain. Without significant new discoveries, our nation could be dependent upon foreign sources for 60-75% of its petroleum needs within the next 10-15 years, almost double the present level of dependency.

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Production from existing Arctic Alaska oil fields which are presently being produced at about 1.8 million barrels per day will begin a precipitous decline by 1988. It is a matter of technical certainty that the present level of production from Alaska's North Slope will decline to about 500,000 barrels per day by the year 2000, earliest date by which new production from the ANWR Coastal Plain would likely be available.

If highly prospective areas such as the Coastal Plain are placed off limits to petroleum exploration, the nation may experience a future energy crisis which will make the 1973 embargo and the 1979-1980 price escalation seem mild by comparison.

Increasing consumption and rising imports along with decreasing domestic reserves and production, coupled with delay in opening promising new areas to exploration and development, are all factors which collectively will contribute to the likelihood of a future energy crisis.

The resource assessment contained in the draft LEIS for the Coastal Plain supports our view that the area may contain significant reserves. The Coastal Plain has great potential for making a substantial contribution to our domestic energy supply.

Even the most optimistic production scenario will physically utilize only a very small area of the Coastal Plain. The very small area which would be affected by discovery and development of

1 or 2 giant oil fields should be balanced against the very strong contribution to the national interest that such discoveries could represent.

Our industry has demonstrated its compatibility to explore for, develop, and produce oil in the Alaska Arctic without significant adverse impact on wildlife and the environment. The dire predictions of environmental degradation and harm to wildlife made 15 years ago, prior to the development of the giant Prudhoe Bay field and the construction of the Trans-Alaska Pipeline have proven to be unfounded. The predicted demise of major caribou herds, deterioration in water quality and major losses of habitat simply have not occurred.

Instead, the development of Prudhoe Bay and the Trans-Alaska Pipeline have permitted the production of 5 billion barrels of much needed oil with minimal environmental impact. During the 15 year period of development wildlife have thrived in the midst of oil field development and evidenced by the fact that the Central Arctic Caribou Herd has grown from about 3,000 to a population now estimated at over 13,000 animals.

With regard to the issue of protecting the Porcupine Caribou Herd which uses the Coastal Plain on a seasonal basis, there has been a development since the issuance of the draft report which I would like to mention. On December 3, 1986, the United States and Canada have devised an agreement for the management and conservation of the Porcupine Caribou Herd. This agreement which also involved the native subsistence users of both the Canadian and American Arctic assures that appropriate steps will be taken to guarantee the well-being and preservation of the Porcupine Caribou Herd. In view of this development, the final report to be submitted to the Congress should be revised to reflect this new measure of protection afforded the Porcupine Caribou Herd.

I would like to acknowledge the 5 years of extensive field investigations, data collections and analyses by over 50 trained professional scientists, including wildlife and fishery biologists, botanists, zoologists, chemists, geologists and resource specialists who contributed to this draft report. We consider the factual basis for the scientific analysis to be adequate and the conclusions to be reasoned. However, we cannot support some of the speculation on environmental consequences found in the report which result in an over estimation of potential impacts.

Except for a few provisions, the proposed stipulations found in the report and the land use stipulations found in the Agreement Between the Arctic Slope Regional Corporation and the United States of America (incorporated into the report by reference), appear reasonable. The proposed mitigation measures are generally consistent with current and proven industry practices for the protection of wildlife and the environment. The application of reasonable mitigation can ensure that development is conducted in a manner compatible with the purposes of the Refuge and ensure

that no unnecessary adverse environmental impacts occur. Our written comments will address in detail, those measures that we believe are unduly restrictive.

AOGA strongly endorses Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest. Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise. Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling. Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C would just be another delay in the eventual production from the area. Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

AOGA's expresses its full support of the Department of the Interior's proposed recommendation to Congress which states "...even though the millions of barrels of oil resources have been brought on line and the infrastructure developed to bring that oil to U.S. markets, the fish and wildlife resources of the Prudhoe Bay area remain extremely healthy. The Central Arctic Caribou Herd has increased substantially during the period that development has occurred within the heart of its range. Estimated at about 3,000 animals in 1972, the herd now numbers more than 13,000. Similarly, important waterfowl species continue to successfully nest and rear their brood within the developed area. Although circumstances within the "1002" area may be somewhat different, the evidence derived from the Prudhoe Bay experience leads one to be quite optimistic about the ability to explore for and develop the hydrocarbon potential of the "1002" area without significant deleterious effects on the unit's wildlife resources".

Thank you for the opportunity to present this statement.

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Paragraph 2 correctly points out that wide year-to-year variations in calving distribution can occur due to weather influences and the arrival of spring snow-melt. This acknowledged effect of weather further erodes the core-calving area concept and points out the wide annual variability and adaptability of caribou.

Paragraph 3 clearly shows this annual variability. During 1983, 1984, and 1985, calving estimates varied from 74% to 35% and 82% respectively in the 1002 area. These data clearly show the adaptability of the PCH to yearly variations in weather conditions and point out that calving distributions do vary widely.

Therefore, we ask that conclusions regarding the relative importance of the Jago highlands as a core-calving area be de-emphasized throughout the report.

Page 29, paragraph 3: Similar to calving distribution, caribou demonstrate wide variation in their selection and use of insect relief habitat. Although many groups move towards the coast, the report correctly points out that many also move to higher foothill and mountain areas for relief. We feel the report does not sufficiently recognize the wide variation in acceptable insect relief habitat, and thus places undue emphasis on the coastal areas. We also point out that the Prudhoe Bay development pads and roads have actually created insect relief habitat and have not prohibited CAH access to coastal areas for insect relief. We ask that this section clearly point out the favorable experience at Prudhoe Bay.

Page 27-33, Other mammalian species: Population size and distribution data for other mammalian species in the 1002 area are summarized as follows:

Species	Population Density in 1002 Area*
Muskox	Approx. 476 individuals
Moose	Does not exceed 25
Dall Sheep	Very rare
Wolves	Does not exceed 5-10 animals
Arctic Foxes	Common with annual fluctuations
Wolverines	Few-accurate figures are unavailable
Brown Bear	Approx. 108 bears

* Population density statements taken from 1002 report, pages 29-33.

As can be clearly seen from these data, very few individuals of these species are found in the 1002 area. We ask that the report conclusions be strengthened to point out the extremely low density of use for these species, and thus the low potential for any impacts on these species due to development.

Page 34, paragraphs 3 and 4: The report does not consider the results from the highly successful 1986 whaling season. During

this season, Kaktovik took 3 whales and Nuiqsut took 1 whale. These successful hunts took place while offshore drilling and drillship activity were allowed to occur during a portion of the fall bowhead migration. We feel this experience clearly documents the compatibility of offshore drilling activity with subsistence whaling.

We ask that these data be added to this section of the report.

Page 43, column 1, paragraph 3: "The 1002 area has received no industrial use other than oil and gas exploration under the 1002 program."

Reindeer herding and commercial whaling were practiced in the early part of the century.

Page 45, column 2: Statistics on recreational use of the 1002 area seem unduly inflated. Permit data on file with the USFWS indicate that 1983, 1984 and 1985 had only 6, 33 and 33 permitted users respectively for the 1002 area. Additionally, it is not clear whether the "less than 3000" recreational visits per year include the "Kaktovik residents also engage in snowmobiling" or not. If so, the number is deceptively large.

We ask that these figures be included in the report to emphasize the low frequency of recreational use for the area.

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Page 45, column 2, paragraph 5: "The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America."

There is ample evidence in the report referring to recreational and subsistence use of the area to show that the area is not undisturbed.

Page 46, column 1, paragraph 2: "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge."

This statement is contrary to the wildlife population data cited in the preceding parts of this chapter which point out the relatively low abundance of wildlife species and the relatively short period of use of the 1002 area. We suggest deletion or at least clarification and quantitative justification for this statement.

Page 46, paragraph 3: This paragraph acknowledges the esthetics of the coastal plain area but fails to recognize that the easternmost portion of the ANWR coastal plain has similar aesthetics and is currently designated as wilderness.

Even with full leasing under Alternative A, this 30 miles of coastal plain from the 1002 area east to the Canadian border and further into Canada will remain as wilderness, thus preserving the complete spectrum of arctic ecosystems represented in the Arctic Refuge. Furthermore, we believe that leasing and development will not lead to a permanent loss of esthetics.

Page 49, column 2, paragraph 2: "These 26 prospects were subjected to technological and economic conditions to determine the degree to which their resources could be recovered, resulting in estimates of conditional economically recoverable resources."

It should be recognized that these technological and economic criteria could be different for different lessees, resulting in variable reserve estimates, high and low.

Page 49, column 2, paragraph 2: "It is estimated, if there is economically recoverable oil present (the chance of which is estimated to be about 20 percent),..."

This estimate is misleading to those who are not familiar with typical industry risk and success ratios. While a 20% chance might be considered unfavorable to others outside the petroleum industry, it is an excellent chance from an industry standpoint. The record in Alaska shows only 1 out of 10 exploratory wells drilled encounters any hydrocarbons at all, and of those that do, only 1 out of 5 finds a commercial field. Hence, out of 100 exploratory wells drilled, only 10 would encounter oil. Of those 10, only 2 would have discovered economically developable fields. This represents a 2 percent chance of success compared to the 20 percent mentioned above. In other words, 20 percent represents a considerable increase over past industry success in Alaska.

Page 51, column 1, paragraph 4: "However, the estimation of recoverable resources was limited to those prospects (all structural) which can be identified and delineated with reasonable degree of certainty, and which are physically large enough that they could reasonably be expected to contain commercial quantities of oil."

A reserve estimate based on these criteria should represent a minimum. Recoverable resources from stratigraphic traps could be considerable since many of the plays identified on p. 63-67 are stratigraphic in nature. Further, the minimum economic field size would be expected to decrease as infrastructure from larger fields is developed. Prospects that were deemed too small to be economically viable on their own may come into play later on in the development cycle. Additionally, all of this discussion precludes the uncertainty of oil prices and the effect of price fluctuations on the economic viability of any prospect.

Page 54, column 2, paragraph 1: "If most of the Ellesmerian rocks are missing in most of the 1002 area, the assessment number would be reduced considerably. Drilling of one or two wells in critical areas would resolve this question."

Although the drilling of one or two stratigraphic wells would provide additional geologic detail, it only prolongs the process of determining and evaluating the resource potential of the Coastal Plain. The level of geological information currently in hand is sufficient to begin an exploratory phase of drilling on the Coastal

Plain. As exploratory wells are drilled to evaluate oil and gas prospects, stratigraphic information will be obtained to update resource and reserve estimates.

Page 58, column 2, paragraph 6: "No prospects were adequately resolved within the detached and highly deformed Mesozoic and Tertiary rocks."..."Structural analogs in Canada - the Alberta disturbed belt - and in the Montana-Wyoming thrust belt suggest that the probability of traps occurring in the subsurface in this structural setting is high, although determining their location on the basis of existing seismic data is difficult."

These statements indicate that the resource estimate might actually be higher than what is stated in the report.

Page 61, Table III-2: Data on Petroleum Prospects in the 1002 Area.

The data presented in the Table indicate that many of the prospects have been identified by only one seismic line. It is difficult, if not impossible, to identify the areal extent of a prospect from only one seismic line. Hence, the reserve estimates for these prospects could be understated.

Page 68, column 2, paragraph 4: "The PRESTO model also allows for input of a minimum economic field size. Any field smaller than this economic field size is not counted in the prospect or area conditional resource estimates."

The economical viability of small fields should improve as the infrastructure is developed for larger fields. To exclude the reserve potential of smaller fields strictly by size does not seem reasonable.

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The scenarios for exploration, development, production and transportation set forth in Chapter IV are realistic and reasonable descriptions of how petroleum development and operations may be conducted on the Coastal Plain. We believe that Chapter IV is responsive to Section 1002(h)(3), which requires an evaluation of the effects of further oil and gas exploration, development, and Section 1002(h)(4), which requires a description of transportation facilities. We offer the following comments and suggestions on the content of Chapter IV:

Page 75, column 1, paragraph 3: "Without exploratory drilling as a confirmation and delineation tool, all estimates must be considered uncertain."

We fully support this important caveat. Drilling an adequate number of exploratory wells is the only means of reducing the inherent uncertainty of the estimates which form the basis for the scenarios described in Chapter IV.

Page 75, near top of column 2: "Specific locations and sources of water and gravel for exploration and development activities have not been identified; and it is understood that these resources, especially water, are not readily available on the 1002 area."

Throughout the "1002" draft there are numerous references to gravel and water shortages with the implication that there are no known ways in which these resources can be obtained in quantities sufficient to support development and operations. We believe the report overstates potential problems in obtaining needed water and gravel.

With regard to the availability of gravel, it is acknowledged on page 20 of the report that "The valleys of larger streams are underlain by large quantities of coarse sand and gravel". Further, data available from the drilling of thousands of shallow shot-holes throughout the 1002 area substantiate that much of the area is underlain in the very near surface with gravel. These data from the group seismic surveys are available to the Department of the Interior and should be used to substantiate the availability of gravel for construction.

We also believe that the report overstates the problems attributed to the scarcity of water from the 1002 area. While we acknowledge that fresh water may not be readily available in much of the 1002 area (as is the case generally in the Arctic), there are ways of providing for water as demonstrated in the Prudhoe Bay area. Water availability varies by location, and solutions to provide water must be considered on a site-specific basis. Specific solutions are addressed in later comments.

Page 75, column 2, last paragraph: "On the North Slope, exploratory wells to a depth of approximately 12,000 feet can usually be drilled in a single season. It is possible that many wells would require two seasons."

The presumption that a 12,000 foot exploratory well can usually be drilled in a single season is not necessarily correct. Further, the presumption that wells which cannot be drilled in a single winter season will require a multi-season effort should be examined on a case-by-case basis. While we agree that operations should be scheduled to avoid significant disturbance to wildlife and the environment, conducting exploratory operations into or through the summer may be warranted if adverse impacts can be avoided.

Page 76, column 1, paragraph 2: "Heavy construction equipment is used to prepare the wellsite for the drilling operation and to prepare an airstrip large enough for Hercules C-130 aircraft."

The assumption that all exploratory drilling operations would be mobilized and supported by C-130 aircraft results in overestimating water and gravel requirements, vegetation disturbance, wildlife displacement and loss of habitat. Exploratory wells can also be mobilized and supported by Rolligons and other surface vehicles as has been demonstrated by past experience on the North Slope.

Page 76, column 2, paragraph 1: "On the 1002 area, obtaining the water needed for drilling, and more particularly for ancillary needs such as ice roads and airstrip construction, poses the major engineering problem."

Here again, the problem of water availability is overstated, particularly for an exploratory well. The roads and ice airstrips can be constructed from snow. Snow fences have been successfully used for the collection of snow for such construction. Snow/ice melters can be used to obtain water for drilling and camp use. As a last resort, water can be hauled or even air-lifted to an exploratory operation. Also, there are lakes (depending upon locality) which do not freeze to the bottom. The three scenarios for obtaining water described on page 76 are also feasible alternatives for obtaining water or reducing the requirements for water.

Page 77, column 2, paragraph 1: "Following is a discovery of oil from exploration drilling, a confirmation or delineation well is drilled during the next drilling season. ... further delineation drilling occurs during subsequent drilling seasons."

Delineation drilling may not require a sequential season-by-season time frame. Delineation wells often can be drilled in a significantly shorter drilling time than a rank exploratory well depending on (among other factors) the depth of the production horizon. Also, one or more delineation wells can be drilled from the same location by directional drilling which in itself would reduce

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expenses and impacts by limiting the number of surface locations required.

Page 78, column 1, full paragraph 3: "...about 10 years will elapse before production starts from a new lease."

This may be an overly optimistic time frame, if seasonal restrictions are indiscriminately placed on operations and construction. Permit acquisition may contribute to a more lengthy time frame. Twelve to fifteen years could be required from lease acquisition to first production.

Production Infrastructure

Page 80, column 2, paragraph 5: "The drilling pad--- covers 20-35 acres... 160,000 - 285,000 cubic yards of gravel."

This is not typical at present but relates to the 40-50 wells/pad suggested on page 81 (paragraph 2). Typical latest technology on Kuparuk River Field (D.S. 3G) is 24 wells on an 11.5 acre site (including reserve pit area) with only 46,000 cubic yards of gravel (for wellheads at 25 feet spacing). With reduction in wellhead spacing (which is already achievable) a 40-50 well pad could be little bigger than the Kuparuk River Field example given above. Well spacing for the Endicott field, now under development, is about 10 feet from wellhead to wellhead.

Page 81, column 2, paragraph 1: "These roads would have a crown width of approximately 35 feet...."

Kuparuk River field standard is 32 feet for main roads and only 24 feet for other roads.

Page 81, column 2, paragraph 1: "Construction of a marine facility to service development... would be necessary because long hauls... from Prudhoe Bay are impractical."

A marine facility would be required for major equipment sealifts in summer open water seasons. However, year-round transportation services to drillsite facilities would be via Prudhoe Bay.

Page 82, column 1, full paragraph 2: "...construct a second pipeline parallel to TAPS..."

Given the certain and precipitous decline from existing North Slope production, which will have occurred long before any new production will be available form the 1002 area, it is very unlikely that a new trunkline from the Prudhoe Bay to Valdez would be required.

Page 82, column 2, full paragraph 2: "A concept used in the Kuparuk River field pipeline, but not incorporated in TAPS, was construction of only one road for use as both a main transportation artery and a pipeline maintenance road."

If the main road is not adjacent to the pipeline, adequate access on a year-round basis will be needed to the pipeline.

Page 83, column 1, paragraph 1: "Access to valves, which require frequent maintenance..."

This is not the case, although on the rare occasion when a valve is automatically closed it may need to be reopened manually.

Page 83, column 1, paragraph 2: "A pump station is required every 50-100 miles... 2 or 3 pump stations probably would be required... The first would be located near the oil field."

For 150 miles no intermediate pump station would be necessary. The first and only pump station would be located at the oil field. A pipeline of this length would certainly not be designed with 2 or 3 pump stations, but with one and a pipeline diameter sufficient for a the anticipated maximum flow.

Page 83, column 2, paragraph 4: "Maintaining continuous control of the pipeline... would require a complex communication system".

Although complex, such communication systems are standard technology.

Page 84, column 1, paragraph 2: "Airfields may be required at pipeline construction camps and pump stations or airfields may be shared with oil development facilities."

Permanent airstrips (5,000-6,000 feet long and 150 feet wide and five feet thick) are not likely to be required to support the pipeline during construction or operation. To consolidate facilities, only one or two permanent airstrips are likely to be needed to support all operations in the 1002 area. Temporary ice airstrips may be required to support exploratory drilling and pipeline construction.

Page 85, column 2, full paragraph 4: "the actual availability of gravel is unknown..."

Here again, we offer the comment that data from thousands of shot-holes drilled as part of the 1002 area group seismic surveys provide evidence of widespread gravel availability in the near surface of the 1002 area.

O-74

The five alternatives ranging from full leasing (Alternative A) to wilderness designation (alternative E) describe a full spectrum of possible alternatives for the future management of the 1002 area. The options as listed occur in the order of industry preference. That is: full leasing, followed by limited leasing, further exploration, no action. The least preferred would be a wilderness designation for the Coastal Plain. No action would be far better than wilderness status. The area is currently managed as a wilderness. If no action is taken, then the Coastal Plain will continue to be managed as wilderness, but options will still be open for the future.

We strongly endorse Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest.

Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise.

Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling. Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C would just be another delay in the eventual production from the area.

Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

Page 89, column 1, paragraph 1: "If the Congress chooses to authorize leasing in the entire 1002 area, the legislation would probably contain the important elements of the Mineral Leasing Act and the NPRA legislation, with special provisions to meet the unique needs of the Arctic Refuge."

Without offering specific suggestions as to lease terms and the provisions for leasing, which may be applied to the 1002 area, we would like to point out a few problems with the NPRA leasing program. First, the NPRA program did not provide for unitization which (among other things) is the basis for the consolidation of facilities. Provisions for unitization are necessary if redundant operations and facilities are to be minimized. Second, given the long lead times for development in the 1002 area, there should be provisions for holding a lease (or unit) beyond the primary term of

the lease by virtue of "shut-in" production. Third, the overall suite of stipulations and regulations applied to exploration, development, and production in the 1002 area must not be unduly burdensome. Collectively, the stipulations and regulatory framework imposed on the NPRA were burdensome to the point of precluding industry interest in evaluating the NPRA.

Page 89, column 1, item 3: "Development will be unitized within the 1002 area and on privately owned subsurface resources in the vicinity of Kaktovik."

Exploration as well as development should be allowed to occur under unitized operations. Further, given the proximity of state submerged lands, private lands, and federal lands (1002 area onshore and the OCS), unitization policy should be coordinated between all lessors and their managing entities.

Page 89, column 2, item 5: "Development, production and, transportation of oil from the 1002 area are considered to be independent of any offshore production; however, infrastructure could be shared."

Please see previous comment on item 3 regarding unitization. Given the proximity of state, federal, and private lands it is possible that common reservoirs may extend under all categories of land ownership. If this proves to be the case, the management of onshore land should not be considered independently of offshore lands.

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Page 91, Table 5-1: Some of the estimates in this Table seem to be overstated. There does not appear to be a great deal of difference between the full leasing option and the limited leasing option. The number of facilities, amounts of gravel, and acres indicated in the table seem excessive, such as: processing facilities, permanent airfields, and drilling pads. Table 5-1, as well as Figure 5-1 are very hypothetical cases. Development might be something like this or it might be one large field or a combination of closely located fields.

Page 92, column 1, paragraph 4: "A program to drill off-structure test wells would provide subsurface geological information."

The drilling of additional wells/stratigraphic tests would not necessarily determine the presence or absence of oil or the absolute presence or absence of the Ellesmerian section. Industry feels that it has sufficient data to lease and explore for oil and gas. Alternative C represents an unnecessary delay in exploration and, ultimately, production.

The general comments pertaining to Chapter II apply also to Chapter VI. The following are specific comments on Chapter VI:

Page 95, paragraph 8: "In Alternative A, three portions of the 1002 area.....are all predicted as being developed, and the assessment considers all three areas as developed concurrently... Therefore, the analysis and consequences may represent a higher level of development than may actually occur at any specific time if the area were opened to leasing."

We would agree that the analysis represents a worst case scenario and therefore most subsequent environmental effects outlined in Chapter VI are overstated from what is likely to occur.

Page 98, paragraph 2: For additional comments, see our Comment #5 on page 10 of this document. We feel that the designation of USFWS Resource Category 1 for a portion of the calving habitat available to the PCH is inappropriate. Significant year-to-year variability in calving distribution has been recorded for the Porcupine herd all across the coastal plain from well into Canada and west to the Canning River. Therefore, calving habitat is more appropriately represented as a true continuum across the coastal plain. Thus, the "unique and irreplaceable" nature required for designation as Resource Category 1 does not pertain.

Page 98, section on Effect on Physical Geography and Processes: There are no mitigation sections in the subheadings:

"Consequences of Geological and Geophysical Exploration"
"Consequences of Exploratory Drilling"
"Consequences of Development Drilling"
"Consequences Resulting from Construction of Roads, Pipelines, and Marine and Production Facilities"

Mitigation sections are found in the remaining two main subheadings in this chapter: "Effects on Biological Environment" and "Effects on Socioeconomic Environment", thus it would seem appropriate to include mitigation sections in the "Effects on Physical Geography and Processes." This is particularly true in light of the very large body of knowledge that has been developed over the past two decades on this subject. There are literally hundreds of proven mitigative techniques commonly applied on North Slope oilfields by virtue of the fact that arctic environmental engineering is in a mature stage of development.

Page 100, paragraph 1 and 2: "Preliminary results of those investigations show gradients of increase in pH, salinity, alkalinity, turbidity, and sediment loads from control ponds to ponds adjacent to reserve pits (R.L. West and E. Snyder-Conn, unpublished data). Trends of increase in the vicinity of reserve pits were also shown for heavy metals such as aluminum, barium, chromium, zinc and arsenic, as well as for certain hydrocarbons...."

We feel that the conclusions regarding relative impacts from potential discharges of reserve pit waters are overly severe and not substantiated by actual field monitoring data or current practice information from Prudhoe Bay areas. It is not appropriate for DOI to cite unavailable and unpublished data in support of these allegations. To the contrary, available data indicate that any impacts are extremely localized and limited to the immediate vicinity surrounding the pit. No effects have been observed in fish or wildlife species from active reserve pits and we feel adequate technology exists to close pits in an environmentally safe manner.

West and Snyder-Conn report basic conclusions, cited in the draft 1002(h) report, that were derived from the misapplication of statistical analyses. Based on the ANOVA analysis performed in West and Snyder-Conn's draft report, they would not have concluded that ponds adjacent to reserve pits were significantly different from control ponds because they did not apply the statistics to answer that question. What they did conclude by their analyses, based on the comparison they carried out, was that reserve pits differed from control ponds. The difference was that USFWS compared reserve pits to control ponds, and ARCO compared ponds near reserve pits to control ponds. There is no question that reserve pit water quality differs from natural ponds. The appropriate question is how natural ponds near reserve pits differ from control ponds. USFWS has not adequately analyzed the data to answer this question.

O-76

We recommend deleting any references to West and Snyder-Conn's report or their conclusions.

Page 100, paragraph 3: "There are two approaches to abandoning an exploratory well reserve pit: 1. Leave it as is."....

Recent studies in the Canadian Arctic (French, 1985) and in the NPRA, Alaska (Nuera Reclamation, 1986) document the minor environmental effects of abandoning a drilling reserve pit without closure. However, it is current industry practice to "button up" the reserve pit adjacent to exploratory wells. All recent state and federal lease sale stipulations require complete closure and containment of reserve pits. Therefore, the purposes of discussing future options for reserve pit closeout on the Coastal Plain, option #1 is not relevant and should be deleted.

Page 100, paragraph 4: ....."Therefore, this method requires remobilizing construction equipment, opening a gravel pit elsewhere, and hauling in material to fill in and "mound up" over the reserve pit area."....

Recent experience from exploration wells on the North Slope do not support this statement. Reserve pits can be excavated into the permafrost and then closed out by filling with the original mineral soil and capped by the tundra mat material. This allows the pit contents and capping soil to freeze back and form a stable mound over the pit and to accommodate revegetation. Experience indicates that a) this method is a very effective mitigation technique, b)

remobilizing equipment is not necessary, c) opening other gravel borrow pits is not necessary, and d) the material will revegetate naturally and rapidly.

Page 100, paragraph 8: "The almost unavoidable minor oil leaks and spill.....which would contaminate the tundra and, possibly, the aquatic environment....."

Spills of oil are easily noticed on ice and snow and rarely escape detection, even in quantities of less than a gallon. Further, these spills are easily and routinely cleaned up and disposed of properly. All that is required is that the snow/oil mixture be scooped up by shovel or front end loader. Thus, the actual amount of spilled oil that lasts until spring is exceedingly minor.

Page 101, paragraph 17: "Construction of a solid-core causeway....would require breaching to permit fish passage...."

The breaching of gravel causeways for fish passage is not a necessary requirement. Although fish do pass through large breaches (Endicott Environmental Studies 1985) they also go around causeways with and without large breaches (Endicott Studies 1985; Prudhoe Bay Waterflood Studies 1981, 1982, 1983 and 1984). The Waterflood studies demonstrated that the West Dock Causeway was not an impediment to the migration of large fish. The 1985 Endicott and Colville River Fish Studies showed that even the smallest migratory anadromous fish, young-of-the-year Arctic cisco, were able to get by both the West Dock and Endicott causeways to reach the Colville River.

Page 103, paragraph 5: Meehan (1986) is a draft report that contains a significant number of errors including many erroneous conclusions on (1) gravel spray and (2) dust. We also have significant additional concerns over the methods used and data interpretations. We request that all calculations, extrapolations and conclusions based on Meehan (1986) be omitted.

Page 103, paragraph 7: "Since 1972 some 23,000, mostly small, spills have been reported to the Alaska Department of Environmental Conservation. The largest spill of 658,000 gallons was the result of sabotage in 1978. A spill of over 200,000 gallons near Atigun Pass in 1979...."

It should be pointed out that neither of these incidents occurred on the North Slope, although they are an indirect outgrowth of North Slope development.

Page 104, paragraph 1: "to date, the cumulative effect of spills has not been significant".

We would concur with this assessment. However, the main reason for the lack of significant impact is completely absent from the discussion. Of the 82,216 gallons spilled in 1985, very little actually reached the environment because it was properly cleaned up. The discussion leaves the reader to conclude that all 82,216

gallons went into the tundra or wetlands. Spill prevention and cleanup is aggressively pursued on the North Slope and to date has been effective. Most spills occur on gravel production pads while snow is on the ground and are therefore easy to spot and cleanup. Those that do escape detection or occur in the summer off gravel pads are treated with sorbent pads and rehabilitation and revegetation procedures.

Page 104, paragraphs 4 and 6, Mitigation Section

The preceding discussion of impacts to vegetation, wetlands, and terrain types covers in detail the possible impacts from:

1. seismic surveys
2. ice pads and roads
3. gravel pads and roads
4. reserve pits
5. oil and fuel spills
6. gravel mining
7. secondary effects of roads, such as dust, thermokarst, gravel spray and impoundments.
8. seawater spills

The following Mitigation Section for these impacts discusses only a portion of these impacts and does so in the briefest possible manner. It is not for lack of subject matter or data, however, since 18 years of Arctic experience and many millions of dollars have been spent on effective mitigation techniques. The following commonly employed mitigation techniques should be discussed to properly balance the discussion:

1. Snow depth, routing and USFWS oversight procedures followed during seismic surveys.

2. Current accepted design parameters for ice pads and roads, (i.e. Brontosaurus well, NPRA, ARCO) that requires sufficient thickness, siting considerations.

3. Site selection criteria for roads and pads that avoid critical habitats.

4. The trend towards smaller gravel pads and reserve pits, decreasing the wellsite "footprint".

5. Aggressive fluid management of reserve pits to prevent overtopping and leaking.

6. Chemical screening of all reserve pit fluids prior to surface disposal to insure water quality standards are met.

7. Comprehensive oil spill contingency planning.

8. Spill clean up procedures, including proper disposal of contaminated snow in winter and sorbent pads in summer.

9. Rehabilitation and revegetation of disturbed sites, including gravel spray removal, reseeding, replacing damaged vegetation mat.

10. Road watering to minimize dust generation.

11. Improved culvert design and placement to avoid impoundments.

Page 104, paragraph 7: "The expected modification of approximately 12,650 acres (0.8 percent of the 1002 area) would be a moderate effect (Table VI-1) on area vegetation and wetlands."

The estimate of 5,650 acres for direct impacts of gravel appears to be reasonable based on the proposed scenario. Further, the classification of moderate impact for this area is appropriate. However, classifying 7,000 acres of secondary impacts as moderate is either a) too large an area to be placed in the moderate category, as defined, or b) too severe a category for that broad an area.

The moderate category requires either a "local modification of considerable severity" or a "widespread modification of lesser severity". Since 12,650 acres is 0.8 percent of the Coastal Plain, it does not fit the category of "widespread". Therefore, the 7,000 acres of secondary effects are defined as local modification having "considerable severity". It is difficult to defend the hypothesis that 7,000 acres of road dust, gravel spray and thermokarst would reach this degree of impact.

Page 106, paragraph 2: "Later studies (Cameron and Whitten, 1979, 1980; Cameron and others, 1981; Whitten and Cameron, 1985) indicate an absence of calving near the Coast at Prudhoe Bay during 1976-85, possibly due to avoidance of the activity area by calving caribou".

This is a widely quoted, through erroneous, conclusion of the low numbers of cows with calves found in the Prudhoe Bay area. ADF&G, for the period 1978-85, reports average caribou densities of 0.06 caribou/km^2 while Gavin (1979) reports densities of 0.01-0.05/km^2 for the predevelopment period of 1970-79. Thus, the conclusion is that total caribou densities have always been low. In regards to calving, inspection of Table 1 shows the same consistent low historical numbers with little change through development.

At a recent caribou workshop at Alyeska (Demography and Behavior of the Central Arctic and Porcupine Caribou Herds in Relation to Oil Field Development, Oct. 1986) all ADF&G and USFWS participants including Messrs Cameron and Whitten, reached the consensus that "the Central Arctic Herd (CAH) has never calved in the Prudhoe Bay area in large numbers."

We suggest this paragraph and Table VI-4 be amended to show this area as a historically low density calving area (see Table 1). Regardless of the pre-development data the fact remains that this herd has continued to proliferate during the period of maximum development at Prudhoe Bay.

TABLE 1 - TOTAL NUMBERS OF COWS AND CALVES WITHIN THE PRUDHOE BAY AREA (1165 km^2), 1970-1979. From Gavin, 1980.

Year	Cows	Calves	Calves per 100 Cows	Yearlings	Bulls	Total	Density Caribou/km^2
1970	24	17	71	8		49	0.04
1971	16	7	44	7		30	0.03
1972	8	5	63	4		17	0.01
1973	24	9	38	9		42	0.04
1974	34	9	27	8		51	0.04
1973	27	13	48	4		44	0.04
1976	19	4	21	5		28	0.03
1977	14	11	79	3		28	0.03
1978	29	15	50	7	6	57	0.05
1979	13	7	50	8	4	32	0.03

O-78

Page 106, paragraph 4: "The 242,000 acres of calving habitat are proposed for designation as Resource Category 1 in accord with FWS mitigation policy."

We feel strongly that this is an inappropriate designation and over-extension of the FWS mitigation policy. We recommend that this designation be eliminated. See comment for page 98, paragraph 2, above.

Page 107, paragraph 2: Calculations of secondary modifications should be changed to exclude any data extracted from Meehan (1986).

Page 107, 108 and 109: These three pages of literature citations discuss the Prudhoe Bay caribou behavior studies in detail. Data are reported which discuss disturbance and displacement of caribou movement patterns throughout the field as a result of developmental activities.

We readily agree that some degree of modified behavior and displacement has occurred in response to habitat alterations in the Prudhoe field. However as discussed in comments for page 28, paragraph 1, above, habitat is not limiting caribou population growth for any Alaskan herds at the present time. Therefore, a degree of habitat loss as a result of development on the coastal plain will be inconsequential to growth and productivity of the herd.

In the management of wildlife populations, the concept of habitat carrying capacity is the key to defining management goals for a herd. It is an established fact that neither the CAH nor the Porcupine Herd approach the carrying capacity of their ranges. Indeed, Skoog (1968) stated the "It seems likely that the Alaskan caribou population has remained far below range carrying capacity and that the total habitat has never been fully occupied. In reality, caribou populations seem to have maintained densities much lower than the maximum dictated by food alone, and hence the reduction in total range becomes less meaningful." Thus, we agree with Skoog's conclusion that habitat is not currently limiting the growth of the Porcupine Herd and that the loss of habitat represented by likely development in the 1002 area will not impact growth or productivity of resident caribou.

Page 107, paragraph 5: "Whitten and Cameron (1985) found consistently low numbers of caribou and generally low percentages of calves in the Prudhoe Bay oilfield from their annual surveys of the CAH calving grounds, 1972-82, with caribou being displaced to adjacent areas already used for calving."

Based on Gavin (1980) which demonstrated consistently low numbers of caribou and low percentages of calves throughout the period 1970-1979, the conclusion is reached that numbers have always been low in the Prudhoe Bay Region. White et al. (1975) suggests that the high percentage of wet and moist areas near Prudhoe Bay makes this area less attractive to caribou. This was the conclusion of

the Alyeska Caribou Workshop in October 1986 (see comments for page 105, paragraph 2).

Page 107, paragraph 5: "Dau and Cameron (1985), in what may be the most systematic study of caribou displacement by oil development, reported that maternal caribou groups showed measurable declines in habitat use within approximately two miles on either side of the Milne Point Road in the Central Alaskan Arctic."

The "two mile" reference is a typographical error. The actual distance is "two km".

Page 108, paragraph 2: "Displacement of the PCH from a core calving area to a less desirable area would be excepted to reduce caribou productivity."

It is implied that any displacement of the PCH would necessarily be into a less desirable area. As the report points out, there is over two million acres of known concentrated calving area, not counting peripheral areas. Since the PCH has calved throughout this area successfully in the past, and there is no known effect of decreased productivity in the years that the herd used those areas exclusively, there is no reason to conclude that the areas outside the core calving area area less desirable. Therefore, the expectation that the herd's productivity will suffer is not supportable.

Page 108, paragraph 3: Although the absolute density for the PCH is almost 14 times, and the Western Arctic almost 15 times greater than the CAH, none of these herds approach the carrying capacity of their respective ranges. Therefore, any arguments against extrapolation of CAH data to the PCH based on relative densities on the fact that the PCH may occupy coastal plain habitat in higher densities than the CAH are not valid. (See comment to page 107-109, above).

We ask that the above point be clearly made in the conclusions of environmental impacts for alternative A.

Page 108, paragraph 5: "The lack of observable adverse effects from displacement exhibited by the CAH would be unlikely for the PCH. The PCH is much more crowded in its calving habitats, and a substantially greater proportion of important calving habitats would be involved with development that included their core calving area."

The fact that the PCH has higher calving densities than the CAH is not sufficient to argue that displacement would be likely to cause adverse effects. Two other conditions would have to be met: 1) alternative high quality calving habitat is not available in sufficient quantities. The large area used by the PCH for calving, and their historical use and success in that habitat, would indicate that this is not the case. 2) The densities achieved by the PCH during calving are near some threshold limit above which range destruction or negative intraspecific interactions would occur. This has not been demonstrated.

Page 108, paragraph 7: "Based upon the work of Dau and Cameron (1985), caribou are displaced approximately 2 miles out from development...within this 2 mile area of influence are about 357,000 acres of the total core calving grounds in the 1002 area."

This statement is a misrepresentation of the study conclusions. In fact the relationship between calves and distance from the road (Milne Point) is statistically insignificant. Dau and Cameron did find fewer maternal groups near the road than away from it, but the partial displacement was for 2 kilometers, not 2 miles.

Additionally, their data show a high degree of year-to-year variability -- so much so that they had to resort to a mathematical transformation of their data in order to show stabilized variances so a test of significance could be run. Their data also show that non-maternal caribou were not displaced by the road corridor and that "partial displacement" was shown within a zone of 0-3 km.

The USFWS uses these data to imply that a complete displacement of all caribou groups occurred out to 2 miles. This is a gross over-extrapolation of the data and we ask that this section be rewritten to more propertly reflect the study results.

Regardless of the conclusions regarding partial displacement, a comparison of the study data from 1978 to 1985 clearly documents an increased density of animals through the period of maximum development in the area. We feel this increased density clearly demonstrates that the CAH has continued to grow and thrive concurrently with the development of the oil field. This conclusion must be noted in any discussion of the Dau and Cameron data.

Page 109, paragraph 6: "If caribou refuse to cross through any development areas, then 194,000 acres would be unavailable as habitat. That area encompasses 52 percent of total insect-relief and over 80 percent of Coastal insect-relief habitats. This would mean that all coastal insect-relief habitats within the 1002 area, except for a small area in the eastern portion, would become unavailable under full development.

The hypothesis that the PCH would be eliminated from virtually all it's coastal insect-relief is predicated by the supposition that the PCH would "refuse to cross through any development areas". There are no studies in the literature to support the hypothesis that a properly designed pipeline and road would present a total physical barrier to caribou movements. Yet there are abundant examples of herds throughout the world regularly crossing roads, roads with pipelines, hunter's firing lines, and even improperly designed pipelines such as the Norilsk gasline in Russia (Shideler, 1986). The supposition is unsupportable.

Page 109, paragraph 6: "The second factor is to assume the approximately 2-mile sphere of influence for oil development used previously. Under that assumption, caribou crossing through the development area would avoid using approximately 72,000 acres or 29 percent of identified coastal insect-relief habitat withing the 1002 area...."

The 2-mile sphere of influence is based on the Dau and Cameron (1985) study that was conducted during the calving season, not mosquito harassment season. Conclusions regarding movement of mosquito harassed groups seeking coastal areas cannot be drawn from studies of the distribution of caribou during calving. Dau and Cameron (1986) found that "during June, the relative number of caribou within 1km of the (Milne Point) road was positively correlated with distance from the road; there was no relationship between number of caribou and distance from the road for either May or July/Aug." It is well recognized that measurable behaviors that can occur during calving, such as avoidance, are often absent at other times of the year, such as during insect harassment.

Page 110, paragraph 3 and 4: Available literature clearly shows that caribou can and do readily acclimate to aircraft overlight noise. CAH animals throughout the Prudhoe Bay area characteristically show little disturbance to typical overflights. Any perceived negative effects can be readily mitigated by maintaining a minimum aircraft altitude of 500 feet (AGL) during overflights. Also the experience with the Delta herd, where calving grounds are located next to overflight, bombing, and strafing areas, further documents the acclamation of these animals to aircraft noise.

Thus, we ask that this section be rewritten to more properly reflect the acclamation of caribou to aircraft.

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Page 111, item #10: Reduction of surface occupancy in the insect relief habitat to 3 miles from the coast.

In the Kuparuk River oilfield, experience has shown that 3/4 mile of reduced occupancy from the coast is sufficient to ensure adequate insect relief habitat. This distance appears sufficient since actual insect relief habitat is the coast line proper, shallow coastal water, offshore islands and coastal bluffs - a relatively narrow band. Once this narrow band is provided, the second requirement is to provide for relatively free movement along the coastline. Elevated pipelines and other normal mitigation measures similar to those applied in the Kuparuk Oilfield have proven effective in allowing passage. Thus, we ask this stipulation for a 3 mile reduced surface occupancy zone be changed to reflect the currently proven experience of 3/4 mile.

Page 112, paragraph 2: Neither the CAH nor PCH are at carrying capacity for their respective ranges and therefore incremental habitat loss due to development of the coastal plain can be expected to result in only minimal displacement of the herd. See comment page 107-109 above.

Page 112, paragraph 3: "A major change in distribution. . . could occur if the 1002 area were fully developed . . . nearly 80% of coastal insect relief habitat could be affected if development proves to be a barrier to caribou movements."

Although the conclusions of this paragraph are preceded with "could" and "if", the statements are still gross over-generalizations with no basis in fact. The extensive Prudhoe Bay experience indicates that these statements are false. The Kuparuk River oilfield experience clearly shows that caribou can and do readily move across developmental structures. Proven mitigation measures such as elevated pipelines and crossings ensure that access to insect relief habitat will remain. Thus, projections such as 80% loss of available relief habitat are unfounded.

We ask these gross generalizations be removed from the report.

Page 112, paragraph 4: ". . . could result in major population decline and change in distribution of 20-40 percent . . . this estimate is uncertain."

Although this projection is followed by the uncertainty statement, we feel strongly that this statement is completely unfounded and unsupportable. No data are provided to support this estimate and we are given no basis for its determination. We conclude that the estimate is highly speculative and ask that the entire paragraph be deleted from the final report.

Page 112, paragraph 5: "For the CAH, a moderate change in distribution or decline in that portion of the CAH using the 1002 area could occur. The effect on the entire CAH population throughout its range may also be moderate. Those effects on the segment of the CAH within the 1002 area would be similar to those on the PCH that occur from disturbance, displacement and barriers to free movement. The population decline or distribution change would be 5-10 percent for the CAH throughout its range."

The basis for concluding that a moderate change in the CAH distribution or numbers has not been presented. In fact, all the data presented would lead one to the opposite conclusion. There is abundant discussion in the report regarding why the CAH is different and can be expected to respond differently to development than the PCH. The facts of lower overall densities, lower calving densities, more distributed rather than concentrated calving, incomplete range utilization, greater habituation and the overwhelming fact that the CAH has already demonstrated its accommodation to development are all discussed in the report. All of these argue towards a minimal impact of the proposed scenario on the CAH. Further, the proposed development scenario borders the extreme eastern extension of the CAH's calving areas, while it overlaps substantially with the PCH. Given all these differences discussed in detail in the report, it appears to be inconsistent with the conclusion that the "effects....would be similar." The qualification of "on the segment of the CAH within the 1002 area" is specious because there is no distinct subpopulation of the CAH that uses the 1002 area. That a "population decline or distribution change would be 5-10 percent" is not supportable. Based on Table VI-1, the environmental effect on the CAH should be negligible.

Predicted population declines, particularly in the CAH cannot be supported by any scientific or logical hypotheses. In fact, the CAH has continued to grow at a 13% year rate while continuing to calve in areas of oil development. A prediction of population decline for the CAH, based on oil development in the fringe areas of their calving habitat, directly contradicts the results of 10 years of detailed scientific study of the CAH.

Page 113, paragraph 3: "Displacement from calving areas would have a negative effect on muskoxen production."

Displacement from calving areas may have a negative effect on muskoxen production if they are near or at their upper limit of utilizing all high quality calving habitat throughout their range. The high productivity reported for the ANWR muskox population has been attributed to the availability of preferred forage during summer (Robus 1981) and to the tendency for herds to remain in relatively restricted home ranges, thereby capitalizing on the abundant forage (Jingfors 1980). As the 1002 report points out, "carrying capacity has apparently not been reached." Thus due to the fact that the herd is still expanding its range, and that high productivity rates have been tied to abundant forage, it does not follow that displacement would have a negative effect on productivity.

Page 113, paragraph 4: "From the reports of Russell (1977) and Reynolds and La Plant (1985), a 2 mile sphere of influence was assumed in calculating the range which could be affected by full leasing."

O-81

The term "affected" is defined in the next sentence as "lost or greatly reduced." Thus the 2-mile area is being defined as an area where muskoxen are removed by 100% (lost) or decreased by an amount in the range of 60-90% (greatly reduced). The data of Reynolds and LaPlant (1985) show that a flight response occurred in only 7 of 31 groups (23%) encountered in the Tamayariak area (Table 1) or the Okerokovik area (Table 3). This flight response occurred at distances from 200 m to 3.2 km, or an average of 1.5 km. Based on these data, one would have to significantly increase the stimulus, or shorten the 2-mile sphere of influence, or both, to reasonably expect a 50 to 100% displacement in muskoxen. Four of the 9 groups (44%) displayed no response at distances less than a km. It is not sound scientific judgement to pick the farthest distance reported for a flight reaction (3.2 km) and then conclude that most or all of the animals will behave in a similar manner, when the Reynolds and LaPlant data show that only 23% actually did. This is particularly true since habituation is known to occur in muskoxen, as the report states.

Thus, the assumption that a 2-mile sphere of influence is appropriate for a complete displacement of muskoxen is not supportable by the data.

Page 113, paragraph 4: "Table VI-6 shows that habitat values could be lost or greatly reduced throughout about one-third (256,000 acres) of the muskox range within the 1002 area."

These figures should be decreased by at least half based on the previous discussion.

Page 114, paragraph 1 and 2: We feel that the conclusions regarding potential developmental effects on muskox are unnecessarily severe and unfounded. While it is true that very little data characterizing muskox responses to oil field development are available, it is also true that the muskox has shown ready adaptability to human presence and has even been semi-domesticated in several areas. This adaptability to human presence will significantly reduce the worst-case conclusions implicated in the DEIS.

Several experimental farming programs have been successfully initiated in Alaska and Canada to domestically raise muskox for their high quality quivit, or underwool, to be used in the knitting industry. Obviously their adaptability to constant human presence in these situations significantly reduces concerns over occasional and distant disturbances from developmental interests. Limited observations of muskox response to oil exploration activities in Greenland indicate that muskox respond by a gradual and temporary avoidance to seismic activities.

We ask that this section of the report be re-written to properly reflect the adaptability of muskox to human presence and thus reduce the severity of the projected effects.

Page 114, paragraph 9: "Effects on the regional moose population from habitat loss and mortality due to oil development in the 1002 area would be minor."

Due to the very low population of moose on the Coastal Plain, the extremely low loss of habitat expected, the ability of moose to habituate to disturbance and the ability of ADF&G to regulate moose harvest, it is reasonable to expect a negligible, rather than a minor, effect.

Page 115, paragraph 6: "A moderate decline of the wolf population using the 1002 and surrounding area could result from the cumulative effects of direct mortality and reduced production or survival of ground, caused by reduced prey availability."

As pointed out in the state references, there is indeed a relationship between the abundance of wolves and the biomass of ungulate prey. However, even if one hypothesizes a 40% decline in the PCH from 180,000 to 100,000 animals, it is difficult to demonstrate that 5 to 10 wolves would be in any way limited by a herd of such magnitude. The cited references all deal with wolf/caribou densities that are orders of magnitude higher than 0.00002 to 0.0001. Further, no consideration is given to alternate prey species.

The environmental effect on wolves from the proposed development should be changed to negligible.

Page 119, column 2, paragraph 1: This paragraph discusses behavioral effects on marine mammals.

The last sentence should be modified to add "however, a large body of data indicates that there are none."

Page 120, paragraph 11: All references to the West and Snyder-Conn Report should be deleted for the reasons provided earlier in the comments on page 100, paragraph 1 and 2.

Page 121, paragraph 7: "Table VI-7 shows the amount of habitat that could be affected by development resulting from full leasing, assuming snow geese are displaced 1.5 and 3 miles as observed by Gallop and Davis (1974)."

The reactions of fall-staging snow geese to noise were studied by Gollop and Davis (1974) and Wisely (1974). In those studies, gas compressor noise simulators were placed in fall-staging areas and the reactions of flying and feeding flocks were observed with and without noise production. Some general conclusions, which cannot be evaluated quantitatively, included:

1. noise may decrease the number of flocks that land at a particular site:

2. noise may cause a temporary alteration in the flight path of geese flocks;

3. geese may avoid feeding sites where high noise levels are present;

4. feeding flocks may react to the sudden occurrence of gas-compressor type noise up to 3 miles away (Gollop and Davis 1974); and

5. feeding flocks may approach to within 300 meters of continuously-operating gas-compressor noise simulators, but most flocks appear to avoid the area within 800 meters in front of such noise simulators (Wisely 1974).

O-82

Gollop and Davis (1974) did observe some snow geese disturbance up to 3 miles, but, as with other studies cited in the 1002 report, this should not be given as an adequate indication that geese would be totally displaced out to 3 miles. In fact, Gollop and Gavis report in their Table 8 that the mean distance that snow geese flared under simulator tests was 365 yards, or 0.2 miles. Thus, the 1.5 and 3 mile limits suggested by the report are gross overestimates and are not supported by the cited literature.

Page 121, paragraph 8: "Reduced time spent feeding and lost habitat in which to feed would result from petroleum development, adversely affecting accumulation of the energy reserves essential for migration. Davis and Wisely (1974) estimated that staging juvenile snow geese unable to adjust to aircraft disturbance accumulated 20.4 percent less energy reserves due to lost feeding time."

Davis and Wisely's discussion of the energetic effects of disturbance is questionable because the authors assumed that disturbance reaction time would subtract in equal proportions from all other activities. A more conservative approach would be to assume that the geese were capable of at least some compensatory increase in feeding rate. The estimates of 20.4% reduction and 9.5% reduction in energy reserves acquired by juvenile geese subjected to 2-hour interval fixed-wing and helicopter overflights, respectively, are probably overestimates of the bioenergetic impact of these disturbances.

Page 122, paragraph 2: "The average number of snow geese annually staging on the 1002 area could be reduced by almost 50 percent."

The affected habitat has been grossly overstated based on a misapplication of Gollop and Davis's results and the assumption that geese could not compensate for lost feeding time or habituate to disturbance. This has led to an equally gross overstatement of the potential effects on snow geese.

Page 122, paragraph 2: Recently conducted extensive monitoring in the Lisburne field provides data to reduce concerns over geese and brant displacement. Avian monitoring has shown that a brant colony has successfully nested in this area since the 1970's with no decrease in productivity. The density of geese and swans using this area has not changed from pre-construction (1983-84) to post-construction (1985). Geese broods actually cross roads and pipelines into the Lisburne area. Brant continuously utilize a marsh at the mouth of the Putuligayuk River within 400 meters of one of the busiest roads on the North Slope. Snow geese occasionally move into the Lisburne area to feed and rear young, often immediately next to busy roads. Also, white-fronted geese often nest close to roads.

We ask that this section be modified to include these important new data from Murphy et al. 1986. "Lisburne terrestrial monitoring program - 1985. The effects of the Lisburne development project on geese and swans."

Page 123, paragraph 4: "Recent work near Prudhoe Bay has shown that reduced numbers of shore-birds occur near roads in the oil field (Troy and other, 1983; Troy, 1984)."

Troy's work also shows increased habitat use near roads for several species, including Northern Pintails, Red-Necked and Red Phalaropes in impoundments, and Semi-palmated Sandpipers in dust induced early melt zones.

Page 126, paragraph 1: We support the conclusion that only minor to negligible effects on coastal fishery resources or fishery habitat will occur. Experience at Prudhoe Bay has provided a significant volume of data to support this viewpoint.

Page 126, column 2, paragraph 5: We also support the conclusions of minor to negligible impacts on endangered and threatened animal species such as bowhead and grey whales and the peregrine falcon. We feel that the transient nature of their presence on the coastal plain and the history of developmental interaction in the Prudhoe Bay field clearly demonstrate the lack of meaningful impacts on these species.

Page 129, column 2, paragraph 4: Based on the preceding conclusions of negligible to minimal effects on wildlife populations as a result of development, there remains no reason to assume that major effects on subsistence uses will occur. Therefore, we ask that this paragraph be deleted.

Page 131, column 2, paragraph 4: We would like to underscore the relatively low value of the coastal plain as recreational habitat. History of use indicates that only a handful of individuals have actually utilized the coastal plain for recreation, either hunting, fishing or camping. It is extremely expensive to reach the area; a trip from the contiguous states costs thousands of dollars and requires air charter flights. Wet and moist ground conditions make hiking difficult during the 8-10 week "summer". Extreme cold and darkness during a large part of the year further reduce recreational use.

We ask that these perspectives be added to this section of the report.

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Page 134, paragraph 6 and 7: See comment above for page 112, paragraph 4.

Page 140, next to last paragraph: Seismic Trails:

This paragraph should be modified to add "although, seismic trails can only be detected from the air after two or three years."

Page 143, paragraph 6: See comment above for page 6, column 2, paragraph 5.

Pages 145-147, Summary of Recommended Mitigation

Stipulation 2: Design all bridges and culverts to handle at least 50-year flood events.

Comment: Insert "permanent" before the word bridges.

Stipulation 3: Use ice or gravel-foam-timber pads, where feasible, for exploration wells.

Comment: There may be limited use for ice pads; however, the use of pad material must ensure a safe and successful completion of the operations plan.

Stipulations 5: Prohibit off-road vehicle use within 5 miles of all pipelines, pads, roads, and other facilities, except by local residents engaged in traditional uses or if otherwise specifically permitted.

Comment: Prohibiting all activities in all seasons is too restrictive. This stipulation should be limited to summer season only and not be applied to research, surveying, seismic work, etc. approved by USFWS.

Stipulation 6: Limit oil exploration, except surface geology studies, to November 1-May 1 (exact dates to be determined by Refuge Manager). Cease exploration activities and remove or store equipment at an approved site by May 15. Local exceptions may be made.

Comment: Seasonal restriction might be appropriate for intensive human activity such as construction but should allow activities less likely to interfere with animal behavior to continue. Activities in this category would be those largely confined to the drill pad and required support and would include drilling and testing of wells. When recognizing that such prohibition cannot reasonably be applied during any subsequent development activities, USFWS should allow those activities while being conducted as part of an approved research program to determine actual effects on wildlife and to develop better mitigation techniques if needed for development. Restriction on drilling and testing could cause exploratory wells to take two or more years to complete, which extends environmental exposure, may compromise well safety and control, and significantly increases the cost of the well.

Stipulations 8 9 & 10: Elevate pipelines to allow free passage of caribou in areas without ramps or buried sections.

Place ramps over pipelines at natural crossings or where development tends to funnel animals.

Bury pipelines where possible.

Comment: Stipulations 8, 9, and 10 appear to prefer buried pipelines. Burial of pipelines is unnecessary where elevation and ramping are used to accommodate movements of animals. Buried pipelines are not environmentally

preferred on the North Slope due to permafrost. Moreover, burying causes more environmental impact initially and during abandonment. Suggest adopting the current State of Alaska policy: To minimize impacts on caribou, pipelines must be consolidated to the extent feasible and must be designed, sited and constructed to allow safe passage of caribou. Adequate elevation, ramping or burial of pipelines will be required in areas identified by [Department of Fish and Game] USFWS as important caribou movement zones.

Stipulation 11: Separate roads and pipelines 400-800 feet, depending on terrain, in areas used for caribou crossing.

Comment: The combination of roads near pipelines is considered a deterrent to caribou crossing, primarily when there is high human use (traffic) of the road, therefore, it is unnecessary to have all roads separate from pipelines. This policy conflicts with the basic desire to consolidate facilities. A preferable wording of this stipulation may be "separate high use trunk roads and pipelines 400-800 feet,..."

Stipulation 12: Restrict surface occupancy in the zone from the coastline inland 3 miles to marine facilities and infrastructure necessary to support activities outside the restricted zone.

Comment: This restriction could preclude access to and development of significant reserves. Temporary exploration facilities and essential production facilities should be allowed on a site-specific basis.

Stipulation 14: Close areas within 3/4 mile of high-water mark of specified water courses to permanent facilities and limit transportation crossings. Gravel removal may occur on a site-specific basis.

Comment: A 3/4 mile buffer is an excessive restriction. Maximum effort to protect critical riparian habitat should be required; however, essential production facilities should be allowed on a site-specific basis.

Stipulation 21: Close area within 5 miles of development and associated infrastructure to hunting, trapping and discharge of firearms.

Comment: Subsistence trapping without firearms should be allowed.

Stipulation 23: Define range of the candidate plant Thlaspi arcticum. Minimize surface occupancy in immediate vicinity of areas identified as supporting the plant. Position pads, collecting lines, and associated roads at least 1/2 mile from candidate plant locations.

Comment: It appears that a feasible and prudent effort to avoid adverse impacts to the plant would be reasonable: 1/2 mile buffer appears excessive and unnecessary.

Stipulation 24: Construct docks and causeways so that fish movements are not impeded and lagoon water chemistry is basically unchanged.

Comment: Policy needs to focus on potential impacts: suggest wording "...and lagoon water chemistry not be altered to a degree which causes significant adverse effects on marine populations."

Stipulation 25: Establish time and area closures or restrictions on surface activity in areas of wildlife concentration during muskox calving, April 15-June 5; caribou calving, May 15-June 20; caribou insect harassment, June 20-August 15; snow goose staging, August 20-September 27 and overwintering and spawning.

Comment: This stipulation should specifically exclude restrictions on activities confined to an exploratory drill pad such as drilling and testing being conducted in conjunction with a USFWS approved research program to determine effects on evaluation (key) species.

Stipulation 26: Acquire authority to establish time and area closures and minimum aircraft altitude of 2,000 feet above ground level (AGL) during muskox and caribou calving and caribou insect harrassment, April 15-August 15; and snow goose staging, August 20-September 25. At other times the minimum altitude generally will be 1,000 feet AGL over areas of animal concentrations.

Comment: It is unnecessary to have time and area closures in addition to minimum altitude restrictions.

Stipulations Found in the USFWS/ASRC Agreement Stipulations (Appendix 2)

Stipulation: Exploration activities will be supported only by ice roads, winter trails, existing road systems, and air service.

Comment: This stipulation should recognize the need for barges and boats for marine support.

Stipulation: The operator shall not significantly alter the banks of streams, rivers, or lakes while conducting exploration activities. Crossings of stream, river, or lake banks shall utilize a low angle approach or, if appropriate, snow bridges. If snow bridges are utilized for bank protection, they shall be free of dirt and debris and shall be removed after use or prior to breakup each year, whichever occurs first.

Comment: The need for the removal of ice bridges after use or before breakup is not readily apparent. If the intent is to prevent flooding, the stipulation should so state, and allow alternatives such as selective or partial removal of ice bridges.

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Stipulation: Reserve pits shall be rendered impermeable by a design of the operator's choice, other than reliance upon permafrost.

Comment: For below-grade (excavated) designed pits, permafrost provides an impermeable barrier. Suggest deleting the words "other than reliance upon permafrost." This stipulation should defer to existing reserve pit regulation in this matter.

Stipulation: All hydrocarbons discharged into flare and relief pits shall be removed and properly disposed of as soon as practicable during the winter but prior to spring breakup, except that during periods of thaw such removal shall occur within 72 hours of discovery.

Comment: This language from the COE AAP Special condition C is under revision by the COE to read: "Hydrocarbons discharged into relief pits, flare pits, or reserve pits shall be contained and properly disposed of as soon as practicable. Removal shall minimize waste generation and all hydrocarbons which are removed shall be disposed of in a manner consistent with all pertinent regulations."

Stipulation: When an exploratory well bottom hole depth will not exceed 10,000 feet true vertical depth, the well shall be drilled from an ice pad with piling support for the drill rig.

Comment: Stipulations should allow the use of pad material which will ensure a safe and successful completion of the overall exploratory operations plan. Bottom hole depth may not be the most important criteria in determining a proper pad. This stipulation should be reworded to read: "When an exploratory well program can be safely accomplished from an ice pad, it is preferred that the well be drilled from an ice pad with piling support for the drill rig..."

Stipulation: The Regional Director is authorized to designate within ASRC Lands special caribou calving and post-calving special areas that will be closed to all exploration activities for such periods from May 1 through August 31 of each year as are designated by the Regional Director to ensure that exploration activities do not significantly adversely affect caribou calving and post-calving activities, including but not limited to, relief from insects. The Regional Director may shorten the period of closure or reduce the area closed if it is determined that caribou are not using the area.

Comment: Special area stipulations should be modified to allow continued exploration drilling and testing while conducting research programs to determine the effects on these species (see our comments on Stipulation #6 of the 1002h report).

Stipulation: The Regional Director is authorized to designate within ASRC Lands specific snow goose staging special areas that will be closed to all exploration activities for such periods from August 20 through September 10 of each year as are designated by the Regional Director to ensure that exploration activities do not significantly adversely affect snow goose staging. The Regional Director may shorten the period of closure or reduce the area closed if it is determined that snow geese are not using the area.

Comment: Special area stipulations should be modified to allow continued exploration drilling and testing while conducting research programs to determine the effects on these species (see our comments on Stipulation #6 of the 1002h report).

Stipulation: The Regional Director is authorized to designate within ASRC Lands specific waterfowl nesting habitat special areas that will be closed to all exploration activities for such periods from May 25 through August 1 of each year as are designated by the Regional Director to ensure that exploration activities do not significantly adversely affect waterfowl nesting habitat. The Regional Director may shorten the period of closure or reduce the area closed if it is determined that waterfowl nesting is not occurring within the area.

Comment: Special area stipulations should be modified to allow continued exploration drilling and testing while conducting research programs to determine the effects on these species (see our comments on Stipulation #6 of the 1002h report).

Stipulation: Sand and gravel extraction, processing or storage sites shall not be located within the active floodplains of water courses as defined in the Gravel Removal Guidelines Manual for Arctic and subArctic Floodplains (USFWS 1980), unless there are no feasible and prudent alternatives. In the event that there is no feasible and prudent alternative to sand and gravel extraction, processing or storage within the active floodplain of water courses, and in the event that such sand and gravel extraction, processing or storage otherwise satisfies the environmental protection safeguards of these stipulations, sand and gravel extraction, processing or storage in active floodplains shall be undertaken in accordance with the provisions of the above-referenced Guidelines, to the extent practicable.

Comment: Suggest language consistent with 1002 Report Stipulation 7 which limits the application of the prohibition to major fish-bearing rivers.

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Comment 1 - The 1002 Area's Potential Contribution to U.S. Needs

We agree that the 1002 area has very significant potential. All of the geologic factors favorable for significant oil and gas discoveries exist in the 1002 area, including source rocks that generate oil and gas, thick sequences of reservoir rocks, large structures to trap petroleum and a favorable geologic history. The location of the 1002 area between major petroleum provinces, i.e., Prudhoe Bay and MacKenzie Delta, and the basin's extension of known productive trends make the area especially prospective. Of all untested onshore areas of the United States, the 1002 area is the most promising area for discoveries of major oil and gas fields.

Comment 2 - Contribution to Domestic Oil Demand and Supply

There is a rapidly growing gap between domestic consumption and production capability of U.S. energy supplies. As stated on page 163, paragraph 1, "Oil reserves decreased over 27 percent, about 11 billion barrels from 1970 to 1985 and declined annually during 14 of these 15 years despite extensive exploration and active field exploitation programs." The trend of declining domestic reserves and production is accelerating. In 1985 domestic crude-oil production was 8.9 million barrels per day average. The drastic drop in oil prices in 1986, to approximately one-half 1985 levels, resulted in a dramatic reduction in exploration and production activity and a concomitant increase in U.S. consumption. In 1986 the shutting-in of striper wells and marginal fields has resulted in a decrease in domestic crude-oil production to a current rate of approximately 8.5 million barrels per day. If prices prevail at about $15 per barrel, domestic production could average 6.2 million barrels per day by 1991. Unless significant new reserves are found and developed by the year 2000, domestic production may decline as low as 4 million barrels per day and our nation could be dependent on foreign resources for 60-75% of its demand, almost double the present level of dependency, within 10-15 years.

Future level of oil prices ultimately affects how well the U.S. replaces its production. However, the most important factor in the future decline of domestic production is due to the steep, natural production drop from North America's two largest producing fields, Prudhoe Bay and Kuparuk River. Alaska North Slope production currently contributes 20 percent of U.S. oil production. This production is expected to peak at about 1.9 million barrels per day in 1987, then decline to about 500,000 barrels per day by 2000. The United States must turn to those areas with highest potential for undiscovered oil and gas to reverse the trend towards increasing U.S. reliance on oil imports. Because it takes 10-15 years to explore, develop, and bring Arctic oil and gas

resources into production, the opening of the ANWR 1002 area for exploration and development is now of timely and critical importance.

Comment 3 - Contribution to National Objectives

We agree that production of oil from the 1002 area can help achieve this nation's national economic and security objectives. As demonstrated since 1973, the United States is vulnerable to serious supply disruptions and price escalation because of its dependence on foreign sources of oil. The Free World's sources of petroleum are heavily concentrated in the Middle East where two-thirds of the proven reserves are located. Saudi Arabia alone possesses one-fourth of the world's reserves. Increased future dependency on politically unstable Middle East nations is highly undesirable from a national interest standpoint.

As domestic production continues to deline, and imports continue to rise, U.S. vulnerability to supply disruption will increase. A reliable domestic energy supply is a key factor in maintaining a viable and flexible foreign policy, and reducing potential security threats.

Economic benefits of further North Slope development to the nation are very significant. In addition to the direct benefits to state and federal governments from bonus payments, rentals, royalties, and taxes, the discovery of large new reserves and reduction of oil imports would significantly reduce the national trade deficit by bringing a more favorable trade balance. Nearly half of the U.S. trade deficit today results from imported oil.

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Oil development on the North Slope of Alaska has provided hundreds of billions of dollars to the U.S. economy, representing a benefit to all of the 50 states. Development of petroleum resources in the 1002 area would have a positive impact on the gross national produce and thousands of direct and indirect jobs would be created as demand for goods and services increase. The positive impacts would be felt well beyond the petroleum industry.

It is clearly in the national interest to open the 1002 area of ANWR to leasing and development.

ATTACHMENT B

Renewable Resources Inc.

ENVIRONMENTAL CONSULTANTS #211A - 1503 WEST 33RD AVE., ANCHORAGE, ALASKA 99503

13 January 1987

Mr. William W. Hopkins
Executive Director
Alaska Oil and Gas Association
121 W. Fireweed Lane, Suite 207
ANCHORAGE, Alaska 99503-2035
U.S.A.

Dear Mr. Hopkins:

Re: Review of Draft EIS - ANWR

I am pleased to enclose two copies of a review and comments of the Draft EIS, with particular attention to Chapters II and VI. This review was carried out by myself and Lennart Sopuck.

The review consists of a narrative discussing major issues pertaining to ANWR and how these have been addressed in the EIS, followed by an Appendix of specific comments keyed to the EIS. Appendix II is our review of a key paper by Dau and Cameron (1986), referenced by the EIS, which provides a rationale for differences between the EIS and our own interpretations of potential impacts on caribou. Reference numbers for Appendix I are shown on a copy of Chapters II and VI of the EIs that I have enclosed.

I have also enclosed a copy of a draft paper I prepared for the Caribou Workshop at Alyeska Resort in October 1986. That paper which was prepared with the financial support of Alyeska Pipeline Service Company provides the most detailed examination of and rebuttal to the conclusions of Whitten and Cameron (1985) pertaining to the issue of displacement of calving in the Prudhoe Bay area. The evidence and arguments I presented in that paper form the basis for criticizing the reliance of the EIS on the conclusions reached by Whitten and Cameron (1985).

ANWR has an unusually detailed baseline data base available which was derived over a long period. Those data cover a wide range of wildlife species and ecological relationships. For example, systematic surveys of caribou and other wildlife species in ANWR have been conducted since 1972. In addition, the data base available for wildlife/petroleum interactions in the Prudhoe Bay area and along the Trans-Alaska Pipeline, also covers the long term (over 15 years). The foregoing studies provide detailed analyses of topics which

Cont'd./...

Mr. William W. hopkins
Alaska Oil and Gas Association
ANCHORAGE, Ak.

January 1987 U.S.A.

range from population dynamics, seasonal distribution, behavior and responses to mitigation. The combination and scope of studies and experience available is unprecedented as a sound basis for an environmental impact analysis, assessment and prediction. Our review finds that selective use of those data and studies and omission of relevant references has resulted in over-emphasis of potential negative effects of proposed development on wildlife populations and under-emphasized areas of compatibility or effective mitigation. In particular, the predictions of caribou population declines are not supported by all available evidence.

The prediction of impacts is always a complex task, usually made more difficult by major data deficiencies. The latter, however, does not apply in the present case. Since our review has identified those areas where omissions of relevant information or selectivity of literature have created a significant bias in impact interpretations, we have concluded that the projected impacts on mammalian wildlife populations in the EIS are more severe than would be the case under an actual development which included appropriate mitigative measures.

I would be pleased to provide any clarification of the enclosed material that you may require, and hope that you find our comments to be useful.

Sincerely yours,

for/ R.D. Jakimchuk
President.

RDJ/mt
Enc:

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A REVIEW OF THE REPORT ON THE ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCES ASSESSMENT

Prepared by

R.D. Jakimchuk and L.G. Sopuck

of

Renewable Resources, Inc.

For the

Alaska Oil and Gas Association

January 1987

TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this report is to review the terrestrial wildlife portions of the U.S. Secretary of the Interior's 1002(h) report concerning oil development in the Arctic National Wildlife Refuge (ANWR) in northeastern Alaska. Our approach was to assess the adequacy of the data base used to describe resource values and to predict impacts. We then determined whether the data base was used in an objective and scientifically-sound manner to predict impacts and recommend appropriate mitigative measures. Following sections provide periodic reference to Appendix I which is a list of specific comments keyed to Chapters II and VI of the 1002 report. Appendix I should be consulted for additional and more specific comments.

2.0 ADEQUACY OF THE DATA BASE

The wildlife resource and impact assessment sections of the 1002 report often contain unreliable statistics and poorly referenced and unqualified statements. Conclusions are often based on uncritical acceptance of one or two studies or on unreliable data bases. In some cases, speculative statements are not distinguished from those which are well-documented and hence are misleading.

There are several examples in the report of where the reliability of population data are not addressed. For example, the estimate of 180,000 animals for the Porcupine caribou herd (PCH) in 1986 is crude because the herd has not been properly censused since 1983 when an estimate of 135,000 animals was obtained (Whitten, 1986). However, the uncertainty of the 1986 estimate was not addressed in the report. The report also states that there is a major concentration of Central Arctic herd (CAH) caribou calving on the Canning River Delta. This was based on very limited survey information. In contrast, more extensive calving ground surveys conducted by Renewable Resources Consulting Services Ltd. (RRCS) from 1981-86 show that the Canning River Delta is not a major calving area, but that there tends to be a continuum of calving along the coast with concentrations between major river valleys (Carruthers et al., 1984; Carruthers and Jakimchuk, 1985; Sopuck and Jakimchuk, 1986). These studies were not referenced in the text.

The available data base on the distribution and movements of the PCH and CAH is vastly under-utilized in the report. The calving distribution of the PCH was studied by RRCS from 1972 to 1977 but these studies are not cited directly in the report (Jakimchuk et al., 1974; Roseneau et al., 1974; Roseneau and Curatolo, 1975, 1976; Curatolo and Roseneau, 1977; Bente 1977). However, these reports contain important

site-specific movement and distribution data for the PCH. The report states that caribou use riparian areas during spring and summer but does not cite a recent study by Carruthers et al. (1984a) that shows that females with calves usually avoid riparian habitats. In addition, the movements and distribution of CAH caribou within the 1002 area are described in detail in the report, yet the movements have been very poorly documented to date. If recent unpublished data were used they should have been referenced in the report.

The definition of the "core calving area" for the PCH was derived using information obtained from 1972-85. This report refers to this period as the "14-year study". In fact, the data were obtained from several individual studies and surveys. During some years (e.g., 1973, 1974, 1980) very limited information was obtained on the calving distribution of the PCH, and even more limited estimates of density. Yet it appears in the report that the "core calving area" was defined based on a solid, 14-year data base.

In the impact section of the report, the indirect loss of habitat as a result of behavioral avoidance is quantified using a worst-case scenario. However, based on the studies conducted to date, it is extremely speculative to predict a "zone of total displacement" around a particular development. These speculations are based primarily on one quantitative

study, Dau and Cameron (1986). This study shows short-term partial displacement by maternal groups around an active road system, but also shows that caribou responses can be highly variable. In addition, no quantitative information on how caribou may habituate to these disturbances is available. Habituation over the long term may significantly reduce this "zone of displacement".

The report presents several statements as fact rather than speculation. For example, it is assumed that increased energy demands on individual caribou during the insect relief period will lead to reduced survival and productivity of the herd. However, there are no studies on North American populations of caribou that have established this link. Also, the report makes the implicit assumption that caribou are a "food-limited" species. However, there are no studies that show that mainland populations of caribou in North America are food-limited. European references are not appropriate because reindeer herds are maintained at artificially high stocking levels in largely predator free systems.

The report states that the PCH may have difficulty accommodating to developments such as pipelines because they will interact with them for short periods during the year. However, the report fails to discuss RRCS studies of the Nelchina herd (Carruthers et al., 1984b) which shows that this

herd is exposed to TAPS only twice each year, but crosses it successfully. In the assessment of the impacts of aircraft overflights on caribou, the report ignores the work by Davis et al. (1985). The 1002 report appears to cite references selectively rather than presenting a more balanced viewpoint. Davis et al. show that caribou populations can continue to grow despite sometimes severe harassment from aircraft and other military activities including bombing and strafing within traditional calving ranges.

In summary, the 1002 report does not adequately qualify or reference its conclusions and hence presents an unbalanced assessment of impacts. In many cases, the worst case scenario for impacts is unjustified.

3.0 MAJOR ISSUES FOR THE PORCUPINE AND CENTRAL ARCTIC HERDS

Although a worst case scenario is a valid approach to environmental analysis, for significant resources such as the PCH it should incorporate the following:

1. Assumptions should be realistic and properly qualified.
2. The factual basis for analysis should be supported and well documented.
3. Impact criteria should be well defined and supported.

4. Use of the scientific literature should be objective rather than selective.

3.1 The Displacement Issue

The impact assessment on the PCH is largely based on two studies: Whitten and Cameron (1985) who concluded that calving of the CAH has been displaced from the Prudhoe Bay area since the onset of petroleum development, and Dau and Cameron (1986) who reported local displacement of maternal caribou along the Milne Point Road. Whitten and Cameron (1985) present conclusions based on anecdotal data which are largely correlations after the fact. Jakimchuk (1986) presents a detailed rebuttal to the principal conclusion that calving of the CAH has been displaced from Prudhoe Bay. Their own paper recognizes the possibility of other factors such as flooding which may account for the lower calving density in the Prudhoe Bay Complex (PBC). Jakimchuk (1986) reviews evidence that indicates that the PBC was not an important calving area even before development and that the correlations made by Whitten and Cameron reflect a calving distribution in response to natural influences. However, neither viewpoint can be termed conclusive because of the post facto correlations which are made and the limitations of pre-development data and possible comparisons. Jakimchuk (1986) does, however, present a

critical appraisal of those data and the conclusions of Whitten and Cameron. The evidence supports the notion that the Prudhoe area is similar to other deltas in having a low calving density which existed pre-development and that conclusions that calving has been displaced from the PBC are unsupportable.

Because of the contentious and inconclusive nature of the Prudhoe Bay scenario, the report of Whitten and Cameron (1985) is not a sufficiently strong basis to rely on for the PCH scenario analysis.

Dau and Cameron (1986) present a far better study design and basis for assessing the implications of sensory disturbance to the distribution of calving caribou. Because of its importance as the basis for the impact analysis we have reviewed that study (Appendix II) for its relevance and validity. Several points have emerged from that review which are important to the analysis for the PCH.

1. The Dau and Cameron study, although a better design than previous studies, is not definitive. It documents a partial avoidance by maternal cows over a period of high disturbance. However its limitations include lack of a control, and no discussion of conflicting results with West Sak Road studies which show no avoidance by calving groups along the West Sak Road. Their comments on lack of habituation by caribou to disturbance are unsupportable.

Although Dau and Cameron document reduced habitat use (i.e., lower densities) by maternal groups near the road, they did not in fact document displacement which may be defined as an active process of dislocation of caribou from a previously used area in response to a stimulus. Further, they do not comment on the significance of the fact that numbers of calving caribou in their study area almost doubled between the pre- and post-development study periods.

The most significant error of the scenario analysis for the PCH is the assumption that what is termed "behavioural displacement" would be total for a 2-mile zone adjacent to roads using Dau and Cameron (1986) as a basis for that analysis. A total displacement was not found by Dau and Cameron and there is no basis for the assumption of a zone of habitat loss of that magnitude. Moreover, the analysis unjustifiably fails to discuss the potential for habituation and is highly selective in use of relevant references. It specifically ignores those references which may temper conclusions pertaining to the adverse effects of disturbance and displacement on caribou demography.

For example, Davis et al. (1985) report no short term demographic effects on the Delta herd from displacement from their core calving area and no adverse demographic effects on the herd from severe disturbances on the calving grounds. This

reference is not even cited in the EIS. The analysis of aircraft disturbance ignores at least a dozen aircraft disturbance studies, many of which are more quantitative or relevant than those cited. The gratuitous editorial comment on Bergerud et al. (1984) (ref. 41, p. 110, App. I) as a paper that is "widely disputed" indicates a biased approach to dissenting viewpoints. We consider that such an arbitrary dismissal of a major, refereed, published paper is unethical.

Previous sections of this review and Appendix I identify omissions of specific papers relevant to an objective analysis of impacts. Another example is omission of Carruthers et al. (1984b) on crossing success of TAPS by the Nelchina herd, which has a direct relevance to the question of effects on caribou which only periodically contact a pipeline (ref. 36, p. 109, App. I). This report is not listed in the bibliography of the EIS.

The assumption that displacement from the PCH core calving area would be complete is not justified on the basis of known examples. The further link to population decline is even more speculative. There is inadequate treatment of alternative habitat use and the potential mitigating effects of habituation. The net result of the foregoing omissions is to greatly exaggerate the worst case beyond what can be supported on scientific evidence.

Although the qualifiers "could be", and "maybe" are, frequently used in the impact predictions they are not defined. The assessment would be enhanced considerably by an objective risk or probability analysis in order to place predictions in context with their likelihood of occurrence.

The analysis of comparative calving densities for various herds has been linked to the vulnerability of the PCH to population decline if displacement occurs because of its higher calving densities. That analysis, however, depends entirely on undocumented assumptions that:

a) There is a relationship between calving density and herd productivity.
b) That alternative calving areas are incapable of sustaining the PCH at current levels.
c) That displacement would be complete.
d) That the growth of the CAH is partially a result of its low calving density.

The arguments presented in the EIS regarding assumed relationships between calving density and herd productivity are both speculative and hypothetical. There is no supporting data to warrant the conclusions made. Therefore, the severity of the impacts predicted are overstated and subject to question.

We have given little attention to the impact assessment of the CAH in this summary and refer the reader to specific notes and comments in Appendix I. In general, projected impacts on the CAH are highly overstated since 1002 developments would impinge on a smaller portion of the herd than do existing petroleum developments in the Central Arctic region.

3.2 The Insect Relief Habitat Issue

Although there is considerable theoretical concern for, and discussion of, the importance of insect relief habitat to the PCH and CAH, there is very little documentation of its role or significance to the herds. The overall requirements for insect relief and its relationship to herd health and energetics requires additional study and assessment. As a migratory herd the PCH has insect relief habitat options both north and south of the study area and has utilized both coastal and montane habitats for that purpose. Overall, insect relief habitats are neither scarce nor inaccessible. Maintenance of movement patterns as specified in the mitigation measures and as experienced by the CAH would ensure access to insect relief habitats both along the coast and inland. In addition, elevated areas of gravel pads will increase availability of insect relief sites inland albeit to a minor extent compared to natural areas.

At present, there is no basis to conclude that access to insect relief habitat will be impaired by the development scenario provided that mitigation measures proposed are implemented.

3.3 Mitigation

In general, we agree with the mitigation analysis. The major exception is the recommendations for ramps to facilitate caribou passage. Recent studies show that ramps are not necessary to ensure caribou passage across pipeline corridors provided adequate pipe clearance is available. Further, the construction of ramps has biological costs associated with gravel removal and transport and habitat alteration at source locations and ramp locations.

Although we are in agreement that air traffic should be controlled to minimize disturbance the mitigation analysis presents a one-sided scenario by omitting references to caribou populations exposed to aircraft disturbance which have not suffered demographic effects (Bergerud et al., 1984; Davis et al., 1985). The restrictions proposed for aircraft appear to be overly conservative. For example 2,000 ft-ceilings on overflights are proposed from 20 May to 15 August. However, by

15 July the majority of caribou have left the 1002 area on their mid-summer migration into Canada.

There is also scope to add to and improve the mitigation measures to further reduce impacts on the PCH. These include site-specific scheduling to minimize activity during sensitive periods.

A major unknown is how large concentrations of caribou (100,000 or more in post-calving aggregations) would respond to and negotiate oil development infrastructure. There is reason to believe that large groups are more susceptible to influences such as deflection because of the impetus of their numbers and the dynamics of group leadership. Because of these unknowns it would be prudent to establish facilities such as roads and pipelines in areas of minimal potential conflict with large aggregations of caribou.

Despite evidence that caribou cross under pipelines with clearances as low as 5 ft, we have previously recommended a higher clearance where interaction with large aggregations are anticipated. We feel that a minimum of 7 ft ground/pipe clearance within the range of the Porcupine caribou herd would be a highly significant improvement as a mitigation measure. The major rationale for increasing the clearance is to provide a larger margin for facilitating passage of large

concentrations of caribou and because of the aforementioned impetus of large groups which can govern directional movements during post-calving and mid-summer migration. A higher clearance would facilitate passage of mature antlered bulls and would maintain a physical opening between passing animals and the overhead pipe which would be visible to those animals in the rearguard of large herds.

The existing scenario shows a proposed pipeline location traversing the known post-calving aggregation area for the PCH south of Camden Bay. Additional study is recommended to improve that location, possibly by moving it further north to avoid the area of massive aggregation without precluding access to insect relief habitat.

The foregoing and other measures such as scheduling or convoying traffic during periods of major caribou movements would serve to greatly minimize adverse impacts on the herd and reduce the magnitude of predicted impacts considerably.

In view of the foregoing we disagree with the statement (ref. 43, p. 111, App. I) that mitigation is not possible in Resource Category I lands and feel that there are significant mitigative opportunities and measures to reduce the adverse effects of development activities on those lands.

4.0 OTHER SPECIES

Appendix I provides specific annotations for other species. A major deficiency in the analysis is incomplete use of available literature and data sources. As a result, potential negative impacts tend to be over-emphasized, e.g., the status of Polar Bear denning is accorded considerable attention. However, denning in the 1002 area is an extremely minor component of denning adjacent to ANWR which in turn is a minor component of denning overall for the Beaufort Sea polar bear population.

We are in agreement with the projected impacts and description on grizzly bears. The exponential growth rate of muskoxen may be limited by habitat availability in future. Effects of disturbance on this growth rate are speculative at the present time. The history of the transplant and growth have established the capability of muskoxen to pioneer a new environment and is evidence that they are responsive to opportunities provided by mitigation. In the absence of controls or management, muskoxen would be forage regulated at some future point and might compete with caribou in a conflicting way.

APPENDIX I.

Detailed review comments on the ANWR impact assessment report, pp. 27-170.

A) Chapter II, Existing Environment, pp. 27-45.

Page	Reference No.	Comments
28	1-2	The "core calving area", as defined, has caribou densities of 50 animals/mi^2 or more during five of 14 years. Caribou use of their calving grounds is very dynamic with site-specific densities varying greatly within the calving period. Core calving area is not necessarily "traditionally" favored and the words "strong fidelity" are misleading. It is in fact an area where high density of calving has occurred frequently, i.e., yearly overlap within the overall calving range.
28	3	This paragraph lacks references and is misleading. The generalization that caribou use riparian areas as travel routes and important feeding areas is not fully supported by the available literature (see Jakimchuk and McCourt, 1975; LeResche and Linderman, 1975).
28	4	References or qualifications are required on types of disturbances which may affect bonding and increase in mortality. We need a more realistic impact prediction on the effects of disturbance on calf mortality.
28	5	Uplands are in southern part of calving grounds, not the northern part. Also, use of uplands by most calving cows contradicts previous statement (see #3) that calving "caribou" use vegetated riparian habitats (see Jakimchuk et al., in press). There are no citations of work done by Renewable Resources Consulting Services Ltd. on calving distribution of the Porcupine caribou herd during the 1970s.

Page	Reference No.	Comments
28	6	It is important to distinguish between post-calving movement and aggregation and the mid-summer migration (see Jakimchuk and McCourt, 1975). Summer movements (midsummer migration) are the most consistent movements of the year. Post-calving movements are also quite predictable.
28	7	There is no attempt to define the phrase "critical life stages".
29	8	Is productivity the basis for determining 'impact' or is habitat? Unless the direct link implied is documented for caribou both definitions should not be used simultaneously.
29	9	More documentation of August numbers is needed to determine the frequency of August occupation of the 1002 area (e.g., are numbers closer to 15,000 or to lower end of range?).
29	11	This paragraph requires references. The movements of Central Arctic herd in the 1002 area have not been adequately documented to date.
29	12	Again no references are provided. The most detailed information on calving distribution of the Central Arctic herd is available from Sopuck and Jakimchuk (1986), Carruthers and Jakimchuk (1985) and Carruthers et al, (1984a). The presence of 1,000 females and calves on Canning Delta in most years contradicts data which show more of a calving continuum along the coast with concentrations between major river valleys. Also, the calving situation at Prudhoe Bay oilfield is misleading. The results of Whitten and Cameron (1985) were rebutted by Jakimchuk (1986) who reviewed evidence that the Prudhoe Bay area was never an important calving area for the Central Arctic herd.
29	13	Use of riparian areas as travel corridors and feeding areas by the Central Arctic herd by cows and calves is not supported by the literature (see Carruthers et al., 1984a; Jakimchuk et al., in press).

Page	Reference No.	Comments
		This paragraph ignores the Central Arctic herd as a whole and only discusses the 1002 area and is therefore, incomplete. Since most of the herd occurs outside the 1002 area, this paragraph gives a misleading view of importance of the area to the Central Arctic herd.
29	15	In the presentation of Central Arctic herd distribution and abundance there are no comments on productivity. This omission downplays the tripling of herd size which has occurred since the Prudhoe Bay development started.
30	16	Additional data on moose obtained in the 1970s are available from the Arctic Gas Biological Report Series, Vol. 6, Ch. 1.
20	17	Data on the Sadlerochit Mountains sheep herd are available in an earlier reference (see Arctic Gas Biological Report Series, Vol. 6, Ch. 1).
31	19	More detailed information than available in Chesemore (1967) on Arctic fox distribution in the 1002 area is available from Quimby and Snarski (1974), Arctic Gas Biological Report Series, Vol. 6, Ch. 2.
32	20	Additional information on wolverines in the 1002 area is available from Quimby and Snarski (1974), Arctic Gas Biological Report Series, Vol. 6, Ch. 2).
32	21	Again, earlier work on bears in the 1002 area by Quimby and Snarski (1974) is ignored.
33	24	This paragraph lacks references which are especially required since conculsions presented are controversial.
33	24	Numbers of polar bears in the ANWR part of the Beaufort should be indicated; the Beaufort Sea estimate of 2,000 includes Canadian waters. "Influx of females" implies large numbers moving into the 1002 area. This is not so. References for the population estimate are not given.

Page	Reference No.	Comments
33	25	This paragraph contains very vague and misleading statements. It leaves the impression that a high percentage of the 2,000 bears in the Beaufort population use ANWR. This is not the case. One to two dens in each of four out of five years does not indicate high use of the area by denning bears. See Moore and Quimby (1974) for earlier studies on polar bear denning locations (Biological Report Series, Vol. 32, Ch. 2) which also found a low frequency of denning in ANWR. The 15 dens found between 1951-1985 is cumulative and does not represent actual numbers in any one year.
34	30	Additional information on ringed seals adjacent to ANWR can be found in Moore (1976)Biol. Rept. Series, Vol. 36, Ch. 2. This reference was not cited.
37	31	Studies conducted by McCart et al. (Biol. Rept. Series) on fisheries resources in the ANWR area are not cited.
45	32	The impacts of oil development on the Wilderness resources of the 1002 area will be a key issue.

B) Chapter VI, Environmental Consequences, pp. 95-119.

Page	Reference No.	Comments
96	1	These definitions of impacts do not attempt to quantify the changes in abundance in wildlife populations from the natural state that corresponds to each level of impact. Also there is no allowance for accommodation or habituation by species to modifying influences.
98	2	We agree that the PCH concentrated calving area is considered unique and irreplaceable.
98	3	The remainder of the 1002 area cannot be considered scarce habitats, nationally vs. regionally, and should be category 3-4 for most species.

Page	Reference No.	Comments
105	5	Although up to 82 percent of calving for the Porcupine caribou herd has occurred in the 1002 area, in some years almost no calving has occurred there. However, use of the area is more consistent during the late June/early July insect relief period. The statement that the insect relief period is highly stressful is based largely on theoretical considerations - insect relief habitats are widespread north and south of the 1002 area. An inland pipeline may interfere with movements to the coast and post-calving aggregations; however, a coastal pipeline would not.
105	6	This statement should be qualified as to extent of displacement and should indicate that only a minor component of the Central Arctic caribou herd is involved.
106	7	These statements are hypothetical and too generalized because: 1) Density is only an important consideration if proposed activities have effects on populations. 2) It is debatable if the interaction would be greater than at Prudhoe Bay. The Porcupine caribou herd does not always calve in core area and not all of the core area will be affected. 3) Nonetheless, calving and post-calving densities and numbers do differ significantly from the Central Arctic caribou herd and differing implications may occur. If an adverse effect occurs it would certainly affect a greater proportion of the population especially during post-calving aggregation. We agree also that the Porcupine caribou herd will form larger groups than the Central Arctic caribou herd during post-calving and that predator populations also differ between the two areas.
106	8	This paragraph is of major importance and is highly misleading (see Jakimchuk, 1986; Caribou workshop paper) because: - the Prudhoe Bay oil field was never an

Page	Reference No.	Comments
		important calving area. - Whitten and Cameron (1985) do not show an absence of calving for the entire period but co-incidentally with delayed snowmelt. - Whitten and Cameron also discuss other possibilities for low pre- and post-calving densities. - Other Central Arctic caribou herd calving areas show similar pre- and post-development low calving distributions. This section superficially covers a very important topic and uncritically accepts selected findings of one study (i.e., Whitten and Cameron, 1985).
106	9	Inappropriate secondary reference to a review paper when other references, e.g., Carruthers et al. (1984a), are original sources of systematic data with wider coverage than any other.
106	10	Long term data collected from 1981-86 by Renewable Resources Inc. indicates that the Canning River Delta is not a major calving area for the Central Arctic herd. However, it receives greater use during the post-calving period.
106	11	Table VI-4 shows progressive increase in calving numbers in the oilfield from 1972-1974. A detailed critique of these data is available in Jakimchuk (1986). Also, population estimates for the Central Arctic herd for 1981-1986 are available from various RRCS studies.
106	12	The amount of the "core calving areas" within the 1002 area depends on the definition of core calving ground used. The criteria of >50 caribou/km^2 in at least 5 of 14 years resulting in 80 percent within the 1002 area may be too conservative (i.e., the major calving grounds are actually much larger).
106	12	There are no recently published population estimates for the Porcupine caribou herd since 1983. The 1983 photocensus estimate

Page	Reference No.	Comments
		since 1983. The 1983 photocensus estimate was 135,000. Therefore recent estimates of 165,000 in 1985 and 181,000 in 1986 are guesses rather than actual censuses as implied.
106	13	Year-round use of the 1002 area by 4,000 Central Arctic caribou is undocumented.
106	14	Core-calving and concentrated calving areas are defined using the density of ≥50 caribou/mi^2 yet there is no indication of how these estimates of density were made. Also, a better indication of the use of the 1002 area for calving would be data on the percentage of the herd that calved there each year.
107	16	Indirect habitat losses as a result of behavioral avoidance are difficult to quantify. Studies to date show that the degree of avoidance by caribou is variable and that caribou may habituate to these disturbances over the long term. Indirect habitat losses due to physical barriers may be more signficant depending on the success of mitigation measures employed. Insufficient pipe heights or over-reliance on ramps in combination with disturbance may impede free movements of caribou. This problem may be significant for very large aggregations of Porcupine herd caribou during the post-calving (insect relief) period. Data on the responses of very large groups of caribou to physical barriers are presently unavailable.
107	17	Present studies of behavioral avoidance by caribou of roads do not prove that disturbance is a major source of habitat loss. We need to know how many caribou show the displacement response and whetner habituation will occur in the long term.
107	18	The statement is not true, and not definitive. Dau and Cameron (1986) show local response to roads consisting of reduced densities of maternal caribou not displacement from calving grounds. Conclusions and statements by Cameron and Whitten (1979) have been challenged by

Page	Reference No.	Comments
		Bergerud et al. (1984). Citation is used inappropriately here.
107	19	This statement is grossly misleading since there is no evidence available to support it. The following sentence can also apply to many other areas within the range of the CAH. Both the statement and cited study are misleading (Whitten and Cameron, 1985) and have been separately criticized by Jakimchuk (1986) and Carruthers et al. (1984a). The extent of displacement in the Prudhoe Bay area caused by development is difficult to quantify since the area was never an important calving area and because pre-development data are not sufficiently quantitative.
107	20	The study by Dau and Cameron (1986) shows reduced habitat use by caribou. However, the extent of reduced habitat use shows considerable variation. Habituation of caribou may reduce this effect in the long term.
108	21	If displacement does occur, adjacent areas may not be undesirable since they are frequently used with no short term adverse effects on productivity. Long term studies on effects on productivity of displacement would be required to determine the significance of displacement from a high density calving area. Although displacement of the Porcupine caribou herd from a "core calving area" may be deleterious, studies of the Central Arctic herd show that caribou numbers can increase despite development within their calving areas. We agree, however, that caution should be used in extrapolating Central Arctic caribou herd results to the Porcupine caribou herd since the Porcupine caribou herd occurs at much higher densities on their calving grounds and because predators are more abundant adjacent to the Porcupine caribou herd calving areas. In addition, caution should be used in the assumption that displacement of the Porcupine caribou herd

Page	Reference No.	Comments
		from a "core calving area" would occur in total as implied. The probability of this is low based on evidence from the CAH.
108	22	This statement presupposes a food limiting habitat and a complete loss - the references used deal with non-caribou apparently since caribou are not a food limited species and comparable references are not available for mainland herds of Barren-ground caribou in North America.
	25	There is no basis for "unlikely" conclusion. This is speculation only based on inference of higher density. Also presupposes a "massive" displacement rather than a local displacement. This is an example where the CAH experience is downplayed despite the existence of data on compatibility with development. "...no recognizable... long term effect... has been demonstrated to date (emphasis ours).
	26	However, all participants of the FWS workshop did not agree to the extent or significance of that displacement.
108	27-28	Dau and Cameron (1986) indicate that reduced density of maternal caribou which they term displacement may occur within 2 miles from active roads. However, the percentage of caribou affected is uncertain. A significant number of caribou within 2 miles may be unaffected by disturbance. Therefore, development would not result in the complete loss of 32 percent of the Porcupine caribou herd core calving area as calculated.
108	28	It is erroneous and misleading to imply a "total displacement" two miles wide. The term probable population decline is unsubstantiated i.e., displacement is linked to decline, but such an effect has never been demonstrated or documented. The assumption of massive displacement is unwarranted based on the Central Arctic caribou herd experience.
108	29	Several studies show that pipelines such as TAPS and Kuparuk do not create a barrier. Note one-sided refs. Need to clearly

Page	Reference No.	Comments
		establish the likelihood of conditions which constitute interference or provide better qualifications of statements made.
109	31	Agree - valid concern. I have previously recommended 7' ground to pipe clearance rather than the 5' level cited in this and the workshop report.
109	31	We agree that the effect of potential barriers are greater during post-calving than during calving because of the very large size of post-calving aggregations and the sudden, erratic movements between inland areas and coastal insect-relief habitats. There is insufficient evidence, however, to indicate that survival or productivity of caribou may be reduced as a result of a disruption in movements during this period. We recommend that the location of a main east-west pipeline be studied furtner and that pipe heights should be raised from the minimum of 5' cited in the EIS to 7' within the range of the PCH.
109	32	The European references used are not appropriate - carrying capacity and nutritional limitations are greater for European populations.
109	34	This statement is based on one example and hence is not objective.
109	35	There is no evidence that ramps will significantly increase crossing success - rather pipe heights and the presence of vehicular traffic are more important.
109	36	It is appropriate to discuss RRCS studies of the Nelchina herd (Carruthers et al., 1984b) here and reference it. This herd is exposed to TAPS only twice a year, but crosses it successfully.
109	37	This worst case is unjustified on the basis of known responses of caribou. It is unrealistic and ignores experience to date.
		Also should not assume 2-mile sphere of influence even without mitigation.

Page	Reference No.	Comments
110	38	Disturbance and harassment are significantly different. There is no evidence that disturbance will result in direct or indirect mortality as a result of trampling or increased energy loss.
110	39	This paragraph ignores several other studies some of which are more quantitative.
110	40	Davis et al. (1985) report no demographic effects or calving ground displacement on the Delta caribou herd from severe aircraft disturbance and other disturbance associated with military activity. This is an example where significant conclusions of a recent peer review paper (Davis et al., 1985) are ignored in favour of an outdated non-peer review reference.
110	41	The editorial comment "widely disputed view" is an inappropriate and unsubstantiated comment on a peer-review published paper.
111	43	We disagree with this conclusion since Category 1 habitats would not suffer an inevitable "loss". Mitigation of Category I habitat is possible because: 1) A 2-mile avoidance zone is not a valid assumption (see previous comments). 2) Many mitigation options are available including: - Traffic control - Reduced human activity during calving - Reduced aircraft overflights - Speed limits on traffic, etc.
111	44	Ramps are over-emphasized and not justified. Elevation of pipelines to 7' above ground (because of large groups) should be a priority over ramps.
111	46	Davis et al. (1985) do not indicate a problem. Restrictions could be lifted after 15 July because most PCH animals are gone on summer movements by that date. We agree with a minimum altitude of 2,000' May 20 through July 15th.
111	47	We basically agree with all mitigation measures except for ramps. However, more

Page	Reference No.	Comments
		measures could also be listed, to further ameliorate impacts.
112	48	Environmental description map in Chapter II shows extent of alternative habitats. Whether these could sustain a growing population assuming loss of all core calving area (although unlikely) is unknown.
112	49	Insect relief habitats need to be more accurately described. We need to know how much space is necessary to give relief to the Porcupine caribou herd.
112	50	There is a major step between potential undocumented effects and a population decline. However this paragraph seems to be properly qualified.
112	51	Is it a decline or distribution change or both? There is no basis for predicting either a 5-10 percent decline or distribution change. The opposite, a three-fold population increase in the CAH accompanied the Prudhoe Bay development which interacted with a much larger proportion of the CAH than would be the case for the 1002 area. The prediction of a decline and distribution change for the CAH throughout its range based on the 1002 interaction totally ignores the well-documented facts of the actual effects of development. This paragraph is unfounded.
113	52	There is no basis given for extrapolating effects on individuals to population effects.
113	54	A major unjustified assumption here is that disturbance will result in absolute loss of habitat value. Also an exponentially expanding population suggests that in the near term it is below carrying capacity.
114	55	Evidence is opposite, these sub-groups all originated from two transplants, one made on Barter Island (1969) and the other at Kavik Camp (13 muskox transplanted in 1970).

Page	Reference No.	Comments
116	56	These conclusions are entirely speculative and there is no possibility of subsequent determination if they are correct or incorrect.
117	57	Agree with this section in general.
118	59	This paragraph is misleading because 12-13 percent of the Beaufort Sea Population do NOT den on land.
119	60	This paragraph should be qualified with a more objective review of likelihood of effects on productivity of bears.

APPENDIX II

Review of Dau and Cameron (1986) Report entitled "Effects of a road system on caribou distribution during calving". "Rangifer", Special Issue No. 1:95-101.

Dau and Cameron have demonstrated a local, short-term reduced density of maternal caribou groups adjacent to an active road system which they refer to as partial displacement. However, several qualifications to their results need to be made that were absent in the report. The authors admit that it is speculative to extrapolate the local effects on maternal caribou to the population as a whole. Yet they imply that displacement will result in widespread, long-term loss of traditionally-used habitat. We argue that such conclusions are unwarranted at this time.

The experimental design of Dau and Cameron, although more rigorous than previous work, did not include adequate controls. The design requires a control area containing a hypothetical road alignment and located in an area of similar habitat and calving density, well away from human activity. Monitoring of a control area during an equivalent study period (1978-85) would indicate whether changes in caribou distribution similar to the experimental area can occur in the absence of development.

In addition, Dau and Cameron fail to note that:

1) despite partial displacement and increasing development activity, caribou densities increased in their study area from 1978-85;

2) most of the displacement was observed in the middle sections of the road, the north and south ends of the road alignment supported lower densities of caribou before and after the development;

3) non-maternal groups, which included up to 25 percent calves, occurred at higher densities (although not significantly higher) near the road alignment than away from the alignment during the post-development period;

4) habituation was not evident up to 1985 because the intensity of human activity was also increasing dramatically at this time.

The Dau and Cameron study showed statistically significant differences in caribou density vs. distance but also indicate that annual variability was high. In fact, the annual variability within each 4-year period was almost significant ($p = 0.053$) for calves. This suggests that the displacement response varied considerably from year to year.

It is noteworthy that Dau and Cameron showed that non-maternal caribou were not displaced by the road development. Also, the response by maternal groups was partial displacement within a zone of 0-3 km (0-1.9 mi). In the ANWR report it is implied that all caribou show a total displacement within 2 miles. This scenario is not supported by the Dau and Cameron report.

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DRAFT - 27 October 1986

THE RELATIONSHIP OF CARIBOU SUMMER DISTRIBUTIONS AND THE TRANS-ALASKA PIPELINE: DOES ABSENCE MEAN DISPLACEMENT?

By

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for

Joint Industry - Alaska Department of Fish & Game

Caribou Workshop

28-30 October 1986

INTRODUCTION

The ideal experimental design to test whether calving and post-calving cow/calf groups avoid TAPS and are displaced by oil developments in the Prudhoe Bay area is not available to us. Such a design would have as its basic elements comparable pre-development baseline data for control areas and areas which would subsequently be perturbed. Comparable techniques would be used to measure changes of various ecological variables in control and exposure areas before and following perturbation. The experimental design would be careful to ensure that comparisons are valid and would eliminate biases owing to either environmental variables or to the changing seasonal behaviors and distributions of caribou. The designs would endeavor to eliminate biases associated with the highly clumped or non-homogeneous distributions of caribou which characterize the species by recognizing the implications of differing densities, grouping behaviour, sexual segregation, and differential habitat use to the analysis. Surveys would be conducted during comparable time and life cycle periods to reduce the foregoing potential biases. The foregoing would ensure that data were comparable for the test and control areas within years, so that between-year comparisons could be made

between controls as well as test (exposure) areas both before and after development. Finally, the study design would encourage identification and measurement of exogenous environmental influences such as snow characteristics, plant phenology or seasonal flooding which may, independently of the previously mentioned variables, affect the distribution of and habitat use by caribou between two apparently similar areas. Such measurements would help account for variations in use or density which might occur even where exhaustive attempts were made to standardize the experiment based on the criteria I have previously mentioned.

The lack of many of the foregoing elements has contributed to differing interpretations on the relationship between caribou distributions and North Slope petroleum developments, especially as it pertains to calving distributions and the percentage calves associated with the TAPS corridor. These differing interpretations, in turn, have generated controversy which has often obscured rather than clarified issues. However, despite deficiencies in many of the data requirements I have described, there are numerous bodies of evidence which can objectively focus on questions of caribou interaction with the TAPS corridor and the implication of that interaction. These data, accumulated over a period of the past 16 years, provide a basis for interpreting the relative role of ecological factors and disturbance in governing the

distribution, movements and habitat use of Central Arctic caribou. In this paper I can only develop and substantiate some important principles: I do not intend to review and debate the minutiae of 15 years of survey data but to point out some of the most significant findings which encompass the period prior to and following development of the TAPS corridor.

Specific data for the area are available for the period before extensive oilfield development, the construction of the Dalton Highway in 1974, or the pipeline between 1975 and 1977. The main sources of pre-development data are studies by Angus Gavin from 1969 to 1978 (Gavin 1977; Gavin and Chamberlain 1979), White et al. (1975), and Child (1973). Post-development data are derived from a wide range of ADF&G and industry sponsored studies from 1975 to the present.

METHODOLOGICAL PROBLEMS: UNEQUAL COMPARISONS

One of the major difficulties in any analysis of Central Arctic caribou and development interactions is separating out the relative influence on caribou of the pipeline, the Dalton Highway and the oilfield development. Although this paper deals with the TAPS corridor, it cannot ignore pre-construction calving distributions as they relate to Prudhoe Bay and TAPS. Therefore I must comment, in part, on

the conclusions pertaining to the oilfield presented by Smith and Cameron (1983) and Whitten and Cameron (1985). Figure 1 shows the study area and the TAPS corridor.

The major conclusions of Cameron and Whitten (1980_) and Cameron et al. (1979) are that cow/calf groups avoid the TAPS corridor during calving and the summer period based on a comparison of calf percentages along the corridor versus regionally. The major conclusion of Smith and Cameron (1983) and Whitten and Cameron (1985) is that calving caribou have been displaced from the Prudhoe Bay Oilfield. This conclusion is based on low densities of calving caribou in the field and a lower calf percentage of total caribou in the field versus the regional percentage.

The problem of comparability of data is a major limitation to the conclusions drawn by Cameron and Whitten (1980_), Cameron et al. (1979, 1985). In the latter final report, comparisons of calf percentages between regional and corridor values during the calving period (June) are available for only two years (1975-76) of the seven-year study (1975-1982). Other seasonal periods were compared but they combined periods in which seasonal distributions are known to vary considerably and frequently in response to environmental factors. Thus, comparisons of short yearling percentages in April/May between the TAPS corridor and regional values does

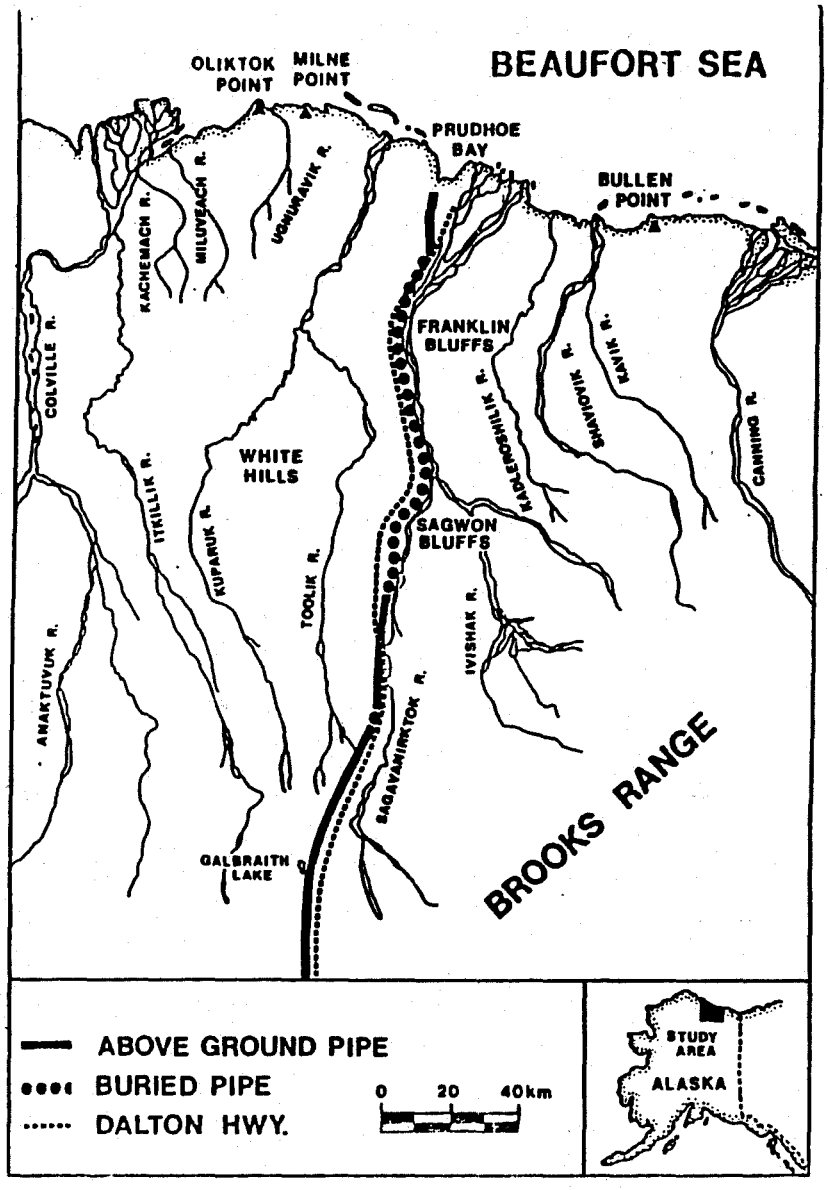

Figure 1. The study area.

not take into account sexual segregation (Figure 2) and differential habitat use by the sexes at that time (Figure 3), while comparisons for the July-August period are confounded by the extreme flux in movements in response to insects which can affect calf percentages in a specific area drastically even on a given day (White et al. 1978). Even so, calf percentages along the corridor and regionally were the same in two of five years for the July-August period (Cameron et al. 1985), suggesting that factors other than the TAPS corridor influenced those percentages.

Although Cameron et al. (1985) attempt to reduce previous biases in survey coverage of non-riparian habitats regionally by deleting road surveys south of Region 4 and coastal transects from aerial surveys, regional surveys still appear to oversample non-riparian habitats. The published methodology (Cameron and Whitten 1979) states a deliberate effort to sample non-riparian habitats on regional surveys for at least 3 km on either side of riparian habitats. Thus, many high density non-riparian calving areas are sampled in the regional surveys (Figure 4) and compared to the 1 km wide surveys on either side of the Dalton Highway which is closely associated with riparian habitat of the Sagavanirktok River (Figure 5). The route of TAPS does not transect such calving concentrations and traverses approximately three times the regional percentage of riparian habitat (Carruthers et al. 1984).

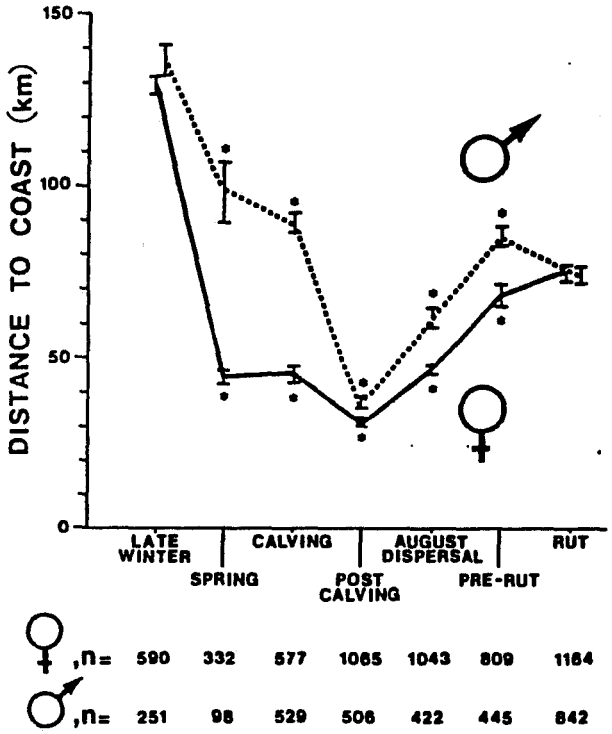

Figure 2. Seasonal variation in average distance to coast for male and female caribou groups within the study area (1981-1983).

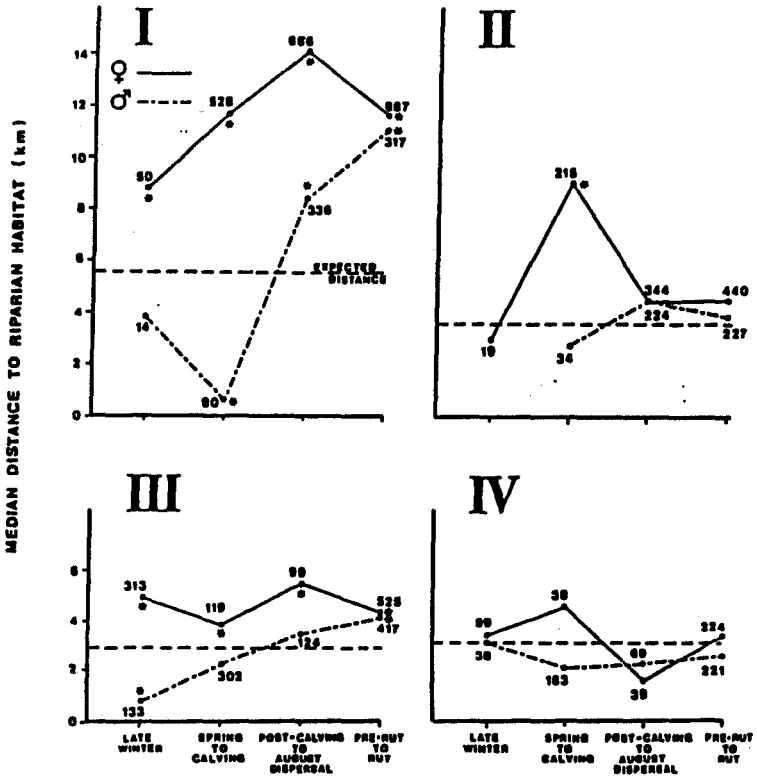

Figure 3. Seasonal variation in median distance to riparian habitat (km) of male and female caribou for four subregions of the study area (1981-1983).
*Asterisk denotes that median distance is significantly different than expected based on a random distribution.

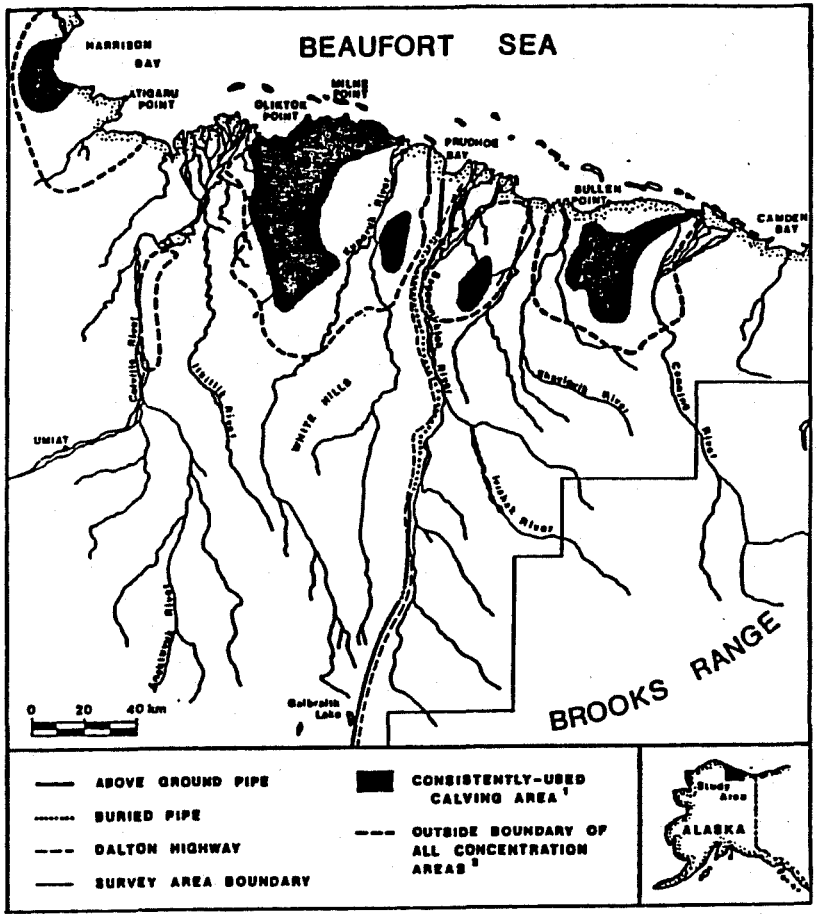

Figure 4. Location of calving concentration areas, 1981-1986.
[1]Area of concentrated calving in 4 of 6 years from 1981-1986 (between Canning and Colville Rivers) and in 2 of 3 years from 1984-1986 (west of Colville and east of Canning River only).
[2]This boundary encompasses all concentration areas recorded from 1981-1986.

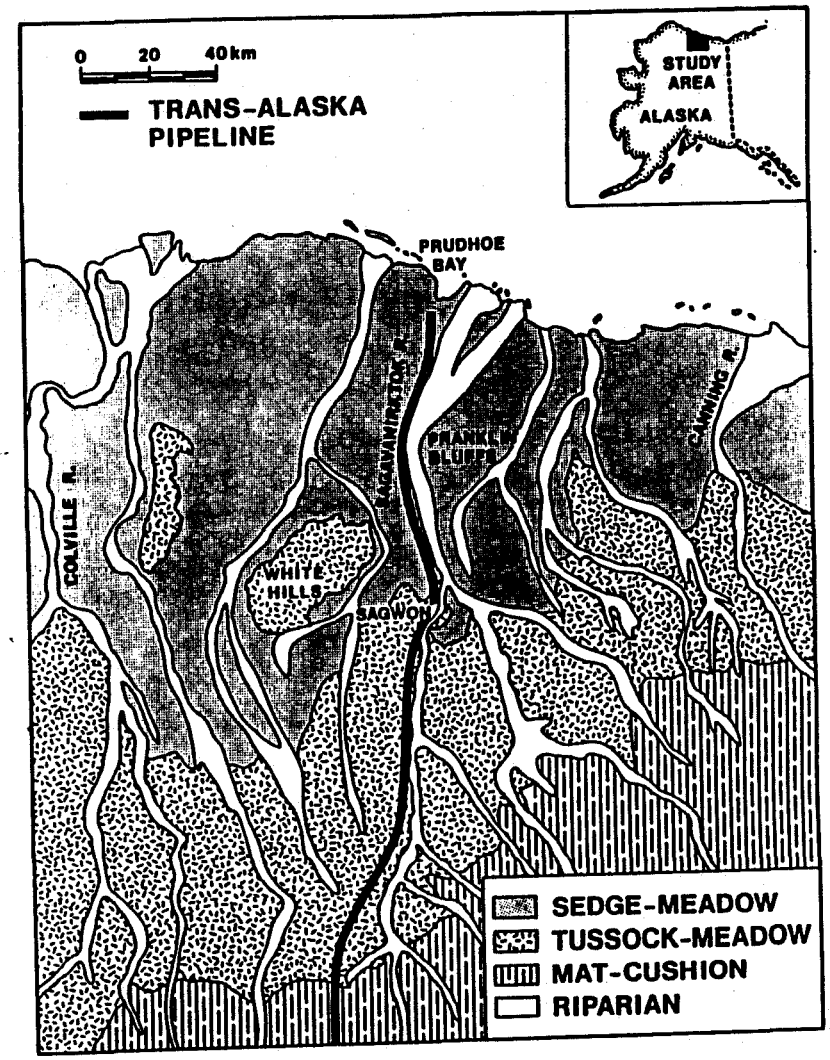

Figure 5. Generalized habitat types within the study area.

I do not disagree that calf percentages are lower along the TAPS corridor than for the region as a whole but with the interpretation of why they are lower. There is considerable evidence that:

1. The Prudhoe Bay area was not an important calving area even prior to development (Table 1; White et al. 1975; Gavin 1977; Gavin and Chamberlain 1979) (Figure 6).

2. There is well documented evidence that sexual segregation (Cameron and Whitten 1979; Carruthers et al. 1984) and differential habitat use result in different distributions of cow/calf and bull groups in riparian versus non-riparian habitats (Jakimchuk et al., in press; Curatolo 1985). Indeed, Curatolo found that this differential habitat use occurred even within intensively developed areas and that calf percentages were consistently lower in riparian habitat. Jakimchuk et al. (in press) show that differing distance relationships to riparian habitats between bulls and cows are consistent regional distributional trend.

3. Finally, along the West Sak Road, where habitats normally used by cows and calves have been traversed by a road corridor, thus eliminating the habitat bias to a large degree, summer calf percentages have been the same or

Table 1. Estimated caribou populations, North Slope, Alaska, 1970-1978.

	Colville-Canning Region, Ca. 9000 Sq. Mi.						Prudhoe Bay Area[1], Ca. 455 Sq. Mi.					
Year	Cows	Calves	Calves per 100[2] Cows	Year-lings	Bulls	Total	Cows	Calves	Calves per 100[3] Cows	Year-lings	Bulls[4]	Total
1970	8,868	5,962	67	5,193	1,581	21,604	24	17	71	8		49
1971	8,600	3,100	36	2,000	1,300	15,000	16	7	44	7		30
1972	1,200	450	37	350	500	2,500	8	5	63	4		17
1973	9,200	3,500	38	2,500	1,200	16,400	24	9	38	9		42
1974	10,000	3,800	37	3,500	1,100	18,600	34	9	27	8		51
1975	7,800	2,800	36	2,600	1,300	14,500	27	13	48	4		44
1976	2,200	750	34	1,100	950	5,000	19	4	21	5		28
1977	3,200	1,200	37	600	1,000	6,000	14	11	79	3		28
1978	3,170	1,580	50	970	1,100	6,820	29	15	52	7	6	57

[1]Encompasses the area from the Sagavanirktok River to Kuparuk River and from the Coast to Franklin Bluffs.
[2]Colville-Canning Region ten year average = 41 calves per 100 cows per year.
[3]Prudhoe Bay Area ten year average = 46 calves per 100 cows per year.
[4]No data available except for 1978.

SOURCE: Gavin and Chamberlain (1979).

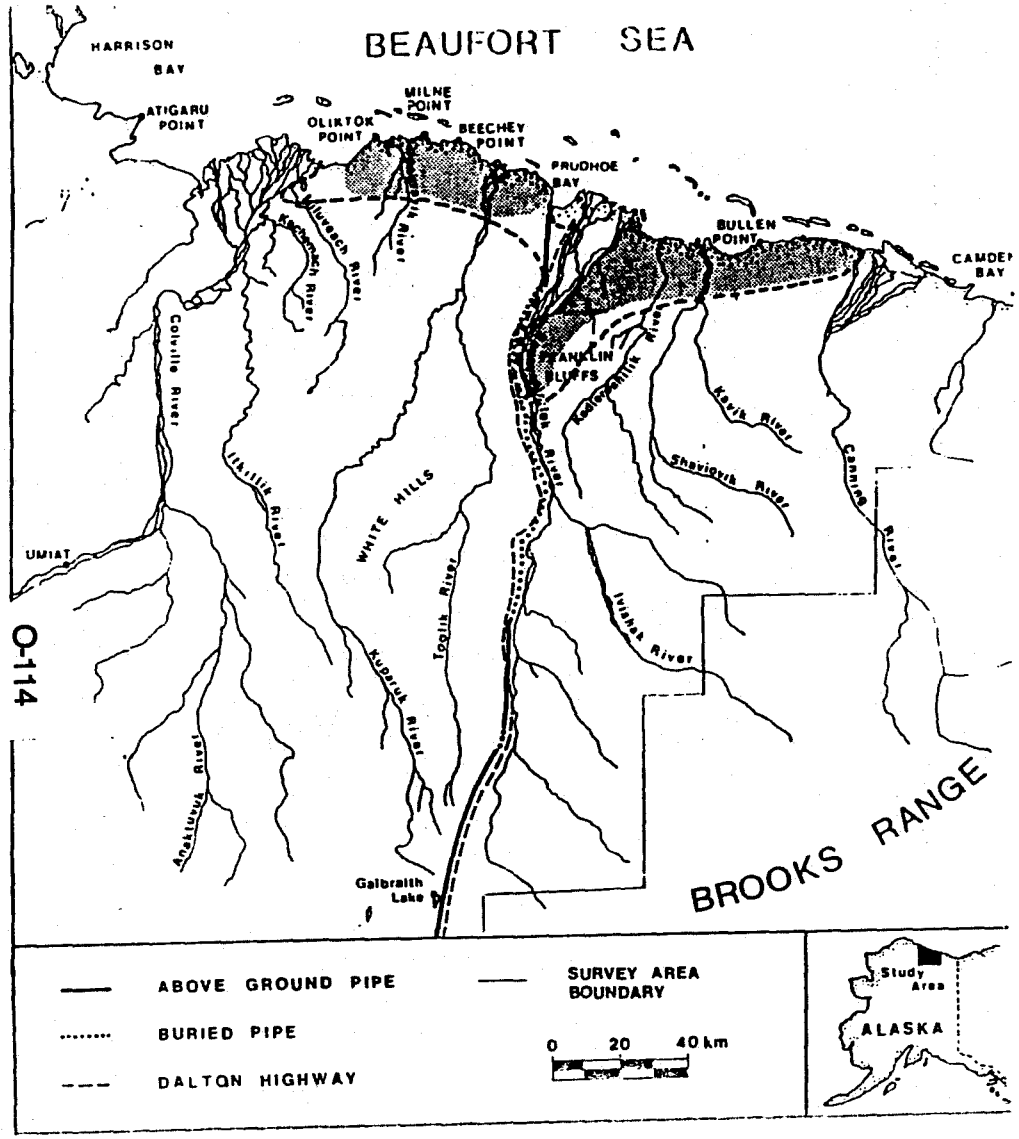

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Figure 6. Major calving areas of Central Arctic caribou in 3 of 4 years (1981-1983 inclusive.. Dotted line denotes calving in at least one of four years (After Gavin 1977).

virtually the same as regional values in five of seven years following the development of the corridor (Table 2).

Notwithstanding Table 2, which eliminates a major habitat bias, calf percentages alone are a poor measure of impact along the TAPS corridor when one considers seasonal variations in caribou distribution in response to environmental influences such as snow cover, insect harassment, and differential habitat use by the sexes.

The major evidence presented that calving has been displaced from the Prudhoe Bay area are the low calf percentages recorded, the low number of calving groups found there during summer and the higher incidence of calving south of Prudhoe Bay (Whitten and Cameron 1983; Smith and Cameron 1983). However, comparison of pre- and post-development calving distributions shows a similar distribution to that found in recent years (Sopuck and Jakimchuk 1986), with more calving south of Prudhoe Bay than in the Prudhoe Bay oilfield area even prior to extensive development (Figures 4 and 6). The apparent reason for this is the frequent, extensive flooding associated with sedge meadows in the Prudhoe Bay area. Late snow melt and flooding of lowland habitats in the coastal zone at calving has occurred in 7 of the past 13 years where data are available (Table 3). In years of delayed snow melt, calving farther inland has been consistently reported. This

Table 2. A comparison of regional calf percentages and calf percentages observed along the West Sak (Spine) Road during summer 1978-1984.

Year	Spine Road (West Sak) Percent Calves	Regional Calf Percentages Percent Calves	Source
1978	26	25	Cameron & Whitten 1979b
1979	25.0	25	Cameron & Whitten 1980b
1980	20.0	21	Cameron et al. 1981
1981	18.0[ab]	27	Cameron et al. 1983
1982	16.0	No Data	Smith et al. 1984
1983	17.5	21	Smith et al. 1984
1984	22.3	23.2	Smith et al. 1984

[a] Represents 14,966 total caribou seen from the road in 1981 versus 4,552 seen in 1980.

[b] Of caribou observed crossing West Sak road and Kuparuk pipeline in 1981, calves were 25% of total caribou.

Table 3. Pheonology of snowmelt and calving distributions in the central Arctic region, 1970-1986.

Year	Snowmelt Phenology During Calving	Comments on Calving Distribution	Source
1970	No data	"Usual distribution" (see Fig. 6)	Gavin 1977
1971	Deep snow coastal plain	Calving in foothills	Gavin 1977
1972	Heavy snow	Low use of Coastal Zone & Prudhoe Bay	Gavin 1977
1973	Dry year	Some inland calving	Gavin 1977
1974	No data	"Usual distribution" (Fig. 6)	Gavin 1977
1975	No data	Scattered calving, no concentration areas	
1976	Heavy snow	"Usual distribution" (Fig. 6)	Gavin 1977
1977		"Usual distribution" (Fig. 6)	Gavin 1977
1978	Late snowmelt, flooding		
1979	Dry - relatively snow-free	No data	Cameron et al. 1981
1980	Late Snowmelt - extensive flooding	More inland caribou	Whitten & Cameron 1985
1981	Dry, snow-free calving	Little inland	Cameron et al. 1983
1982	Late snowmelt - extensive flooding	More calving inland	Whitten & Cameron 1985
1983	Relatively dry	Usual (see Fig. 6)	
1984	Relatively dry	Usual (Fig. 6)	Sopuck & Jakimchuk 1986
1985	Relatively dry	Usual	Sopuck & Jakimchuk 1986
1986	Late snowmelt	Majority inland calving east of Sag River.	Sopuck & Jakimchuk 1986

seems to be a reasonable explanation for the consistent calving associated with the Franklin Bluffs area south of Prudhoe Bay which was documented prior to extensive oilfield development at Prudhoe Bay.

If we look at factors affecting pre- and post-calving distributions we find strong well-documented ecological reasons to explain observed distributions. When we test these hypotheses by looking at known calving and post-calving areas where development has occurred, such as the West Sak Road area and Prudhoe Bay, we find that the hypotheses pertaining to habitat use and their effects on distribution hold (Curatolo 1985; Jakimchuk et al., in press; this paper). The explanations for apparent discrepancies between what occurs along the TAPS corridor and regionally are in response to ecological factors. This explains the apparent contradiction of avoidance of TAPS but no avoidance of the Spine Road during summer by the same caribou on the same summer range.

I have concluded that absence does not equal displacement. I do not think that cow/calf groups avoid TAPS but the major river valley associated with TAPS - a relationship which also holds regionally for other comparable major rivers such as the Canning and Colville. Similarly, I think the evidence is strong that the Prudhoe Bay complex prior to development was not an important calving area. Its present

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ATTACHMENT E

TESTIMONY ON THE
DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
Anchorage, Alaska
Presented by the Alaska Oil and Gas Association (AOGA)
January 5, 1987

I am Tom Cook, Alaska Exploration Representative for Chevron U.S.A. Inc. Today I am appearing before you on behalf of the Alaska Oil and Gas Association. AOGA is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. Let me say at the outset that AOGA strongly supports the Department of Interior's proposed recommendation that the entire "1002" area, also known as the Coastal Plain, be authorized for oil and gas exploration and production. We have restricted our comments today to three aspects of the "1002(h) report", but will submit detailed written comments on the entire report before the January 23, 1987 deadline specified in the Federal Register Notice.

Mr. Mike Bradshaw of Conoco will first address the national interest in developing the petroleum resources discussed in Chapter VII, then Mr. Mark McDermott of ARCO will comment on the biological content of Chapters II and VI. I will conclude our statement with comments on the recommended stipulations applicable to the area, together with an endorsement of the proposed full leasing Alternative A selected for recommendation by the Assistant Secretary for Fish and Wildlife and Parks, William P. Horn.

Comments on National Need for Oil and Gas (Chapter VII)

Thank you. For the record, I am Mike Bradshaw, Operations Director-Alaska for Conoco Inc. There are many factors that are relevant in determining why opening the ANWR Coastal Plain to oil and gas leasing, exploration and production is in the national interest.

- The U.S. is rapidly depleting its domestic reserves of oil and gas.
- Domestic crude oil production from existing fields is forecast to decline from the 8.9 million barrels per day average in 1985 to 6.2 million barrels per day by 1991, if prices remain at $15 per barrel. Current domestic production has already fallen to about 8.5 million barrels per day. Domestic production is forecast to fall as low as 4 million barrels per day by the year 2000.
- Currently Alaska supplies our nation with approximately 20% of the total U.S. production.

- Barring new domestic discoveries to replace depleted reserves, and assuming the demand for petroleum does not increase, the U.S. may need to import 12 million barrels per day by the year 2000. Thus, without significant new discoveries, our nation could be dependent upon foreign sources for 60-75% of its demand, within the next 10-15 years, almost double the present level of dependency.

Currently the U.S. consumes more than 25 percent of worldwide petroleum production even though it has less than 4 percent of proven worldwide reserves. Policy decisions which slow or prohibit replenishment of domestic reserves only exacerbate this problem. Opportunities to explore for and develop new reserves must be forthcoming.

As we have seen in recent years, the U.S. is vulnerable to serious supply disruptions because of its dependence on foreign oil. Foreign sources of petroleum are concentrated largely in the Middle East where two-thirds of the proven reserves of the non-communist world exist. Saudi Arabia alone possesses over one-fourth of the free world's reserves. Increased future dependency on these politically unstable Middle Eastern areas is highly undesirable from a national interest viewpoint.

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As domestic production continues to decline, and imports continue to rise, U.S. vulnerability to supply disruption will increase. A reliable domestic energy supply is a key factor in maintaining a viable foreign policy.

It is in the national security and economic interest to encourage exploration for new domestic reserves wherever the potential exists, on the Coastal Plain of ANWR and other promising areas. Any decision to delay that search is a step toward increased dependency on foreign supply. Lead times to develop frontier Alaska oilfields are very long, typically 10 to 15 years from discovery to first production. If a major discovery were made on the Coastal Plain today, first production would not be likely before the year 2000.

Increasing consumption, decreasing domestic production, and rising imports, coupled with delay in opening promising new areas to exploration and development are all factors which collectively will contribute to the likelihood of a future energy crisis. 1986 was a year of drastic change throughout the oil and gas industry. Exploration is currently at a near standstill, marginal and uneconomic fields are being shut-in, and research and development have been drastically reduced. Continuity of exploration and development are necessary to replace depleted reserves. Delays in the exploration process today will cause greatly reduced future production.

Those who oppose oil resource development argue that the reserve potential of the Coastal Plain may represent only a few months supply of oil to the nation. This statement, though misleading,

illustrates very well the significance of such a reserve if it is discovered and produced from the Coastal Plain. A few months is indeed significant when compared on the same terms with the 18 month supply in the largest oilfield ever discovered in North America - Prudhoe Bay. But, the statement is misleading for two very important reasons. First, no oil field can be fully produced in a few months. Prudhoe Bay, for example, may produce oil and gas for at least 30 years. Second, the statement assumes a reserve estimate which would offset total daily consumption rather than an offset to imports during the life of the field. From a national security perspective, offsetting imports is a more important comparison. Prudhoe Bay, on average, could offset approximately 13% of foreign oil imports for 30 years (assuming 10 billion barrels recoverable reserves and 7 million barrels per day imports).

The report estimates a 19% chance of finding economically recoverable oil on the Coastal Plain. This promising outlook for success helps explain industry's high interest in exploring the Coastal Plain because it is a ten-fold increase over the statistical industry success rate in Alaska. Historically only one out of fifty, or 2%, of the exploratory wells drilled in Alaska has ever resulted in a commercial discovery

Economic benefits of further North Slope development to the nation are extremely significant. In addition to the direct benefits to the State and Federal governments from bonus payments, rentals, royalties, and taxes, the discovery of large new reserves would significantly reduce oil imports and the associated national trade deficit. Nearly half of the U.S. trade deficit today results from imported oil.

Oil development on the North Slope of Alaska has provided hundreds of billions of dollars to the U.S. economy, representing a benefit to all of the 50 states. Therefore, petroleum development from the Coastal Plain, especially on the order of magnitude of Kuparuk or Prudhoe Bay, would promote economic development not only within Alaska, but also throughout the United States. Jobs would be created as the demand for goods and services increase and the positive impacts would be felt well beyond the petroleum industry.

If highly prospective areas such as the Coastal Plain are placed off limits to petroleum exploration, the nation may experience a future energy crisis which will make the 1973 embargo and the 1979-1980 price escalation seem mild by comparison.

In summary, we believe it is clearly in the national interest to open the Coastal Plain of ANWR to leasing and development.

I will now turn the microphone to Mark McDermott with ARCO who will comment on the biological aspects of the draft report.

Biological Review Comments

My name is Mark McDermott and I am a Senior Environmental Coordinator for ARCO Alaska, Inc. Following a detailed review of the LEIS Chapter II - Existing Environment and Chapter VI - Environmental Consequences, the Alaska Oil and Gas Association strongly endorses the DOI recommendation to lease the entire "1002" Coastal Plain area for oil and gas exploration, development and production based on the following points and conclusions:

Prudhoe Bay Region/TAPS

Often the National Environmental Policy Act (NEPA)-mandated EIS process tries to predict environmental consequences of new developments with little or no previous field experience to guide the predictions. Clearly, for the ANWR Coastal Plain, test cases have already been run at Prudhoe Bay, Kuparuk, Milne Point, Lisburne, and Endicott, and with the Trans Alaska Pipeline. Collectively, the experience of the regulatory agencies and industry is summarized in the LEIS on page 2: "The evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources. Hence, it is reasonable to assume that development can proceed on the Coastal Plain and generate similar minimal effects."

Furthermore, we support the statement, also on page 2 of the LEIS, that "Most adverse effects would be minimized or eliminated through carefully applied mitigation, using the lessons learned and technology acquired from development at other North Slope oilfields and from the construction and operation of the Trans-Alaska Pipeline System (TAPS)".

Indeed, we would like to point out that all of the dire predictions of environmental degradation made 15 years ago, prior to the construction of TAPS, have subsequently been proven to be unfounded. The predicted demise of major caribou herds, deterioration in water quality and major losses of habitat simply have not occurred. Instead, the development of Prudhoe Bay and the TAPS have allowed Alaskans to enjoy economic prosperity in harmony with a high quality environment and thriving wildlife populations.

National Environmental Policy Act

We understand that the draft document is a legislative EIS largely following the requirements of the National Environmental Policy Act. We would like to point out that many of the environmental consequences predicted to occur for the 5 alternatives appear to be based on "worst case" evaluations. In April 1986 the NEPA-EIS guidelines were changed from requiring a "worst case" assessment to one of "most likely to occur." We feel that many of the major conclusions of significant effects carry the earlier "worst case" assessment to an extreme and thus we ask that the authors reconsider many of their conclusions in light of the "most likely to occur" assessment of impacts. The standard for the "most likely to occur" case exists in the experience from other North Slope oilfields. Many of these specific points will be detailed in our written comments.

Caribou

We agree that caribou, both from a standpoint of numbers and distribution, is the specie most likely to encounter developmental activities in the "1002" area. The LEIS quote from page 6 states that "Changes could include displacement and reduction in the size of the Porcupine Caribou Herd. The amount of reduction and its long-term significance for herd viability is highly speculative" (emphasis added). We ask that these acknowledged qualifications be presented throughout the environmental consequences section to ensure that all readers of the document are fully aware of the highly speculative nature of some of the hypothesized impacts.

Carrying Capacity

In the management of wildlife populations, the concept of habitat carrying capacity is key to defining management goals. It is an established fact that the Porcupine Herd does not approach the carrying capacity of its range. Indeed, former Alaska Fish & Game Commissioner, R. Skoog, in his Doctoral dissertation (1968) stated that "It seems likely that the Alaskan caribou population has remained far below range carrying capacity and that the total habitat has never been fully occupied. In reality, caribou populations seem to have maintained densities much lower than the maximum dictated by food alone, and hence the reduction in total range becomes less meaningful." Thus, we agree with the conclusions that habitat is not currently limiting the growth of the Porcupine Herd and that the small loss of habitat represented by likely development in the "1002" area will not impact growth or productivity of caribou. Consequently, we disagree with the speculation that a reduction of caribou population is likely to occur as a result of small reductions in habitat availability and value.

"Core Calving Area" Concept

Significant year-to-year variability in calving distribution has been recorded for the Porcupine Herd all across the Arctic coast from east into Canada and west to the Canning River. Concentrated calving has been observed across the entire so-called core calving area during only 5 of the past 14 years. Therefore, calving habitat is more appropriately represented as a true continuum across the Coastal Plain including portions of the Arctic coast outside the "1002" study area. The Porcupine Caribou Herd has demonstrated numerous times in the past, including this past year, that it can and will successfully calve miles from the (quote) "core calving area" (unquote). Thus, the "unique and irreplaceable" nature required for designation as Resource Category 1 does not apply.

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While AOGA embraces the responsible use of mitigation procedures in the Arctic, it is inappropriate to emphasize habitat loss alone without consideration of actual effects or lack of effects on wildlife populations from development.

Muskox

We feel that the conclusions regarding potential impacts of development on muskox are unnecessarily severe and unfounded. While it is true that very few data characterizing muskox responses to oil field development are available, it is also true that the muskox have shown ready adaptability to human presence and have even been semi-domesticated in several areas. This adaptability to human presence will significantly reduce the "worst-case" conclusions stated in the LEIS.

Mammalian Species

We feel that it is important to point out that the remaining mammalian species including moose, dall sheep, wolves, arctic fox, wolverines and brown bears are present on the Coastal Plain in relatively low population densities or for relatively short periods during the year. Thus, we support the conclusions of minimal or negligible impacts on these species.

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Fishery Populations

We support the conclusion that only minor to negligible effects on coastal fishery resources or fishery habitat will occur. Experience at Prudhoe Bay and Endicott has provided a significant volume of data to support this judgment.

Threatened and Endangered Species

We also support the conclusions of minor to negligible impacts on endangered and threatened animal species such as bowhead and grey whales and the peregrine falcon. We feel that the transient nature of their presence on the Coastal Plain and the history of developmental interaction in the Prudhoe Bay field clearly demonstrate the lack of meaningful impacts on these species. Regarding the plant, Thlaspi arcticum, we feel that conclusions and set-back stipulations based on the presence of this specie are overly restrictive because the plant has not been determined to be threatened or endangered.

Recreation

We would like to underscore the extraordinarily low use of the Coastal Plain as a recreational area. History indicates that only a small number of individuals have actually utilized the Coastal Plain for recreation in the form of hunting, fishing, camping or hiking. It is extremely expensive to reach the area; a trip from

the contiguous states costs thousands of dollars and requires an air charter flight to reach the Coastal Plain. Wet and moist ground conditions make hiking difficult during the 8-10 week "summer." Extreme cold and darkness during most of the year further reduce recreational use of the Coastal Plain. For most of the year this is an extremely harsh and hostile environment.

While there is no reason to believe that leasing and development would lead to a permanent loss of aesthetic values, over 30 miles of Coastal Plain from the "1002" area east to the Canadian border are already classified as wilderness, thus preserving the complete spectrum of arctic ecosystems represented in the Arctic Refuge.

Summary

Before I ask Mr. Cook to conclude our statement, I would like to acknowledge the 5 years of extensive field investigations, data collections and analyses by over 50 trained professional scientists, including wildlife and fishery biologists, botanists, zoologists, chemists, geologists and resource specialists who contributed to this draft report. We consider the factual basis for the scientific analysis to be adequate and the conclusions to be reasoned. However, we cannot support some of the speculation on environmental consequences found in the report which result in an over estimation of potential impacts.

Concluding Remarks

As previously stated AOGA supports the full leasing of the ANWR Coastal Plain under reasonable measures for environmental protection. Except for a few provisions, the proposed stipulations found in the report and the land use stipulations found in the Agreement Between the Arctic Slope Regional Corporation and the United States of America (incorporated into the report by reference), appear reasonable. The proposed mitigation measures are generally consistent with current and proven industry practices for the protection of wildlife and the environment. The application of reasonable mitigation can ensure that development is conducted in a manner compatible with the purposes of the Refuge and ensure that no unnecessary adverse environmental impacts occur. Our written comments will address in detail, those measures that we believe are unduly restrictive.

AOGA strongly endorses Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest. Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise. Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling.

Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C would just be another delay in the eventual production from the area. Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

We fully support the proposed recommendation on page 169 which contains the following statement: "even though the billions of barrels of oil reserves have been brought on line and the infrastructure developed to bring that oil to U.S. markets, the fish and wildlife resources of the Prudhoe Bay area remain extremely healthy. The Central Arctic Caribou Herd has increased substantially during the period that development has occurred within the heart of its range. Estimated at about 3,000 animals in 1972, the herd now numbers more than 13,000. Similarly, important waterfowl species continue to successfully nest and rear their brood within the developed area. Although circumstances within the "1002" area may be somewhat different, the evidence derived from the Prudhoe Bay experience leads one to be quite optimistic about the ability to explore for and develop the hydrocarbon potential of the "1002" area without significant deleterious effects on the unit's wildlife resources."

Thank you for this opportunity to comment.

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TESTIMONY ON THE
DRAFT LEGISLATION ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
Washington, D.C.
Presented by the Alaska Oil and Gas Association (AOGA)
January 9, 1987

I am Wayne Smith, District Manager of Amoco Production Company and President of the Alaska Oil and Gas Association (AOGA). I am appearing before you today on behalf of AOGA which is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. AOGA strongly supports the Department of the Interior's proposed recommendation that the entire "1002" area, also known as the Coastal Plain of the Arctic National Wildlife Refuge (ANWR), be authorized for oil and gas leasing, exploration and production.

Currently, Alaska supplies our nation with approximately 20% of its total domestic production. Lead times are long in frontier Alaska regions--at least 10 years from discovery to first production, but more likely to extend as long as 15 years in the case of the ANWR Coastal Plain. Without significant new discoveries, our nation could be dependent upon foreign sources for 60-75% of its petroleum needs within the next 10-15 years, almost double the present level of dependency.

Production from existing Arctic Alaska oil fields which are presently being produced at about 1.8 million barrels per day will begin a precipitous decline by 1988. It is a matter of technical certainty that the present level of production from Alaska's North Slope will decline to about 500,000 barrels per day by the year 2000, earliest date by which new production from the ANWR Coastal Plain would likely be available.

If highly prospective areas such as the Coastal Plain are placed off limits to petroleum exploration, the nation may experience a future energy crisis which will make the 1973 embargo and the 1979-1980 price escalation seem mild by comparison.

Increasing consumption and rising imports along with decreasing domestic reserves and production, coupled with delay in opening promising new areas to exploration and development, are all factors which collectively will contribute to the likelihood of a future energy crisis.

The resource assessment contained in the draft LEIS for the Coastal Plain supports our view that the area may contain significant reserves. The Coastal Plain has great potential for making a substantial contribution to our domestic energy supply.

Even the most optimistic production scenario will physically utilize only a very small area of the Coastal Plain. The very small area which would be affected by discovery and development of

1 or 2 giant oil fields should be balanced against the very strong contribution to the national interest that such discoveries could represent.

Our industry has demonstrated its compatibility to explore for, develop, and produce oil in the Alaska Arctic without significant adverse impact on wildlife and the environment. The dire predictions of environmental degradation and harm to wildlife made 15 years ago, prior to the development of the giant Prudhoe Bay field and the construction of the Trans-Alaska Pipeline have proven to be unfounded. The predicted demise of major caribou herds, deterioration in water quality and major losses of habitat simply have not occurred.

Instead, the development of Prudhoe Bay and the Trans-Alaska Pipeline have permitted the production of 5 billion barrels of much needed oil with minimal environmental impact. During the 15 year period of development wildlife have thrived in the midst of oil field development and evidenced by the fact that the Central Arctic Caribou Herd has grown from about 3,000 to a population now estimated at over 13,000 animals.

With regard to the issue of protecting the Porcupine Caribou Herd which uses the Coastal Plain on a seasonal basis, there has been a development since the issuance of the draft report which I would like to mention. On December 3, 1986, the United States and Canada have devised an agreement for the management and conservation of the Porcupine Caribou Herd. This agreement which also involved the native subsistence users of both the Canadian and American Arctic assures that appropriate steps will be taken to guarantee the well-being and preservation of the Porcupine Caribou Herd. In view of this development, the final report to be submitted to the Congress should be revised to reflect this new measure of protection afforded the Porcupine Caribou Herd.

I would like to acknowledge the 5 years of extensive field investigations, data collections and analyses by over 50 trained professional scientists, including wildlife and fishery biologists, botanists, zoologists, chemists, geologists and resource specialists who contributed to this draft report. We consider the factual basis for the scientific analysis to be adequate and the conclusions to be reasoned. However, we cannot support some of the speculation on environmental consequences found in the report which result in an over estimation of potential impacts.

Except for a few provisions, the proposed stipulations found in the report and the land use stipulations found in the Agreement Between the Arctic Slope Regional Corporation and the United States of America (incorporated into the report by reference), appear reasonable. The proposed mitigation measures are generally consistent with current and proven industry practices for the protection of wildlife and the environment. The application of reasonable mitigation can ensure that development is conducted in a manner compatible with the purposes of the Refuge and ensure

that no unnecessary adverse environmental impacts occur. Our written comments will address in detail, those measures that we believe are unduly restrictive.

AOGA strongly endorses Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest. Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise. Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling. Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C would just be another delay in the eventual production from the area. Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

AOGA's expresses its full support of the Department of the Interior's proposed recommendation to Congress which states "...even though the millions of barrels of oil resources have been brought on line and the infrastructure developed to bring that oil to U.S. markets, the fish and wildlife resources of the Prudhoe Bay area remain extremely healthy. The Central Arctic Caribou Herd has increased substantially during the period that development has occurred within the heart of its range. Estimated at about 3,000 animals in 1972, the herd now numbers more than 13,000. Similarly, important waterfowl species continue to successfully nest and rear their brood within the developed area. Although circumstances within the "1002" area may be somewhat different, the evidence derived from the Prudhoe Bay experience leads one to be quite optimistic about the ability to explore for and develop the hydrocarbon potential of the "1002" area without significant deleterious effects on the unit's wildlife resources".

Thank you for the opportunity to present this statement.

DO YOU WANT TO MAKE PUBLIC COMMENTS? AOGA 3 speakers

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

10:17:50

Please print

Name Tom Cook

Mailing Address 1200 Firewood #207

Anchorage AK 99503

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☒ I am speaking for Alaska Oil & Gas Assoc (AOGA)

(please enter name of organization you represent)

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TESTIMONY ON THE
DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
Anchorage, Alaska
Presented by the Alaska Oil and Gas Association (AOGA)
January 5, 1987

I am Tom Cook, Alaska Exploration Representative for Chevron U.S.A. Inc. Today I am appearing before you on behalf of the Alaska Oil and Gas Association. AOGA is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. Let me say at the outset that AOGA strongly supports the Department of Interior's proposed recommendation that the entire "1002" area, also known as the Coastal Plain, be authorized for oil and gas exploration and production. We have restricted our comments today to three aspects of the "1002(h) report", but will submit detailed written comments on the entire report before the January 23, 1987 deadline specified in the Federal Register Notice.

Mr. Mike Bradshaw of Conoco will first address the national interest in developing the petroleum resources discussed in Chapter VII, then Mr. Mark McDermott of ARCO will comment on the biological content of Chapters II and VI. I will conclude our statement with comments on the recommended stipulations applicable to the area, together with an endorsement of the proposed full leasing Alternative A selected for recommendation by the Assistant Secretary for Fish and Wildlife and Parks, William P. Horn.

Comments on National Need for Oil and Gas (Chapter VII)

Thank you. For the record, I am Mike Bradshaw, Operations Director-Alaska for Conoco Inc. There are many factors that are relevant in determining why opening the ANWR Coastal Plain to oil and gas leasing, exploration and production is in the national interest.

- The U.S. is rapidly depleting its domestic reserves of oil and gas.
- Domestic crude oil production from existing fields is forecast to decline from the 8.9 million barrels per day average in 1985 to 6.2 million barrels per day by 1991, if prices remain at $15 per barrel. Current domestic production has already fallen to about 8.5 million barrels per day. Domestic production is forecast to fall as low as 4 million barrels per day by the year 2000.
- Currently Alaska supplies our nation with approximately 20% of the total U.S. production.
- Barring new domestic discoveries to replace depleted reserves, and assuming the demand for petroleum does not

increase, the U.S. may need to import 12 million barrels per day by the year 2000. Thus, without significant new discoveries, our nation could be dependent upon foreign sources for 60-75% of its demand, within the next 10-15 years, almost double the present level of dependency.

Currently the U.S. consumes more than 25 percent of worldwide petroleum production even though it has less than 4 percent of proven worldwide reserves. Policy decisions which slow or prohibit replenishment of domestic reserves only exacerbate this problem. Opportunities to explore for and develop new reserves must be forthcoming.

As we have seen in recent years, the U.S. is vulnerable to serious supply disruptions because of its dependence on foreign oil. Foreign sources of petroleum are concentrated largely in the Middle East where two-thirds of the proven reserves of the non-communist world exist. Saudi Arabia alone possesses over one-fourth of the free world's reserves. Increased future dependency on these politically unstable Middle Eastern areas is highly undesirable from a national interest viewpoint.

As domestic production continues to decline, and imports continue to rise, U.S. vulnerability to supply disruption will increase. A reliable domestic energy supply is a key factor in maintaining a viable foreign policy.

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It is in the national security and economic interest to encourage exploration for new domestic reserves wherever the potential exists, on the Coastal Plain of ANWR and other promising areas. Any decision to delay that search is a step toward increased dependency on foreign supply. Lead times to develop frontier Alaska oilfields are very long, typically 10 to 15 years from discovery to first production. If a major discovery were made on the Coastal Plain today, first production would not be likely before the year 2000.

Increasing consumption, decreasing domestic production, and rising imports, coupled with delay in opening promising new areas to exploration and development are all factors which collectively will contribute to the likelihood of a future energy crisis. 1986 was a year of drastic change throughout the oil and gas industry. Exploration is currently at a near standstill, marginal and uneconomic fields are being shut-in, and research and development have been drastically reduced. Continuity of exploration and development are necessary to replace depleted reserves. Delays in the exploration process today will cause greatly reduced future production.

Those who oppose oil resource development argue that the reserve potential of the Coastal Plain may represent only a few months supply of oil to the nation. This statement, though misleading, illustrates very well the significance of such a reserve if it is discovered and produced from the Coastal Plain. A few months is

indeed significant when compared on the same terms with the 18 month supply in the largest oilfield ever discovered in North America - Prudhoe Bay. But, the statement is misleading for two very important reasons. First, no oil field can be fully produced in a few months. Prudhoe Bay, for example, may produce oil and gas for at least 30 years. Second, the statement assumes a reserve estimate which would offset total daily consumption rather than an offset to imports during the life of the field. From a national security perspective, offsetting imports is a more important comparison. Prudhoe Bay, on average, could offset approximately 13% of foreign oil imports for 30 years (assuming 10 billion barrels recoverable reserves and 7 million barrels per day imports).

The report estimates a 19% chance of finding economically recoverable oil on the Coastal Plain. This promising outlook for success helps explain industry's high interest in exploring the Coastal Plain because it is a ten-fold increase over the statistical industry success rate in Alaska. Historically only one out of fifty, or 2%, of the exploratory wells drilled in Alaska has ever resulted in a commercial discovery

Economic benefits of further North Slope development to the nation are extremely significant. In addition to the direct benefits to the State and Federal governments from bonus payments, rentals, royalties, and taxes, the discovery of large new reserves would significantly reduce oil imports and the associated national trade deficit. Nearly half of the U.S. trade deficit today results from imported oil.

Oil development on the North Slope of Alaska has provided hundreds of billions of dollars to the U.S. economy, representing a benefit to all of the 50 states. Therefore, petroleum development from the Coastal Plain, especially on the order of magnitude of Kuparuk or Prudhoe Bay, would promote economic development not only within Alaska, but also throughout the United States. Jobs would be created as the demand for goods and services increase and the positive impacts would be felt well beyond the petroleum industry.

If highly prospective areas such as the Coastal Plain are placed off limits to petroleum exploration, the nation may experience a future energy crisis which will make the 1973 embargo and the 1979-1980 price escalation seem mild by comparison.

In summary, we believe it is clearly in the national interest to open the Coastal Plain of ANWR to leasing and development.

I will now turn the microphone to Mark McDermott with ARCO who will comment on the biological aspects of the draft report.

Biological Review Comments

My name is Mark McDermott and I am a Senior Environmental Coordinator for ARCO Alaska, Inc. Following a detailed review of the LEIS Chapter II - Existing Environment and Chapter VI - Environmental Consequences, the Alaska Oil and Gas Association strongly endorses the DOI recommendation to lease the entire "1002" Coastal Plain area for oil and gas exploration, development and production based on the following points and conclusions:

Prudhoe Bay Region/TAPS

Often the National Environmental Policy Act (NEPA)-mandated EIS process tries to predict environmental consequences of new developments with little or no previous field experience to guide the predictions. Clearly, for the ANWR Coastal Plain, test cases have already been run at Prudhoe Bay, Kuparuk, Milne Point, Lisburne, and Endicott, and with the Trans Alaska Pipeline. Collectively, the experience of the regulatory agencies and industry is summarized in the LEIS on page 2: "The evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources. Hence, it is reasonable to assume that development can proceed on the Coastal Plain and generate similar minimal effects."

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Furthermore, we support the statement, also on page 2 of the LEIS, that "Most adverse effects would be minimized or eliminated through carefully applied mitigation, using the lessons learned and technology acquired from development at other North Slope oilfields and from the construction and operation of the Trans-Alaska Pipeline System (TAPS)".

Indeed, we would like to point out that all of the dire predictions of environmental degradation made 15 years ago, prior to the construction of TAPS, have subsequently been proven to be unfounded. The predicted demise of major caribou herds, deterioration in water quality and major losses of habitat simply have not occurred. Instead, the development of Prudhoe Bay and the TAPS have allowed Alaskans to enjoy economic prosperity in harmony with a high quality environment and thriving wildlife populations.

National Environmental Policy Act

We understand that the draft document is a legislative EIS largely following the requirements of the National Environmental Policy Act. We would like to point out that many of the environmental consequences predicted to occur for the 5 alternatives appear to be based on "worst case" evaluations. In April 1986 the NEPA-EIS guidelines were changed from requiring a "worst case" assessment to one of "most likely to occur." We feel that many of the major conclusions of significant effects carry the earlier "worst case" assessment to an extreme and thus we ask that the authors reconsider many of their conclusions in light of the "most likely to occur" assessment of impacts. The standard for the "most likely to occur" case exists in the experience from other North Slope oilfields. Many of these specific points will be detailed in our written comments.

Caribou

We agree that caribou, both from a standpoint of numbers and distribution, is the specie most likely to encounter developmental activities in the "1002" area. The LEIS quote from page 6 states that "Changes could include displacement and reduction in the size of the Porcupine Caribou Herd. The amount of reduction and its long-term significance for herd viability is highly speculative" (emphasis added). We ask that these acknowledged qualifications be presented throughout the environmental consequences section to ensure that all readers of the document are fully aware of the highly speculative nature of some of the hypothesized impacts.

Carrying Capacity

In the management of wildlife populations, the concept of habitat carrying capacity is key to defining management goals. It is an established fact that the Porcupine Herd does not approach the carrying capacity of its range. Indeed, former Alaska Fish & Game Commissioner, R. Skoog, in his Doctoral dissertation (1968) stated that "It seems likely that the Alaskan caribou population has remained far below range carrying capacity and that the total habitat has never been fully occupied. In reality, caribou populations seem to have maintained densities much lower than the maximum dictated by food alone, and hence the reduction in total range becomes less meaningful." Thus, we agree with the conclusions that habitat is not currently limiting the growth of the Porcupine Herd and that the small loss of habitat represented by likely development in the "1002" area will not impact growth or productivity of caribou. Consequently, we disagree with the speculation that a reduction of caribou population is likely to occur as a result of small reductions in habitat availability and value.

"Core Calving Area" Concept

Significant year-to-year variability in calving distribution has been recorded for the Porcupine Herd all across the Arctic coast from east into Canada and west to the Canning River. Concentrated calving has been observed across the entire so-called core calving area during only 5 of the past 14 years. Therefore, calving habitat is more appropriately represented as a true continuum across the Coastal Plain including portions of the Arctic coast outside the "1002" study area. The Porcupine Caribou Herd has demonstrated numerous times in the past, including this past year, that it can and will successfully calve miles from the (quote) "core calving area" (unquote). Thus, the "unique and irreplaceable" nature required for designation as Resource Category 1 does not apply.

While AOGA embraces the responsible use of mitigation procedures in the Arctic, it is inappropriate to emphasize habitat loss alone without consideration of actual effects or lack of effects on wildlife populations from development.

Muskox

We feel that the conclusions regarding potential impacts of development on muskox are unnecessarily severe and unfounded. While it is true that very few data characterizing muskox responses to oil field development are available, it is also true that the muskox have shown ready adaptability to human presence and have even been semi-domesticated in several areas. This adaptability to human presence will significantly reduce the "worst-case" conclusions stated in the LEIS.

Mammalian Species

We feel that it is important to point out that the remaining mammalian species including moose, dall sheep, wolves, arctic fox, wolverines and brown bears are present on the Coastal Plain in relatively low population densities or for relatively short periods during the year. Thus, we support the conclusions of minimal or negligible impacts on these species.

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Fishery Populations

We support the conclusion that only minor to negligible effects on coastal fishery resources or fishery habitat will occur. Experience at Prudhoe Bay and Endicott has provided a significant volume of data to support this judgment.

Threatened and Endangered Species

We also support the conclusions of minor to negligible impacts on endangered and threatened animal species such as bowhead and grey whales and the peregrine falcon. We feel that the transient nature of their presence on the Coastal Plain and the history of developmental interaction in the Prudhoe Bay field clearly demonstrate the lack of meaningful impacts on these species. Regarding the plant, Thlaspi arcticum, we feel that conclusions and set-back stipulations based on the presence of this specie are overly restrictive because the plant has not been determined to be threatened or endangered.

Recreation

We would like to underscore the extraordinarily low use of the Coastal Plain as a recreational area. History indicates that only a small number of individuals have actually utilized the Coastal Plain for recreation in the form of hunting, fishing, camping or hiking. It is extremely expensive to reach the area; a trip from

the contiguous states costs thousands of dollars and requires an air charter flight to reach the Coastal Plain. Wet and moist ground conditions make hiking difficult during the 8-10 week "summer." Extreme cold and darkness during most of the year further reduce recreational use of the Coastal Plain. For most of the year this is an extremely harsh and hostile environment.

While there is no reason to believe that leasing and development would lead to a permanent loss of aesthetic values, over 30 miles of Coastal Plain from the "1002" area east to the Canadian border are already classified as wilderness, thus preserving the complete spectrum of arctic ecosystems represented in the Arctic Refuge.

Summary

Before I ask Mr. Cook to conclude our statement, I would like to acknowledge the 5 years of extensive field investigations, data collections and analyses by over 50 trained professional scientists, including wildlife and fishery biologists, botanists, zoologists, chemists, geologists and resource specialists who contributed to this draft report. We consider the factual basis for the scientific analysis to be adequate and the conclusions to be reasoned. However, we cannot support some of the speculation on environmental consequences found in the report which result in an over estimation of potential impacts.

Concluding Remarks

As previously stated AOGA supports the full leasing of the ANWR Coastal Plain under reasonable measures for environmental protection. Except for a few provisions, the proposed stipulations found in the report and the land use stipulations found in the Agreement Between the Arctic Slope Regional Corporation and the United States of America (incorporated into the report by reference), appear reasonable. The proposed mitigation measures are generally consistent with current and proven industry practices for the protection of wildlife and the environment. The application of reasonable mitigation can ensure that development is conducted in a manner compatible with the purposes of the Refuge and ensure that no unnecessary adverse environmental impacts occur. Our written comments will address in detail, those measures that we believe are unduly restrictive.

AOGA strongly endorses Alternative A, full leasing of the "1002" study area, as the most acceptable alternative consistent with the national interest. Alternative B, partial leasing, is based on a speculative premise that a traditional core calving area exists and is necessary for the maintenance of a healthy caribou herd. This has not been demonstrated in the scientific literature and there is a large body of data which indicates otherwise. Alternative C makes no positive contribution. Surface and regional geologic information already confirm that the area has oil potential. The amount can only be verified by on-structure drilling.

Stratigraphic type drilling is an unnecessary duplication and its surface impact would be in addition to that eventually required for on-structure wells. Also, Alternative C would just be another delay in the eventual production from the area. Neither Alternatives D, no action, nor E, wilderness designation, would determine whether or not substantial petroleum reserves exist in the "1002" study area. Alternatives D and E preclude reasoned planning and would deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

We fully support the proposed recommendation on page 169 which contains the following statement: "even though the billions of barrels of oil reserves have been brought on line and the infrastructure developed to bring that oil to U.S. markets, the fish and wildlife resources of the Prudhoe Bay area remain extremely healthy. The Central Arctic Caribou Herd has increased substantially during the period that development has occurred within the heart of its range. Estimated at about 3,000 animals in 1972, the herd now numbers more than 13,000. Similarly, important waterfowl species continue to successfully nest and rear their brood within the developed area. Although circumstances within the "1002" area may be somewhat different, the evidence derived from the Prudhoe Bay experience leads one to be quite optimistic about the ability to explore for and develop the hydrocarbon potential of the "1002" area without significant deleterious effects on the unit's wildlife resources."

Thank you for this opportunity to comment.

NS3:377

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TESTIMONY ON THE
DRAFT LEGISLATION ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
WASHINGTON, D.C.
PRESENTED BY THE ALASKA OIL AND GAS ASSOCIATION (AOGA)
JANUARY 9, 1987

I AM WAYNE SMITH, DISTRICT MANAGER OF AMOCO PRODUCTION COMPANY AND PRESIDENT OF THE ALASKA OIL AND GAS ASSOCIATION (AOGA). I AM APPEARING BEFORE YOU TODAY ON BEHALF OF AOGA WHICH IS A TRADE ASSOCIATION WHOSE MEMBER COMPANIES ACCOUNT FOR THE MAJORITY OF OIL AND GAS EXPLORATION, PRODUCTION AND TRANSPORTATION ACTIVITIES IN ALASKA. AOGA STRONGLY SUPPORTS THE DEPARTMENT OF THE INTERIOR'S PROPOSED RECOMMENDATION THAT THE ENTIRE "1002" AREA, ALSO KNOWN AS THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE (ANWR), BE AUTHORIZED FOR OIL AND GAS LEASING, EXPLORATION AND PRODUCTION.

CURRENTLY, ALASKA SUPPLIES OUR NATION WITH APPROXIMATELY 20% OF ITS TOTAL DOMESTIC PRODUCTION. LEAD TIMES ARE LONG IN FRONTIER ALASKA REGIONS--AT LEAST 10 YEARS FROM DISCOVERY TO FIRST PRODUCTION, BUT MORE LIKELY TO EXTEND AS LONG AS 15 YEARS IN THE CASE OF THE ANWR COASTAL PLAIN. WITHOUT SIGNIFICANT NEW DISCOVERIES, OUR NATION COULD BE DEPENDENT UPON FOREIGN SOURCES FOR 60-75% OF ITS PETROLEUM NEEDS WITHIN THE NEXT 10-15 YEARS, ALMOST DOUBLE THE PRESENT LEVEL OF DEPENDENCY.

PRODUCTION FROM EXISTING ARCTIC ALASKA OIL FIELDS WHICH ARE PRESENTLY BEING PRODUCED AT ABOUT 1.8 MILLION BARRELS PER DAY WILL BEGIN A PRECIPITOUS DECLINE BY 1988. IT IS A MATTER OF TECHNICAL CERTAINTY THAT THE PRESENT LEVEL OF PRODUCTION FROM ALASKA'S NORTH SLOPE WILL DECLINE TO ABOUT 500,000 BARRELS PER DAY BY THE YEAR 2000, EARLIEST DATE BY WHICH NEW PRODUCTION FROM THE ANWR COASTAL PLAIN WOULD LIKELY BE AVAILABLE.

IF HIGHLY PROSPECTIVE AREAS SUCH AS THE COASTAL PLAIN ARE PLACED OFF LIMITS TO PETROLEUM EXPLORATION, THE NATION MAY EXPERIENCE A FUTURE ENERGY CRISIS WHICH WILL MAKE THE 1973 EMBARGO AND THE 1979-1980 PRICE ESCALATION SEEM MILD BY COMPARISON.

INCREASING CONSUMPTION AND RISING IMPORTS ALONG WITH DECREASING DOMESTIC RESERVES AND PRODUCTION, COUPLED WITH DELAY IN OPENING PROMISING NEW AREAS TO EXPLORATION AND DEVELOPMENT, ARE ALL FACTORS WHICH COLLECTIVELY WILL CONTRIBUTE TO THE LIKELIHOOD OF A FUTURE ENERGY CRISIS.

THE RESOURCE ASSESSMENT CONTAINED IN THE DRAFT LEIS FOR THE COASTAL PLAIN SUPPORTS OUR VIEW THAT THE AREA MAY CONTAIN SIGNIFICANT RESERVES. THE COASTAL PLAIN HAS GREAT POTENTIAL FOR MAKING A SUBSTANTIAL CONTRIBUTION TO OUR DOMESTIC ENERGY SUPPLY.

EVEN THE MOST OPTIMISTIC PRODUCTION SCENARIO WILL PHYSICALLY UTILIZE ONLY A VERY SMALL AREA OF THE COASTAL PLAIN. THE VERY SMALL AREA WHICH WOULD BE AFFECTED BY DISCOVERY AND DEVELOPMENT OF 1 OR 2 GIANT OIL FIELDS SHOULD BE BALANCED AGAINST THE VERY STRONG CONTRIBUTION TO THE NATIONAL INTEREST THAT SUCH DISCOVERIES COULD REPRESENT.

OUR INDUSTRY HAS DEMONSTRATED ITS COMPATIBILITY TO EXPLORE FOR, DEVELOP, AND PRODUCE OIL IN THE ALASKA ARCTIC WITHOUT SIGNIFICANT ADVERSE IMPACT ON WILDLIFE AND THE ENVIRONMENT. THE DIRE PREDICTIONS OF ENVIRONMENTAL DEGRADATION AND HARM TO WILDLIFE MADE 15 YEARS AGO, PRIOR TO THE DEVELOPMENT OF THE GIANT PRUDHOE BAY FIELD AND THE CONSTRUCTION OF THE TRANS-ALASKA PIPELINE HAVE PROVEN TO BE UNFOUNDED. THE PREDICTED DEMISE OF MAJOR CARIBOU HERDS, DETERIORATION IN WATER QUALITY AND MAJOR LOSSES OF HABITAT SIMPLY HAVE NOT OCCURRED.

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INSTEAD, THE DEVELOPMENT OF PRUDHOE BAY AND THE TRANS-ALASKA PIPELINE HAVE PERMITTED THE PRODUCTION OF 5 BILLION BARRELS OF MUCH NEEDED OIL WITH MINIMAL ENVIRONMENTAL IMPACT. DURING THE 15 YEAR PERIOD OF DEVELOPMENT WILDLIFE HAVE THRIVED IN THE MIDST OF OIL FIELD DEVELOPMENT AND EVIDENCED BY THE FACT THAT THE CENTRAL ARCTIC CARIBOU HERD HAS GROWN FROM ABOUT 3,000 TO A POPULATION NOW ESTIMATED AT OVER 13,000 ANIMALS.

WITH REGARD TO THE ISSUE OF PROTECTING THE PORCUPINE CARIBOU HERD WHICH USES THE COASTAL PLAIN ON A SEASONAL BASIS, THERE HAS BEEN A DEVELOPMENT SINCE THE ISSUANCE OF THE DRAFT REPORT WHICH I WOULD LIKE TO MENTION. ON DECEMBER 3, 1986, THE UNITED STATES AND CANADA HAVE DEVISED AN AGREEMENT FOR THE MANAGEMENT AND CONSERVATION OF THE PORCUPINE CARIBOU HERD. THIS AGREEMENT WHICH ALSO INVOLVED THE NATIVE SUBSISTENCE USERS OF BOTH THE CANADIAN AND AMERICAN ARCTIC ASSURES THAT APPROPRIATE STEPS WILL BE TAKEN TO GUARANTEE THE WELL-BEING AND PRESERVATION OF THE PORCUPINE CARIBOU HERD. IN VIEW OF THIS DEVELOPMENT, THE FINAL REPORT TO BE SUBMITTED TO THE CONGRESS SHOULD BE REVISED TO REFLECT THIS NEW MEASURE OF PROTECTION AFFORDED THE PORCUPINE CARIBOU HERD.

I WOULD LIKE TO ACKNOWLEDGE THE 5 YEARS OF EXTENSIVE FIELD INVESTIGATIONS, DATA COLLECTIONS AND ANALYSES BY OVER 50 TRAINED PROFESSIONAL SCIENTISTS, INCLUDING WILDLIFE AND FISHERY BIOLOGISTS, BOTANISTS, ZOOLOGISTS, CHEMISTS, GEOLOGISTS AND RESOURCE SPECIALISTS WHO CONTRIBUTED TO THIS DRAFT REPORT. WE CONSIDER THE FACTUAL BASIS FOR THE SCIENTIFIC ANALYSIS TO BE ADEQUATE AND THE CONCLUSIONS TO BE REASONED. HOWEVER, WE CANNOT SUPPORT SOME OF THE SPECULATION ON ENVIRONMENTAL CONSEQUENCES FOUND IN THE REPORT WHICH RESULT IN AN OVER ESTIMATION OF POTENTIAL IMPACTS.

EXCEPT FOR A FEW PROVISIONS, THE PROPOSED STIPULATIONS FOUND IN THE REPORT AND THE LAND USE STIPULATIONS FOUND IN THE AGREEMENT BETWEEN THE ARCTIC SLOPE REGIONAL CORPORATION AND THE UNITED STATES OF AMERICA (INCORPORATED INTO THE REPORT BY REFERENCE),

APPEAR REASONABLE. THE PROPOSED MITIGATION MEASURES ARE GENERALLY CONSISTENT WITH CURRENT AND PROVEN INDUSTRY PRACTICES FOR THE PROTECTION OF WILDLIFE AND THE ENVIRONMENT. THE APPLICATION OF REASONABLE MITIGATION CAN ENSURE THAT DEVELOPMENT IS CONDUCTED IN A MANNER COMPATIBLE WITH THE PURPOSES OF THE REFUGE AND ENSURE THAT NO UNNECESSARY ADVERSE ENVIRONMENTAL IMPACTS OCCUR. OUR WRITTEN COMMENTS WILL ADDRESS IN DETAIL, THOSE MEASURES THAT WE BELIEVE ARE UNDULY RESTRICTIVE.

AOGA STRONGLY ENDORSES ALTERNATIVE A, FULL LEASING OF THE "1002" STUDY AREA, AS THE MOST ACCEPTABLE ALTERNATIVE CONSISTENT WITH THE NATIONAL INTEREST. ALTERNATIVE B, PARTIAL LEASING, IS BASED ON A SPECULATIVE PREMISE THAT A TRADITIONAL CORE CALVING AREA EXISTS AND IS NECESSARY FOR THE MAINTENANCE OF A HEALTHY CARIBOU HERD. THIS HAS NOT BEEN DEMONSTRATED IN THE SCIENTIFIC LITERATURE AND THERE IS A LARGE BODY OF DATA WHICH INDICATES OTHERWISE. ALTERNATIVE C MAKES NO POSITIVE CONTRIBUTION. SURFACE AND REGIONAL GEOLOGIC INFORMATION ALREADY CONFIRM THAT THE AREA HAS OIL POTENTIAL. THE AMOUNT CAN ONLY BE VERIFIED BY ON-STRUCTURE DRILLING. STRATIGRAPHIC TYPE DRILLING IS AN UNNECESSARY DUPLICATION AND ITS SURFACE IMPACT WOULD BE IN addition TO THAT EVENTUALLY REQUIRED FOR ON-STRUCTURE WELLS. ALSO, ALTERNATIVE C WOULD JUST BE ANOTHER DELAY IN THE EVENTUAL PRODUCTION FROM THE AREA. NEITHER ALTERNATIVES D, NO ACTION, NOR E, WILDERNESS DESIGNATION, WOULD DETERMINE WHETHER OR NOT SUBSTANTIAL PETROLEUM RESERVES EXIST IN THE "1002" STUDY AREA. ALTERNATIVES D AND E PRECLUDE REASONED PLANNING AND WOULD DENY THE NATION THE POSITIVE BENEFITS THAT COULD COME FROM OIL AND GAS PRODUCTION ON THE COASTAL PLAIN.

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AOGA'S EXPRESSES ITS FULL SUPPORT OF THE DEPARTMENT OF THE INTERIOR'S PROPOSED RECOMMENDATION TO CONGRESS WHICH STATES "...EVEN THOUGH THE MILLIONS OF BARRELS OF OIL RESOURCES HAVE BEEN BROUGHT ON LINE AND THE INFRASTRUCTURE DEVELOPED TO BRING THAT OIL TO U.S. MARKETS, THE FISH AND WILDLIFE RESOURCES OF THE PRUDHOE BAY AREA REMAIN EXTREMELY HEALTHY. THE CENTRAL ARCTIC CARIBOU HERD HAS INCREASED SUBSTANTIALLY DURING THE PERIOD THAT DEVELOPMENT HAS OCCURRED WITHIN THE HEART OF ITS RANGE. ESTIMATED AT ABOUT 3,000 ANIMALS IN 1972, THE HERD NOW NUMBERS MORE THAN 13,000. SIMILARLY, IMPORTANT WATERFOWL SPECIES CONTINUE TO SUCCESSFULLY NEST AND REAR THEIR BROOD WITHIN THE DEVELOPED AREA. ALTHOUGH CIRCUMSTANCES WITHIN THE "1002" AREA MAY BE SOMEWHAT DIFFERENT, THE EVIDENCE DERIVED FROM THE PRUDHOE BAY EXPERIENCE LEADS ONE TO BE QUITE OPTIMISTIC ABOUT THE ABILITY TO EXPLORE FOR AND DEVELOP THE HYDROCARBON POTENTIAL OF THE "1002" AREA WITHOUT SIGNIFICANT DELETERIOUS EFFECTS ON THE UNIT'S WILDLIFE RESOURCES".

THANK YOU FOR THE OPPORTUNITY TO PRESENT THIS STATEMENT.

NS3:366

WHITE PAPER REPORT

TO THE SECRETARY OF

THE U.S. DEPARTMENT OF THE INTERIOR

ON THE

ARCTIC NATIONAL WILDLIFE REFUGE

* * * * * * * * * * *

(16 U.S.C. 3142)

Submitted by

Alaska State District
Council of Laborers

WHITE PAPER REPORT

At the request of the U.S. Senate Committee on Energy and Natural Resources, the Department of Interior has commenced a resource analysis and assessment for the Arctic National Wildlife Refuge in northeast Alaska. Upon full compilation of the information available on the impact proposed oil activity will have on Alaska's many resources, the Department of Interior will then, in turn, report to Congress and, ultimately, the nation on the interests at stake. It is the purpose of this White Paper to assure full attention to the Alaskan human resources of affected Alaskan workers as a vital interest to be judiciously considered.

To date, the U.S. Department of Interior's course of study has largely consisted of its assessment of geophysical, environmental, and geological surveys undertaken by the Fish and Wildlife Service and U.S. Geological Survey. Study of the human resource component should be expanded to fully meet the assessment mandated by Congress. The interests of Alaskan workers must be recognized and considered in this national debate.

A growing trend has resulted in Alaskan workers being bypassed by the oil industry currently operating in the state of Alaska. Studies indicate that significant unemployment results in Alaska as its workers are displaced by a nonresident work force in the industry. And as indicated by the below data, unemployment levels in Alaska are among the highest in the nation.

TABLE I

1984 ALASKA UNEMPLOYMENT RATE

	Total	Construction	Manufacturing
Alaska	12.4%	23.8%	16.9%
(Rank Nationally)	2nd	1st	1st

Displacement of Alaskan workers in the oil industry by foreign nationales*1 and nonresidents*2 is a particularly troublesome social problem in Alaska. This stems, no doubt, from the related effects of unemployment on the Alaskan communities*3 but also on the loss of "benefit" while bearing the "cost" of the industry's activities. Accordingly, any cost benefit analysis should astutely account for this shortcoming.

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Operations by the petroleum industry in the Arctic National Wildlife Refuge pose similar and substantial displacement of Alaskan workers. A balanced assessment of the critical question of opening this wilderness refuge to oil industry activities must recognize*4 the significant failure of the industry in Alaska to promote the "human resource"--the interest of Alaskan workers--posed by undertaking this project at this time.

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*1 See Memorandum Investigation of Steelhead Project, State of Alaska, 1986, regarding employment of foreign national workers. Also Beaufort Sea operations performed by predominantly Canadian work force in Alaskan oil fields.

*2 See 67% nonresident/17% Alaskan resident employment ratio, as attached, for Haliburton Corporation, a large North Slope oil industry employer.

*3 See A Special Study to Measure the Economic Impact of Nonresidents on Alaska's Economy, (DOL 1984), Governor B. Sheffield; and attached news articles for graphic insight.

*4 Due recognition of local employment concerns is contemplated by

City/State/Weather Section B

Angry Alaskans blast oil industry

Fairbanks hearing draws Outside hire protest

FAIRBANKS (AP) — A standing-room-only crowd of angry Alaskans jammed a state Senate Labor and Commerce Committee hearing during the weekend to protest oil industry hiring practices on the North Slope.

The 250 who turned out for the hearing packed the Fairbanks North Star Borough Assembly chambers Saturday. Witness after witness denounced the industry's hiring practices. Some threatened to oust lawmakers if the legislature fails to act.

Oil company representatives attended and tape recorded the proceedings, but declined several invitations to speak and refused to comment later.

Two men who said they quit North Slope jobs with VECO Inc. on Friday to testify furnished forms they said the company used to register workers imported from outside Alaska. VECO is a major North Slope construction contractor.

"They said we could use VECO's address on it as our Alaska residency," said Tom Horton of Fairbanks. "All you've got to do is fill one of these out to be a resident of the state of Alaska."

Horton said the VECO job on which he worked employed about 380 people. Only a handful were Alaskans, he said.

Union officials and others have charged that the oil industry imports workers who will work cheaper than Alaska residents and turns them into instant Alaskans by registering them to vote. The companies have denied the practice.

Borough Assemblyman Joe Stilon, who heads the Fairbanks office of Alaskans First, said the situation warrants an investigation by the legislature, the attorney general or a grand jury.

Fairbanks Mayor Bill Walley told the committee he has seen the results of the hiring practices.

"I've heard from people who are 12-and 20-year-residents of Fairbanks who have lost their homes in the last couple of weeks or months," he said. "They've called, they've applied, they've tried, they've done everything physically and mentally and emotionally possible to get (oil industry) jobs, and they've just been sloughed off."

Walley said he had obtained documents about Arco hiring practices and would turn them over to the committee.

"You've got to put those guys back to work or you've got problems in Fairbanks you never dreamed possible in the next few months," Walley warned.

Senate President Don Bennett, R-Fairbanks, urged those at the hearing to spread their efforts.

"There are three branches of government," he said. "You vote for judges and you vote for the chief executive officer, who appoints the commissioners. There is the legislature, but beat on all three, not just one. We're just the 120 day people."

Rep. Marco Pignalberi, R-Anchorage, urged Fairbanks residents to carry their message. In Anchorage, he said, people are about evenly divided on whether Alaska hire is a serious issue.

"You feel it much more intensely here because you feel the impact of the economic downturn first," he said. "You need to tell them it's going to spread down and hurt the rest of the state pretty soon."

Several witnesses said they believed Alaskans are entitled to the North Slope jobs, in part because the oil belongs to the state.

"That work up there should be our work, and they're determined not to let us have it," said Mitch Fuchs. He predicted the influx of outsiders might increase as workers in the depressed oilfields of the Southwest swarm north.

"We have a really bad problem now, but it has the potential of getting even worse," he said.

In addition to oil interests, others also were targets of criticism.

Kathy Fitzgerald chastised Alaskans First for hiring as promotional director a woman who had been in the state less than three weeks.

"It's a total embarassment," Fitzgerald said. "Cleaning (our own) house is probably the first place we should start."

Pignalberi, who formerly headed Alaskans First, said the woman was an Alaskan when she was hired.

"You ain't an Alaskan till you lose your home!" shouted a man in the audience.

Learning center offers help in math, reading

by Jan Mireles
Times Writer

Seven-year-old Mac Case is a bright engaging youngster who does well in Anchorage public school, but for some reason he has had trouble reading. Rather than wait and hope a classroom teacher could solve the problem, his parents, Jim and Erica Case, decided to try something else.

"His reading was below par, but he was up in other areas," Case said.

The Case's read an ad about a new learning center and decided to give it a try. Jim Case said they haven't been disappointed.

"A classroom teacher doesn't always have the

"There are always kids who are going to fall through the cracks," he said.

The center operates Monday through Thursday with classes beginning at 4, 5 and 6 p.m. Friday and Saturday are reserved for make-up sessions. Each student visits the center for one hour twice a week.

Before beginning a program, students take a series of diagnostic tests designed to determine their grade level and establish weaknesses in either math or reading. The fee for two hours of testing in one subject area is $100. There are discounts for a second test area and for siblings.

Once problems are identified a program is designed to meet the individual student's needs, he

Total Number of Employees: 86

Number of Residents: 19
Total Wages paid to Residents: $725,626.72
Relationship - Residents 22 %

Number of Non-Residents: 67
Total Wages paid to Non-Residents: $2,558,78
Non 78 %

Number Male Workers:
Residents: 17
Non-Residents: 67

Number of Female Workers:
Residents: 2
Non-Residents: -0-

Classifications used:	Wage Rate	Work Schedule
Specialist (1)	$14.10/hour	3 weeks on/3 weeks off
Specialist (2)	$12.25/hour	" "
Specialist (1)	$11.53/hour	" "
Specialist (1)	$12.47/hour	" "
Specialist (8)	$13.11/hour	" "
Specialist	$24.84/hour	varies
Specialist (1)	$12.78/hour	varies
Specialist (1)	$14.90/hour	2 weeks on/2 weeks off
Specialist (4)	$10.00/hour	3 weeks on/3 weeks off
Specialist (3)	$12.36/hour	" "
Specialist (1)	$13.17/hour	" "
Specialist (1)	$19.24/hour	varies
Specialist (1)	$18.46/hour	varies
Specialist (1)	$12.40/hour	3 weeks on/3 weeks off
Specialist (1)	$18.14/hour	varies
Specialist (1)	$12.18/hour	3 week on/3 weeks off
Specialist (2)	$11.74/hour	" "
Specialist (1)	$24.03/hour	2 weeks on/2 weeks off
Specialist (1)	$12.50/hour	3 weeks on/3 weeks off
Specialist (1)	$29.02/hour	varies
Specialist (1)	$12.22/hour	3 weeks on/3 weeks off
Specialist (1)	$23.08/hour	2 weeks on/2 weeks off
Specialist (1)	$15.50/hour	3 weeks on/3 weeks off
Specialist (1)	$13.62/hour	" "
Specialist (1)	$10.11/hour	" "
Specialist (1)	$10.24/hour	" "
Specialist (1)	$10.58/hour	" "
Specialist (1)	$14.13/hour	" "
Specialist (1)	$12.22/hour	" "
Specialist (1)	$22.59/hour	" "
Specialist (1)	$11.43/hour	" "
Specialist (1)	$12.45/hour	" "
Specialist (1)	$12.57/hour	varies
Specialist (1)	$12.73/hour	3 weeks on/3 weeks off
Specialist (1)	$24.03/hour	2 weeks on/2 weeks off
Specialist (1)	$13.63/hour	3 weeks on/3 weeks off
Specialist (1)	$11.40/hour	" "
Specialist (1)	$13.10/hour	" "
Specialist (1)	$15.74/hour	" "
Specialist (1)	$12.98/hour	" "
Specialist (1)	$13.69/hour	" "
Specialist (1)	$10.63/hour	" "
Specialist (1)	$20.77/hour	varies
Specialist (2)	$11.65/hour	3 weeks on/3 weeks off
Specialist (1)	$11.12/hour	" "
Specialist (1)	$10.97/hour	" "
Specialist (1)	$16.59/hour	" "
Specialist (1)	$12.83/hour	" "
Specialist (1)	varies	varies

The Alaska State District Council of Laborers has represented Alaskan workers for decades before Alaska statehood or the entry of the oil industry to the state of Alaska. Adequate resolution of potential conflict by the oil industry with the people of the state of Alaska must be resolved prior to any activity being permitted. It is only with this assurance that Alaska's human resource interests will be effectively protected.

STATE OF ALASKA)
) ss.
THIRD JUDICIAL DISTRICT)

AFFIDAVIT OF A. GWENDOLYN JOINER

A. Gwendolyn Joiner, upon being duly sworn, deposes and states:

1. I was employed by VECO, Inc. from January 24, 1986 until May 6, 1986.

2. I was the timekeeper in charge of payroll duties on the night shift. This work involved payroll duties for 375 to 400 employees including personnel changes in the computer system (names, addresses, dates of birth, emergency phone numbers and other data).

3. At approximately the end of February, 1986, or the first of March, 1986, I was instructed by my supervisor, Nancy Green, to enter a change of address for certain VECO, Inc. employees who were working on the Kapurak Pipeline Project. This group of employees totaled more than 100 and had previous addresses outside of Alaska, primarily in Texas and Louisiana. In making tne address changes, however, the emergency phone numbers at the outside of Alaska address were left intact.

4. I asked my supervisor, Nancy Green, for the reason for making the changes. Nancy Green stated, "The order came from the top." She also directed me to make the changes as soon as possible. The majority of the addresses were changed to the VECO, Inc. mail pouch number. The remainder were changed to the Anchorage addresses at that time on record for other VECO, Inc. employees.

Further, affiant sayeth naught.

DATED this 18th day of August, 1986.

A. Gwendolyn Joiner
A. Gwendolyn Joiner

SUBSCRIBED AND SWORN to before me this 18th day of August, 1986.

Notary Public

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THE ALASKA WILDLIFE ALLIANCE

P.O. BOX 190953
ANCHORAGE, ALASKA 99519
907-277-0897

January 20, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Bldg.
Washington D.C. 20240

Dear Sir:

I am Ginny De Vries, Staff Representative of the Alaska Wildlife Alliance and the following is our testimony. To begin with, we would like to protest the facts that hearings were not held in Fairbanks, (the location of the refuge's administrative headquarters) Arctic Village, and Venitie; and that most working people other than oil executives were excluded by the hours of the hearings and because advance sign up was not offered. We have read the three volume baseline study and the draft on the arctic National Wildlife Refuge, Coastal Plain Resource Assessment and we recommend that the Department of Interior forbid the exploration and development of oil and gas in the area. The northernmost unit of the National Wildlife refuge System was established to protect a fraction of Alaska's unique arctic environment. The region encompasses an outstanding arctic and subarctic ecosystem harboring all three species of North American bears (polar, brown, and black), caribou, wolves, wolverines, Dall's sheep, raptors and abundant fish life including arctic char and grayling. The arctic refuge is the only conservation system in North America, and perhaps in the world, that protects such a wide spectrum of the various arctic and subarctic ecosystems in an undisturbed condition.

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In the few minutes alloted, I would like to point out the effects of development on wolf, polar bear, caribou, and whale populations.

Of wolves, the draft study states (p. 31), "Wolves are found throughout Alaska's North Slope. On the 1002 Area, the population density is lower than in areas farther south. "Development in the area would mean roads which would give hunters and other user groups access to an already low population.

Should development occur, caribou would be adversely affected which in turn would adversely affect the wolf population. Page 24 of the baseline study states, "Distribution showed that wolves used the ANWR Coastal Plain East of the Aichilik River extensively, and this used coincided with the presence of caribou. (Information is lacking on the use of the Coastal Plain by wolves in late may to June.) Minimum population estimates for the study area were 27 adults and seven pups in late summer, 1984, not including five known and three suspected mortalities." This information suggests that wolves are being removed in the 1002 area faster than they are reproducing without the presence of roads. Roads, increased human population, and additional human activity would drastically add to the decrease in wolf population.

In relation to polar bears, page 33 of the draft study states, "Pregnant polar bears, and later their cubs, probably spend more time on the 1002 area than other segments of the polar bear population.. At least 15 dens have been locate on ice near the 1002 area (1951-85). Another five dens have been located on ice near the 1002 area. Three locations in the 1002 area have been delineated as confirmed denning areas, that is areas in which polar bear dens and denning activity have been observed in more than one winter."

The draft study goes on to say, "Polar bears are protected under the provisions of the Marine Mammal Protection Act of 1972. An international agreement for the conservation of polar bears was ratified in 1976 by the governments of Canada, Denmark, Norway, The Union of Soviet Socialist Republics, and the United States of America. Article II requires that appropriate actions be taken to protect ecosystems of which polar bears are a part, especially denning and feeding sites."

We have all heard of the dangers to the Porcupine Caribou herd that development poses. If excluded from their calving area, many caribou may be forced to use less suitable areas where they would have difficulty avoiding insects and predators. Also the porcupine Caribou could use up precious fat reserves which are extremely important for winter survival due to fright reaction and disruption caused by development.

In making the decision on whether to lease this area, it is important to remember that of the 1,100 miles of arctic coastline in Alaska, the Arctic National Wildlife Refuge Coastal Plain is the only section of the entire NOrth Slope currently closed to oil and gas development. The U.S. Fish and Wildlife Service has a higher responsibility to conserve the natural diversity of species on the refuge for all wildlife interest. As the report itself states: "Long-term losses in fish and wildlife resources, subsistence uses, and wilderness values would be the inevitable consequences of a long term commitment to oil and gas development, production and transportation."

To summarize, the Alaska Wildlife Alliance is opposed to any oil and gas exploration and development on the Coastal Plain, and supports the designation of the Coastal Plain as wilderness. Thank you for your time.

Sincerely,

Ginny De Vries
Staff Representative

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005
202-682-8170

S. P. Chamberlain
Director, Exploration

February 6, 1987

Mr. Frank Dunkle
Director
U.S. Fish and Wildlife Service
U.S. Department of the Interior
Washington, D.C. 20240

Dear Mr. Dunkle:

The American Petroleum Institute (API) appreciates the opportunity to provide supplemental comments for the Department's consideration on the Draft Legislative Environmental Impact Statement (LEIS) on the Arctic National Wildlife Refuge (ANWR) 1002 area. Our written statement, presented at the January 9 hearing, discussed the national security and economic benefits that may result from leasing the coastal plain area, as well as the compatibility of oil, wildlife and the environment. In addition to those comments, we wish to clarify the significance of the statements on pages 49, 68 and 72 of the LEIS regarding the estimated 19 percent chance of finding any economically recoverable oil from the 1002 area.

Petroleum exploration is an extremely high risk activity. Even the best data are often misleading, misinterpreted or erroneous. Exploration always carries a higher chance of failure than of success. However, the one-in-five chance represented by the 19 percent calculations of the U.S. Geological Survey and Bureau of Land Management professionals reflects a higher-than-normal success probability.

Unfortunately, the draft report fails to explain that this is a very promising percentage for successfully finding economically recoverable oil resources, particularly in frontier areas such as those covered by the LEIS. In fact, this is nearly a tenfold increase in the industry's success rate in Alaska. Only one out of 50, or about 2 percent, of the exploratory wells drilled in Alaska has ever resulted in a commercial discovery.

Undiscovered resources are not proved reserves and, until exploratory drilling occurs, no one can say if any producible oil exists. In order for oil to accumulate in recoverable quantities

five basic criteria must occur. These include: a source sequence from which the oil can be derived; a migration path from the source to an area of accumulation; a reservoir rock and pore space; a trap to hold the oil in one area; and a seal to prevent the oil from escaping and migrating to the surface. All five factors must be favorable or the result is no oil. Given the high degree of uncertainty and the unlikelihood of the existence of all five factors, the 19 percent noted in the LEIS is an exceptionally promising prospect.

We urge the Department to make the significance of this percentage more understandable in the final report to Congress. Additionally, many of the individual companies with the expertise and technology to operate in the arctic environment are providing detailed comments on the LEIS. We urge you to carefully review their comments, as you proceed in fulfilling the mandates of the report and recommendations to Congress.

At a time of escalating heavy U.S. dependence on oil imports and depressed conditions in the domestic petroleum industry, it is vital for the United States to increase its domestic energy production and provide for secure and reliable energy supplies for the 1990s and beyond. That is why the ANWR 1002 area is so vital to our nation's energy future. If we can find and develop the potentially vast resources of the 1002 area, we can help reduce our future dependence on oil imports and increase the domestic oil and gas available to meet our needs a decade from now and beyond. We can lessen the threat of the Organization of Petroleum Exporting Countries regaining its dominant control over world oil prices and we can lessen the chance of a return to the severe energy disruptions experienced in the 1970s. It is important to keep in mind that it takes as much as 10 to 15 years to explore for and place into production oil fields from arctic environments.

Crude oil from the North Slope's producing oil fields is already contributing over 20 percent of total U.S. crude oil production. The nation's dependence on foreign oil could increase markedly in the years ahead, as these fields -- along with other fields in the lower-48 states -- reach peak production and start to decline -- as many already have. One very promising place the United States must turn to is Alaska's undiscovered oil and gas, if our future energy security is to be enhanced. The petroleum industry's record in developing the producing fields on the Alaska North Slope proves that such operations can be and are being conducted in an environmentally sound manner. The technology developed for arctic operations near Prudhoe Bay can be used within ANWR in the search for the large deposits of crude oil that may underlie the 1002 area. Nearly 20 years of experience on the North Slope demonstrates that oil and gas exploration and development can exist in harmony with the arctic environment.

Development of petroleum resources in the 1002 area would result in significant economic benefits to Americans throughout the nation. For example, extrapolating from the employment and Gross National Product (GNP) effects of a recent Battelle/DRI study, which looked at the aggregate employment effects of incremental peak OCS production of 2.5 million barrels a day of crude oil equivalent, the following orders of magnitude are suggested. Based on a Department of the Interior peak production estimate of 659,000 barrels daily (assuming recoverable reserves of 3.2 billion barrels), the cumulative employment gains could be 254,085 jobs. Using the same base projection of production, the GNP could increase about 0.25 percent above the level that would otherwise exist. Finally, significant discoveries within the 1002 area could help reduce the nation's reliance on oil imports. The 1002 area could thus benefit the economic and national security of the United States by helping to reduce oil imports and the flow of American dollars overseas.

In conclusion, the API reiterates its support for the proposed "alternative A" recommendation to permit full oil and gas leasing in the 1002 area.

Sincerely,

S. P. Chamberlain

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STATEMENT ON

ARCTIC NATIONAL WILDLIFE REFUGE

BY

MICHAEL JOHNSON

REPRESENTING
AMERICAN PETROLEUM INSTITUTE

BEFORE THE

DEPARTMENT OF THE INTERIOR
JANUARY 9, 1987

My name is Michael Johnson and I am Manager of Economics & Planning for North America Exploration for Conoco Inc. based in Houston, Texas. I am representing the American Petroleum Institute (API) which is a national trade association representing the domestic petroleum industry. API's membership consists of a broad cross section of the industry's functions, including exploration, production, transportation, refining and marketing. API's membership currently includes 215 companies and about 5,000 individuals.

API supports the U.S. Department of the Interior's (DOI) proposed "Alternative A" recommendation to Congress that the Arctic National Wildlife Refuge (ANWR) coastal plain be opened to oil and natural gas leasing. As DOI's draft report states: "The (1002) area is clearly the most outstanding oil and gas frontier remaining in the United States and could contribute substantially to our domestic energy supplies."

At a time of escalating heavy U.S. dependence on oil imports and depressed conditions in the domestic petroleum industry, it is vital for the United States to increase its domestic energy production and provide for secure and reliable energy supplies for the 1990s and beyond. We agree with the DOI's draft report that Alaska's 1002 area provides one of the nation's best hopes for the energy supplies needed in the years ahead. But the area's vast potential will remain untapped unless oil and gas leasing is permitted in the area.

Why the 1002 Area is Vital to America's Energy Future

Current U.S. energy supply trends underscore the urgent need to find and produce the potentially vast oil and gas resources of the 1002 area. Oil prices during 1986 dropped by about one-half. As a result, U.S. consumption has risen and domestic production has fallen. These trends have been accelerating. Consumption was up 1.2 percent in the first quarter of 1986 over the first quarter of 1985, 2.4 percent in the second quarter and 3.8 percent in the third quarter. Production was barely down in the first quarter, but fell 2.9 percent in the second quarter and 3.1 percent in the third quarter.

This growing gap between domestic consumption and production has been filled by oil imports, which were up 23 percent in 1986 over the 1985 level. Imports in November constituted 38 percent of U.S. oil consumption -- a higher level of dependence than at the time of the 1973-74 oil embargo. Furthermore, U.S. imports from the volatile Persian Gulf area have increased 300 percent in 1986 and accounted for more than half of the total increase in imports in 1986.

If prices remain roughly equal to those of the late fall and early winter of 1986, these current production and consumption trends are likely to continue. If they do, U.S. dependence on oil imports also will continue to rise. As U.S. and other world demand grows, more and more oil will be imported from the OPEC cartel. Within OPEC, a small group of countries concentrated in the Middle East has most of the excess oil production capacity which will be called upon as the demand for oil increases.

This means that there is a significant probability that within a relatively short period -- perhaps as few as three years -- the United States and our allies could once again be significantly more dependent on the Middle East for our oil supplies. Moreover, when supplies tighten and shortages threaten, there is no rapid or easy way to curtail demand, increase domestic supplies, or find substitutes for many critical uses for oil. Thus, we will become more dependent on foreign oil and extremely vulnerable to any form of disruption of supply from the Middle East or from elsewhere. It is important to keep in mind that it takes as much as 10 to 15 years to explore for and place into production oil fields from arctic environments.

That is why the ANWR 1002 area is so vital to our nation's energy future. If we can find and develop the potentially vast resources of the 1002 area, we can sharply reduce our dependence on oil imports and have the domestic oil and gas we need to meet our needs a decade from now and beyond. We can lessen the threat of OPEC regaining its dominant control over world oil prices and we can lessen the chance of a return to the severe energy disruptions experienced in the 1970s.

Resource Potential of the 1002 Area

In its draft report on the 1002 area, DOI estimates that there may be billions of barrels of crude oil to be found under that 1.5 million acre area. DOI estimates that "recoverable

reserves" range from 600 million to 9.2 billion barrels of oil, while the "in-place resources" range from 4.8 billion to 29.4 billion barrels. Recoverable reserves are estimates of economically producible reserves using today's technology; in-place resources are estimates of the total amounts of oil thought to be in the reservoirs, some of which will not be economically producible.

Although there is uncertainty inherent in all oil and gas exploration methods which do not include actual drilling, the Interior Department estimates indicate a very large crude oil potential -- on the same order of magnitude as the nearby Prudhoe Bay field, the largest U.S. discovery to date.

Crude oil from the North Slope's producing oil fields is already contributing about 20 percent of U.S. crude oil production. The nation's dependence on foreign oil could increase markedly in the years ahead, as these fields -- along with older fields in the lower-48 states -- reach peak production and start to decline -- as many already have. One very promising place the United States must turn to is Alaska's undiscovered oil and gas if our future energy security is to be enhanced.

Oil and Gas Operations in the 1002 Area

Only a small portion of the 1002 area would actually be disturbed during exploration and production activities. Based on experience at nearby Prudhoe Bay, less than 1 percent of the surface of the 1002 area could be expected to be affected by drilling and production pads, roads and facilities.

Moreover, if exploration resulted in no commercially producible discoveries, disturbance of the area by petroleum activities would cease and restoration measures would begin. If economically significant oil and gas discoveries were made, the occupation of the area would last only as long as those discoveries were producible, perhaps 20 to 30 years -- a very short time in man's historical use of the area.

The petroleum industry's record in developing the producing fields on the Alaska North Slope proves that such operations can be and are being conducted in an environmentally sound manner. The technology developed for arctic operations near Prudhoe Bay -- the area of the nation's largest oil and gas fields -- can be used within ANWR in the search for the large deposits of crude oil that may underlie the 1002 area.

Numerous laws and regulations assure that oil and gas activities are designed to protect the surrounding environment. Experience in Alaska and the lower 48 states shows that oil and gas activities are consistent with other goals such as wildlife protection. Nearly 20 years of experience on the North Slope demonstrates that oil and gas exploration and development can exist in harmony with the arctic environment. Techniques to minimize disturbance include directional drilling, smaller and consolidated facilities, winter construction, use of temporary ice roads, use of special arctic equipment, and elevated pipelines and facilities. The U.S. Fish and Wildlife Service (USFWS) monitored all of the surface activities and geophysical

operations conducted on the coastal plain and reported that no significant environmental impact resulted from that activity.

Oil from the 1002 area would be transported by onshore pipeline to the Trans-Alaska Pipeline System (TAPS). Experience from TAPS and the Prudhoe Bay, Milne Point and Kuparuk developments proves that pipelines can be designed, constructed and operated on the North Slope to allow passage of caribou and other wildlife.

Exploration activities would also be supported by temporary ice roads, barges and ice airstrips. During development and production, more permanent gravel pads, roads and airstrips would be used to support year-round activities. One main road along a pipeline into ANWR would be needed for pipeline service and resupply. Roads and facilities would be placed in the most efficient manner possible and concurrence would be required from the USFWS and the Alaska Department of Fish and Game.

Sensitive habitats are routinely avoided when routing roads on the North Slope. Some construction activities can be conducted during the winter season when most wildlife is absent from the 1002 area. A pipeline can be designed to ensure passage of caribou and other wildlife during the summer by properly located sections which are elevated, buried or ramped.

Development at Prudhoe Bay, Kuparuk and Milne Point in the calving range of the Central Arctic caribou has not had a harmful effect on this caribou herd. The herd has grown from about 3,000 animals in 1975 to its current size of over 13,000 animals. This experience is reason to believe that development in the 1002 area

would not hurt the Porcupine caribou herd. The 1002 area is only a portion of the calving grounds of the Porcupine herd. Even discovery of a supergiant field would only involve a small portion of the area. In some years, little or no calving occurs in the 1002 area, but takes place in the foothills to the south and/or in Canada.

Oil and gas operations would also be compatible with other wildlife and environmental aspects of the 1002 area:

- Muskoxen were introduced into ANWR only 17 years ago and are still expanding their range. As of 1984, there were 384 muskoxen in ANWR. Muskoxen spend most of their time in the foothills and water-adjacent habitat, so little contact with oil and gas facilities would be likely.
- A 1986 joint industry/state/federal bird impact study indicates that the development at Prudhoe Bay has not affected the general use of the area by birds. While some habitat loss resulted from the placement of facilities, certain species created new habitats at roadsides and pads.
- All 1002 area facilitites will require air quality permits to construct and operate. Air quality monitoring at the large Prudhoe Bay facilities and the other North Slope oil fields shows that oil and gas operations at these locations fully meet state and federal air quality standards.

Economic Benefits of 1002 Area Development

With regard to the economic benefits of coastal plain development, the DOI draft report cites no Gross National Product (GNP) or employment gain estimates. While we have not derived such estimates directly, it is possible to develop some approximate effects by extrapolating from other analyses. Development of petroleum resources in the 1002 area could result in significant economic benefits to Americans throughout the nation. For example, extrapolating from the employment and GNP effects of a recent Battelle/DRI study, which looked at ~~the~~ aggregate employment effects of incremental peak OCS production of 2.5 million barrels a day of crude oil equivalent, we can project the following results. Based on a DOI peak production estimate of 659,000 barrels daily (assuming recoverable reserves of 2.3 billion barrels), the cumulative employment gains could be 254,085 jobs. Using the same base projection of production, the GNP could increase about 0.25 percent above the level that would otherwise exist.

API estimates that, since 1980, when peak production of about 1.5 million barrels per day from the Prudhoe Bay field was achieved, North Slope development has contributed to an increase in the gross domestic product[1] in excess of $19 billion per year.

1 The gross domestic product is the sum of all goods and services produced within a nation's border. The gross national product is the sum of all goods and services produced by a nation's firms anywhere in the world.

Peak annual employment effects are estimated at about 39,000 direct jobs, and about 29,000 indirect jobs. Aggregate development expenditures for North Slope fields, including expenditures for the Trans-Alaskan Pipeline System of about $8.8 billion, are estimated at about $36 billion through 1985.

Experience on Alaska's North Slope shows how states and communities benefit from an active exploration and production program. It is estimated that, between 1980 and 1986, the major oil companies operating on the North Slope spent more than $10.5 billion in the United States developing the North Slope oil fields. Every state in the union participated in supplying goods or services, with the shares of business ranging from nearly $1.4 billion in Alaska to ~~some~~ $200,000 in West Virginia.

However, the individual states and companies within those states have not been the sole beneficiaries of oil company activities. Federal lease sales, rents and royalties on federal land in the U.S. are providing a major source of revenue -- second only to the income tax in size -- for the federal government.

If the coastal plain were to be leased and a large field discovered in the 1002 area, large royalty payments would be generated. The distribution of ~~the~~ potential revenues among the federal, state and local governments depends on the details of how the area will be leased, which has not yet been determined. However, the federal share of the bonus monies, rents and royalties could help offset declining federal revenues from other fields which have passed -- or will soon pass -- peak production.

To put potential revenues into perspective, consider that, in 1984 alone, Alaska received about $1.4 billion in oil and gas royalties, rents and bonuses from leases on its own lands.

Development of the 1002 area would also have the important economic benefit of providing a continuing oil flow for the Trans-Alaska Pipeline as oil fields elsewhere on the North Slope are depleted.

Finally, significant discoveries within the 1002 area could help reduce the nation's reliance on oil imports. The 1002 area could thus benefit the economic and national security of the United States by helping to reduce the flow of American dollars to overseas.

Conclusion

At a time of continuing political instability in the Middle East -- and when U.S. oil imports are at a level even higher than at the time of the 1973-74 oil embargo -- it is critically important for this nation to increase its development of domestic energy resources. As the Department of the Interior's draft report so effectively demonstrates, the 1002 area offers one of America's best prospects for major new oil and gas discoveries. However, as noted earlier, it takes as much as 10 to 15 years to explore for and place into production oil fields in hostile environments such as that of the 1002 area.

Thus, the national interest requires that action be taken now to open the 1002 area to oil and gas exploration and production. We endorse the Interior Department's proposed Alternative A

recommendation to permit full oil and gas leasing in the 1002 area. We regard this step as vital to meeting the nation's future energy supply needs and reducing the risk of a return to the energy disruptions of the 1970s.

P.O. Box 100767
Anchorage, Ak. 99510
January 10, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Bldg.
18th and C Sts., N.W.
Washington, D.C. 20240

To Whom It May Concern:

Enclosed are written comments on the draft, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. I have prepared and submitted these comments on behalf of the American Wilderness Alliance, 7600 East Arapahoe Road, Suite 114, Englewood, Colorado 80112.

Sincerely,

Steve Livingston

Steve Livingston, M.D.

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WRITTEN COMMENTS ON DRAFT, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA, COASTAL PLAIN RESOURCE ASSESSMENT

SUBMITTED ON BEHALF OF THE AMERICAN WILDERNESS ALLIANCE BY STEVE LIVINGSTON, M.D., ANCHORAGE, ALASKA

American Wilderness Alliance
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The American Wilderness Alliance strongly opposes the Secretary of the Interior's preliminary recommendation for full oil leasing of the 1002 area in the Arctic National Wildlife Refuge. We urge the Secretary to reconsider this decision in his final recommendation. After a thorough review of the draft report, we have a number of comments to make on the serious environmental consequences of oil exploration and development in this area.

We would first like to comment on the process used by the Department of the Interior in producing this report. It is only through a lawsuit filed by Trustees for Alaska (and joined by the American Wilderness Alliance as a co-plaintiff), that the draft report was made public at all prior to its presentation to Congress. This constituted a blatant attempt to keep the public from commenting on a major issue, and appeared to be collusion with the oil industry. Such attempt to influence Congress without public input is not compatible with the democratic process. Furthermore, we question both the timing and the location of the public hearings. The hearings began immediately after the longest holiday season of the year, and were held in only three places. In particular, there was little opportunity for Alaskans, who would be affected most by oil drilling in ANWR, to give their views. A 60-day comment period may fulfill the letter of the law, but coming in mid-winter at a busy time, certainly does not fulfill its spirit. In addition, the Department of the Interior continued to demonstrate its contempt for the public process by appealing the original decision requiring public comment. This appeal, which also failed, was moot, and an unwarranted waste of taxpayers' money. We urge the Department to be more forthright in its future dealings regarding public lands.

We have numerous objections to the Secretary's recommendation itself. The Secretary's recommendation almost mimics the oil industry in its attempt to compare environmental effects of Prudhoe Bay oil development with potential effects in

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the 1002 area. The major adverse environmental impacts of oil leasing are understated throughout the recommendation. We will document this further in our specific comments below.

The executive summary is quite misleading, stating that the "evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources." This summary virtually ignores the potential environmental consequences of oil leasing on wildlife, and relegates its comments to a few small, meek paragraphs near the end of the summary. While we are not certain who wrote the executive summary, the author obviously did not read or chose to ignore the chapter on environmental consequences prepared by the U.S. Fish and Wildlife Service, for there are no references to the enormous adverse effects that are well-documented by FWS. Since many congressmen, news media, and other officials are too busy to read the full report, we feel that the current executive summary offers a biased and unfair view of the reality of oil leasing in the 1002 area. We urge the "executive" who wrote this summary to prepare a more balanced one for the final report.

The potential consequences to the physical environment of full oil leasing may be considerably greater than that predicted in the draft report, for there is little attention paid to the issue of water access. As the FWS notes, there simply is not much water available in the 1002 area for oil exploration. Most of the lakes that occur in the 1002 area are shallow, and freeze to the bottom in winter, making them inaccessible for use as water sources during the usual time for exploratory drilling on the North slope, which is winter. Furthermore, almost every one of the 10 major and 14 smaller streams in the 1002 area freezes to the bottom in winter, making these also inaccessible for use as water sources. The few that do not freeze to the bottom are used as fish over-wintering areas, and, therefore, could not logically be used for water sources without doing irreparable harm to the fish. According to FWS, as much as 15 million gallons of water

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would be necessary to drill a single exploratory well.

There is water available from Sadlerochit Spring in the southwestern part of the 1002 area, as there is year-round flow from the spring. However, this 4,000-acre area has been nominated as a National Natural Landmark and would be off-limits for exploration under almost any foreseeable circumstances. There is a dense population of macro-invertebrates, as well as arctic char and grayling in this area and the five miles downstream which remain open during winter, and thus it is used as a fish-wintering area. In addition, this area is used for traditional subsistence.

The report gives a totally inadequate evaluation of this problem, as illustrated by the three suggestions offered for exploratory drilling. One only addresses drilling near the coast, and involves the use of shallow ponds and snowmelters. The second addresses the few wells that could be drilled on corporation lands or near the band of small lakes east of the Jago River. The third concerns most of the 1002 area. According to FWS, "the same innovative effort (obtaining water, snow, or ice from wherever it can be found without disrupting the biological environment) would be required for exploratory drilling elsewhere in the 1002 area." One wonders, from reading these suggestions, if this innovation would include a reversal of the miracle at Cana, i.e., turning wine into water.

The problem of obtaining water for winter exploration pales by comparison to the engineering problems faced for full oil development and production. Water would be needed for up to 50-60 drilling pads, each with one or more wells, plus about seven large and four small central processing facilities. This water would be needed for human use as well as oil exploration and production. This means up to 10,000 gallons of water per day for a construction camp of some 1,500 workers could be needed for human use alone. In addition, there would be up to 200-500 workers in a central processing facility once construction is

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finished.

The report gives two suggestions for obtaining water during full oil drilling and production. One is to use sea water for the waterflooding used to sweep the oil toward producing wells and to maintain reservoir pressure. Waterflooding can involve enormous amounts of water. For example, up to 400,000 barrels per day are injected into the Kuparuk River field and up to two million barrels for Prudhoe Bay. The full leasing scenario, in fact, suggests two marine and saltwater treatment facilities, both presumably located at the coast. This would require an insulated pipeline from the plants to each central processing facility, as well as heat generators spaced at intervals to keep the water from freezing. The treated sea water then would be piped to the individual drilling pads for injection. This scenario could contribute to the major environmental hazards caused by the proposed east-west oil pipeline, particularly with regard to loss of insect-relief habitat for the Porcupine caribou herd. The environmental consequences of these structures are not addressed in the report and, of course, should be.

Second, the report states that "the most obvious, and probably only feasible, solution relates to gravel sources." Full development would involve possible mining and use of as much as 50 million cubic yards of gravel from within the 1002 area. The FWS suggests that the gravel be mined from streambeds to create elongated deep pools up to 40-50 feet deep, which, after spring runoff, can supply water year round. It suggests excavations within the river channel or immediately adjacent but connected to the channel. The environmental consequences of this are not addressed. The only comment is that this might create 20 to 30 elongated deep pools for water storage within or adjacent to river beds that now run dry during winter months. There is no attempt made to assess what effects this would have on streambeds, floodplains, fish habitat, subsistence, etc.

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A careful reading of the draft report reveals that the FWS appears to be unprepared to address the major issue of water access for oil exploration and production. An in-depth study would be necessary on this issue alone.

Potential adverse effects on both the Porcupine caribou herd (PCH) and Central arctic caribou herd (CAH) are well-documented in the chapter on environmental consequences. It should be noted that input on this part of the report was received from 14 caribou biologists, including oil industry representatives. Despite this notation on page 97, and the subsequent report of major adverse effects on the PCH, the Secretary's recommendation only describes the potential effects on the PCH as "some long-term widespread effects." In addition, the Secretary states on page 169 that the CAH "has increased substantially during the period that development has occurred within the heart of its range."

Unlike the Secretary of the Interior and oil industry officials, the caribou biologists were quite cautious in making analogies comparing the effects of current oil development on the CAH and effects of potential 1002 development on the PCH. Because of greater density of PCH on their calving grounds, the PCH would interact with oil development "much more extensively and intensively" than the CAH has interacted with oil development in Prudhoe Bay.

Although the oil industry often points to the increase in the CAH from about 3,000 animals to some 12,000-14,000 after development at Prudhoe Bay, it does not add that almost no calving has been noted in the Prudhoe area since oil development began. According to the report, this increase has been attributed to high calf production and survival as well as relatively light hunting pressure. Attempting to attribute this even in part to the presence of oil development is absurd, as the facts clearly show.

In addition to studies which show decreased calving densities around Prudhoe Bay, a 1985 study reported that maternal caribou groups showed measurable declines in habitat use within

approximately two miles on either side of the Milne Point road. The picture of caribou grazing next to the Transalaska Pipeline is quite misleading, based on this information.

Attempting to compare the effects on the CAH in Prudhoe Bay and those that potentially may occur on the PCH again may be inappropriate, for several reasons. The CAH has been displaced from only part of its calving grounds; suitable alternative high-quality habitat appears available for the CAH, and the overall density of CAH caribou on their calving grounds is very low. The absolute density for the PCH on their calving grounds is 14 times that of the CAH, and the difference in effective densities is even greater.

A substantially greater proportion of important calving habitats would be involved with development that included the PCH core calving area. There is a large overlap of potential oil development facilities with PCH calving areas. The PCH would annually encounter oil development during the most critical time in their yearly cycle, the report states. Seventy-eight percent of the PCH's core calving areas is within the 1002 area and is designated as Resource Category 1 habitat. Category 1 habitat has a FWS mitigation goal of "no loss of existing habitat value." However, according to the report, an approximately two-mile displacement of caribou out from oil facilities would include loss of 32 percent of the most critical PCH core calving areas! According to the FWS, this would represent a complete loss of habitat values.

In addition, predation on the PCH is more important than for the CAH in the Prudhoe area. The CAH has been exposed to minimal predation in recent years. The wolf population in the Central arctic area decreased in the 1970's and has remained low, due to hunting. Brown bears are only moderately abundant in the area. In the 1002 area, however, brown bears are more abundant and, in fact, shift their habitat use to coincide with areas occupied by the PCH during calving and postcalving.

Oil industry claims that caribou easily cross under the Transalaska Pipeline appear to be just as misleading as other

industry claims. The report states that caribou crossing success is generally greatest at buried pipelines and then decreases for roads without traffic, to elevated pipelines adjacent to roads without traffic, to pipelines adjacent to roads with traffic, respectively. Large mosquito-harassed groups do not readily cross beneath elevated pipelines. In the full leasing scenario recommended by the Secretary, the pipeline/haul road would bisect the 1002 area east-to-west. This barrier could significantly inhibit movements for the large postcalving aggregations which annually occur on the 1002 area as the caribou move between inland feeding areas and coastal insect-relief habitats. Insect (mosquito) harassment is one of the primary driving forces in the annual caribou cycle, the report points out, and follows closely behind the calving period. Insect harassment can have a pronounced negative effect on caribou survival, the report states.

Eighteen percent (294,000 acres) of the 1002 area, including native corporation lands, used for insect-relief and other purposes by the PCH lie north of the proposed pipeline/road corridor. If caribou refuse to cross through any development areas, then this area would be unavailable as habitat. This represents 80 percent of coastal insect-relief habitats. Even without such a major problem, the report states that 29 percent of the coastal insect-relief habitat could be reduced or eliminated. This could lead ultimately to reduced survival, particularly for calves.

Increased harvest also could be expected to occur due to oil development. Based on experience of the North Slope haul road, a significant proportion of the caribou harvest could be from illegal hunting, due to increased access for all-terrain vehicles.

In conclusion, the FWS states that full oil development of the 1002 area could result in a major population decline and change in distribution of 20-40 percent, although this estimate is uncertain. A more moderate decline of 5-10 percent was predicted for the CAH.

The above reiteration of the 1002 report on the PCH should not have been necessary in our comments. However, the Secretary's recommendation and the executive summary persist in inappropriate comparisons of the CAH to the PCH and ignore the rest of the data accumulated by FWS. We feel this is unfortunate, as it distorts the issue of whether or not the PCH would suffer major adverse effects with full oil development. The mitigation proposed by FWS could do little to help the PCH.

Other wildlife would be affected adversely as well by oil development. There would be major effects on the muskoxen population. The report predicts that they could be displaced from up to 71 percent of their high-use habitats within the 1002 area, with a possible change in distribution or decline affecting 25 to 50 percent of the population. A moderate adverse impact is predicted for wolverines in the 1002 area, but the FWS cautions that "inadequate controls on access and harvest could possibly reduce by half or more the 1002 area wolverine population." The report also predicts moderate effects on brown bears due to several factors. While there are mitigation factors proposed for these animals that the FWS states would minimize many of the effects, they still should be considered in the overall evaluation of the Secretary's recommendation.

We are very much concerned about the environmental consequences on marine mammals if oil development occurs, and feel that the report does not evaluate one very important factor that could affect marine mammals. That is the cumulative impact of offshore oil drilling from other lease sales, such as Camden Bay, on marine mammals, along with development in the 1002 area. This was not evaluated at all. We feel that such a comprehensive study is essential, and do not feel that the effects of 1002 drilling and offshore drilling could be isolated. This is particularly of concern with regard to polar bears. Even though only a few bears use the 1002 area, the report states that "the exclusion of only one or two bears from areas consistently used for denning would be a moderate impact on that segment of the Beaufort Sea population." What would happen to the polar bear

population if offshore development also occurs? We urge that this be addressed.

We also have some concerns on the effect of drilling and development on birds that use the 1002 area, particularly lesser snow geese. Although annual staging use by snow geese in the 1002 area is noted to be quite variable, the report states that the average number of snow geese annually staging on the 1002 area could be reduced by almost 50 percent. Mitigation factors offered for this potentially serious adverse effect include number 25 listed on page 147. This calls for time and area closures or restrictions on surface activity in areas of wildlife concentration for a number of species, including snow geese. The dates for the various wildlife listed would require rather significant restrictions throughout certain parts of the 1002 area from mid-April until late September. We wonder if such restrictions are enforceable or even practical in the face of massive oil development. If not, this mitigation factor would not be useful.

We also would like to point out the effects predicted on golden eagles, which could be a moderate population decline or change in distribution. The major mitigation factors proposed to protect eagles in the 1002 area are the same as those proposed to protect caribou. This causes some concern since there is so much evidence presented that indicates the PCH may decline significantly irrespective of attempted mitigation.

Effects predicted on fish in the 1002 area are minimal. However, this depends in large part on what would be allowed in terms of water access and gravel removal. We have expressed our serious concerns about these factors previously.

In the summary of unavoidable impacts with full leasing, there are 24 listed impacts. We have chosen to comment on only some of these. The 32 mitigation factors proposed on pages 145-147 certainly could have some positive effects. However, there is no comprehensive plan for what oil development would look like if all of these factors were implemented. Would it even be feasible to implement them all without paralyzing oil

exploration and production during certain times of the year? Apparently not, for oil industry representatives objected to some of these proposed mitigation factors at the initial public hearing in Anchorage.

Full oil leasing of the 1002 area would have a major adverse effect on subsistence uses, according to the draft report. We do not see how any mitigation factors could prevent, in particular, the adverse psychological aspects associated with such a change in the subsistence lifestyle. Increased hunting pressures from nonresidents who would work in the oil fields undoubtedly would affect subsistence adversely. We object to the lack of concern demonstrated for Native villages which could be impacted severely by a decline in the PCH population. The failure to hold a public hearing in Arctic Village is a blatant example of this, as well as another example of the Department of the Interior's hurry to railroad its plans for oil development through Congress at the expense of the public's right to know. These same sentiments have been expressed by villagers from Yukon Territory, as well as the Yukon territorial government. We do not feel that the secret and unethical dealings with Native corporations for land trades in ANWR would mitigate adverse effects upon the subsistence lifestyle, for in some cases Native corporations have demonstrated no more concern for villagers than have the oil companies which traditionally have not hired Natives.

Our most important objection to oil drilling in the 1002 area has not even been mentioned yet, and appears to hold no weight in the eyes of those who see only dollar signs as the "national interest." The coastal plain of ANWR is one of America's premiere wilderness areas, yet only a small portion of it, i.e., the northeastern corner, has been designated wilderness. There is no doubt from any point of view that the 1002 area is wilderness. It should be so designated. In addition, the rest of Alaska's arctic coastal plain outside ANWR is open to oil drilling. Those who say we already have enough wilderness have missed the point. We do not hold the purely anthropocentric

view that wilderness is primarily for human beings to enjoy and contemplate, even though development types speak of an elite corps of backpackers and river runners. While we certainly value the 1002 area for its recreational opportunities, we seek its preservation as wilderness for much more profound reasons than that. Our view is biocentric. We believe humans are part of the earth's ecosystem, not its masters who have the right to interrupt it on a whim.

We strenuously object to the Secretary's contention that oil drilling in the 1002 area is necessary for national security. This is typical of the hoax perpetrated on the American people by the Reagan administration for the past six years to justify everything from environmental pollution to its Star Wars program. It is obvious the Secretary is following the party line, with not a thought about what,really is necessary for our national security. Is it in our national interest to continue to waste our natural resources as we have done for years with no plan for the future and no concern for future generations? Why do we have no national energy plan? What happens in the year 2030 when we have guzzled most of the oil from the 1002 area? Will technology have found a way to circumvent our need for oil completely by then? The wasteful habits promoted by the Reagan administration are indeed myopic, and the failure to complete the ANWR ecosystem by adding the arctic coastal plain to its wilderness is just another illustration of this. How will the four percent of our nation's lustful oil demand supplied by the 1002 area in 2005 help us in the long run? Why is there no discussion in the draft report of energy conservation or alternative energy sources? In our paranoia about foreign control of oil sources, we have decreased dramatically funding for research on the latter. We submit that what the Secretary really means by "national interest" and what the oil companies really mean by that term is simply profit cloaked in the word patriotism. It is a fact that oil development in the 1002 area will not be the panacea for our energy needs that the oil industry seems to claim. In fact, its

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contribution to independence from our reliance on foreign oil will be miniscule in the long run. The main reason to promote oil development in ANWR is not national security, it is pure profit. While we certainly do not object to the latter, we feel that this magnificent area's preservation far outweighs any profit motive. Any claim that oil development can proceed in the 1002 area and preserve its wilderness values simultaneously is absurd. To quote from the draft report on page 131, the "wilderness value of the coastal plain of the Arctic Refuge would be destroyed."

In summary, we oppose full oil leasing of the 1002 area for the following reasons:

1.The 1002 area of ANWR is incomparable wilderness.
2.There is very little water available for oil exploration and development, and the adverse consequences of obtaining it are unacceptable.
3.Oil development would have unacceptable adverse consequences on the physical environment of the coastal plain.
4.Oil development would have a major adverse effect on the Porcupine caribou herd, possibly resulting in a 20 to 40 percent decline in population.
5.Oil development would have a major adverse effect on muskoxen.
6.There would be major adverse effects on snow geese staging in the 1002 area.
7.There would be moderate effects on golden eagles, wolverines, wolves, brown bears, and the Central arctic caribou herd.
8.The effects on marine mammals have not been studied adequately.
9.There is no comprehensive study of the cumulative effects of offshore oil development and oil development in the 1002 area.
10.There is no comprehensive plan for the use of mitigation factors in oil development.
11.Subsistence would be affected severely by oil development.
12.There is no evidence that oil development is necessary for national security.
13.Oil development is not in the national interest in the 1002 area.
14.The nation has no comprehensive plan for energy production,

use, and conservation.

In conclusion, we will work diligently to see that the Congress of the United States designates the 1002 area wilderness.

Steve Livingston

Steve Livingston, M.D.
January 10, 1987

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W. EUGENE GUESS 1932-1975
JOSEPH RUDD 1933-1978

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February 6, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, D.C. 20240

Re: Alliance Testimony on ANWR Draft Environmental Impact Statement

Dear Sirs:

The Alaska Support Industry Alliance (the Alliance) is pleased to offer testimony on the draft Environmental Impact Statement prepared regarding the opening of the Arctic National Wildlife Refuge (ANWR) to oil and gas leasing.

The Alliance strongly endorses leasing in this area.

The Alliance consists of 300 corporate and private members engaged in the oil and gas and mining support industries in Alaska. Our unique level of experience with oil and gas operations on the North Slope is reflected in our testimony. We have focused upon subjects we believe probably will not be adequately covered in other testimony, including leasing methods, transportation, existing regulatory mechanisms, etc.

Sincerely,

James D. Linxwiler
Chairman
Alliance ANWR Committee

JDL:kdw

Enclosure

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#7232W

ANWR TESTIMONY - ALLIANCE

I. Leasing Methods

The most basic action contemplated by Congress with respect to the Arctic National Wildlife Refuge (ANWR) is leasing. However, a full discussion of the merits of this basic action has been obscured by the debate about the environmental consequences of oil development in ANWR. There are significant aspects with respect to the leasing program which should be developed with care. The purpose of this section is to discuss this issue.

The draft Environmental Impact Statement states, with respect to leasing systems, as follows as page 89, in its discussion of "Alternative A":

> Under the alternative of full leasing, it is assumed that Congressional action would allow all Federal subsurface ownerships of the § 1002 area to be available for development through a leasing program administered by the Department of the Interior. This action would also open to oil and gas development in production the private lands within the refuge. The exact terms of the leasing program would be developed in response to specific legislation passed by the Congress. If the Congress chooses to authorize leasing in the entire § 1002 area, the legislation would probably contain the important elements of the Mineral Leasing Act and the NPRA legislations, with special provisions to meet the unique needs of the Arctic Refuge.

This statement appears to be made almost in passing, and there are several significant problems with it:

First, it is important that no element of the NPRA legislation be used. The well demonstrated record is that the NPRA leasing program was not a success. It was created by the Secretary using regulations because the Department itself lacked the statutory authority to provide a normal leasing program. In this environment, the leasing program did not, for instance, contain normal and necessary lease provisions regarding unitization, for the maintenance of the lease and the extension of the primary period by shut-in production, etc. The above-referenced statement encourages Congress to create a new and untested program, and experience has shown this to be unnecessary and undesirable.

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Second, this statement ignores that there already exists a well-developed and environmentally sensitive program expressly created for Alaska game refuges in §§ 1008 and 1009 of ANILCA (16 U.S.C. §§ 31, 48 and 49).

We believe that the Secretary should recommend to Congress that it adopt, with respect to ANWR, the ANILCA §§ 1008 (16 U.S.C. § 3148) and 1009 (16 U.S.C. § 3149) onshore leasing program. The §§ 1008 and 1009 program is the

competitive onshore leasing program utilizing the statutory authority and well developed procedures of the Mineral Lands Leasing Act, as applied by ANILCA to the unique circumstances in Alaska. The important features of this program include procedures intended to provide significant environmental protection, and to apply in the case of game refuges in Alaska in particular.

The procedures provided in § 1008 are similar to those contained in the Outer Continental Shelf Leasing Act (OCSLA, 43 U.S.C. § 1401 et seq.) including the preparation, pursuant to § 1008(f), of an exploration plan, and, pursuant to § 1008(g), preparation of a development and production plan. The Secretary retains the authority to monitor and modify the terms of such plans pursuant to § 1008(h), and if the Secretary determines that "immediate and irrepairable damage will result from a continuation enforce of a lease," then the lease may be suspended or cancelled pursuant to § 1008(i).

Congress need not attempt to "reinvent the wheel." The preparation of an environmentally sensitive leasing program which applies to game refuges in Alaska has already been accomplished by Congress and all Congress need do is to implement it. In other words, the simplest action for Congress to take in this instance would simply be to revoke §§ 1002(i) (16 U.S.C. § 3142(i)) and 1003 (16 U.S.C. § 3143), and the §§ 1008 and 1009 program will automatically apply.

II. NATIVE SUBSISTENCE WITHIN ANWR

Preservation of the subsistence resource is one of the most difficult and important issues relating to opening ANWR to oil and gas development. In evaluating this issue, it is important to keep in mind the following points:

First, the oil and gas industry has a strong commitment to preserving subsistence resources, and an excellent track record in having done so. The oil and gas industry has worked on the North Slope and in western Alaska in close contact with Native communities and regulatory agencies seeking to preserve the subsistence resources which otherwise might be affected by oil and gas exploration and development. As a result, no significant impact upon any subsistence resource has ever been substantiated as a result of oil exploration and development in Alaska -- and it is our strong belief that this excellent track record will continue in ANWR. The industry is strongly committed to this concern and will closely cooperate with Native subsistence users.

Second, it is also important to take note that subsistence impacts can only occur if there are significant impacts upon the wildlife resources of the area. The primary subsistence resource in this area is the Porcupine Caribou

herd, along with water fowl. The industry's excellent record in protecting caribou and other subsistence resources from impact at Prudhoe Bay and Kuparuk is a further reason why subsistence resources will not be impacted in this area.

Third, the subsistence lifestyle requires access to cash, for purposes of obtaining three-wheelers, guns, ammunition, and related supplies. The villagers in the local area will be able to utilize job opportunities offered by oil development to enhance their subsistence activities.

Fourth, Natives in the area, who are well experienced with the interactions between oil and gas development and subsistence, favor oil and gas development in ANWR. In fact, Jacob Adams, President of the Arctic Slope Regional Corporation, himself a whaling captain, has offered testimony in favor of opening ANWR to leasing which states that the Eskimo community is familiar with the favorable record of the oil companies in regard to the preservation of the subsistence resource.

Preservation of subsistence resources, and access to them, is a high priority of Kaktovik residents. Dall sheep, caribou, fish, seals, whales, birds and eggs, moose, and furbearers contribute to their subsistence economy.

As is the case in other North Slope villages, most residents obtain at least some of their food by hunting and fishing, and many get half or more of their total household food through hunting and fishing.

While the villagers of Kaktovik retain strong ties to the land, they also have adopted and incorporated many elements of western culture, technology and economy into their lifestyle. Oil and gas development, and the subsequent North Slope Borough capital improvement program, have increased the village's economic activity.

Changes in the Inupiat subsistence economy at Barter Island began about 1890 when whaling ships anchored in the harbor, and food, utensils, firearms and other items were exchanged for caribou and sheep meat, and clothing made of caribou hides. Bowhead whaling ceased from 1910, but economic activity continued in the forms of reindeer herding, trapping and postwar construction.

This activity created a dependence upon cash, and most villagers see local petroleum development as a positive means for maintaining a cash flow. At the same time they believe that, given appropriate environmental safeguards, oil and gas development will not endanger important subsistence resources.

III. DRILLING TECHNOLOGY

We believe the EIS should take more complete recognition that drilling conditions in ANWR will not be vastly different from Prudhoe Bay. The terrain, climate, logistics and necessary support system will not be anything new and we will have had the benefit of over 40 years of arctic experience. This is especially important in that a "learning curve" has been established and we will not be making the same mistakes. Over 1100 wells have been drilled in the North Slope area with no disastrous consequences to the environment. The oil industry record and methods of operation in the arctic are truly exceptional.

Prior to drilling in ANWR, a comprehensive environmental study will probably be required. Assuming this is completed, a variety of permits will be requested that will insure environmental integrity. This is the first phase of the drilling operation and it will be administered by a host of government agencies. These agencies will spell out stipulations pertaining to all aspects of the program so that in a sense, the government will be implementing and enforcing their own recommendations.

Extensive use of ice roads, and ice airstrips will be used resulting in no environmental damage.

In addition, depending on well requirements the use of ice pads may be applicable. This type of construction is cheaper and more time effective than conventional gravel contruction. It is also in the best interest of the operators since it is more cost effective.

With today's state of the art rigs less pad space is required and a rig can fit on a 25,000 sq. ft. site. Additional space for camp and other drilling equipment will be needed.

Once the rig is mobilized actual drilling operations can commence. Of primary concern is well control and mud disposal since these are the major sources of any potential pollution. Well control is of utmost importance to everyone on the rig and all supervisory personnel will be MMS certified in well control.

In addition to trained personnel, all equipment will be "state of the art." Normal blowout prevention equipment would include three ram type preventors and one annular preventor designed to exceed all expected pressures.

Hydraulically operated chokes, pump stroke counters, trip tanks "flow-show" meters, Kelly cocks, trip tanks and inside BOP's are all part of the well control equipment. These items are considered "standard" on arctic drilling rigs.

In addition to the basic equipment, mud logging functions would normally be used on exploratory work. This system provides continuous monitoring of the mud flow and other drilling parameters such as mud density, background gas, drilling rate and pore pressure.

The use of this equipment helps predict bottom hole pressures and consequently adjustments to mud density can be made before actually needed. Pit level indicators, pit watchers and continuous monitoring by the mud loggers are a normal part of well control. All of this equipment and measuring devices help insure minimal risk of a blowout.

Another area of concern is mud disposal. Mud cuttings are normally dumped in a reserve pit and then covered and reseeded. This system works quite well and the top soil removed is usually stockpiled so it can be used to cover the reserve pit.

Again, it is in the operator's best interest to minimize the fluids in the pit since "mud" costs money. By using solids control equipment such as shale, shakers, desanders, desilters and centrifuges only the cuttings end up in the reserve pit with minimal amounts of mud.

Mud monitoring is usually required and includes data on muds discharged, cuttings discharged, product concentrations and other parameters. Certain products may also be prohibited by the EPA, and the mud system must fall into one of their "generic" types. All mud additives are basically approved prior to actual drilling operations. Alot of effort is extended in these two areas, (blowout prevention, and mud disposal) and again our record to date in Prudhoe shows that we have done a good job.

Other areas of concern include water supply, fuel storage, and sewer discharge. Again these are closely monitored and spelled out in the permits.

Only deep water lakes will be used for water sources with screen hoses to insure no fish are pulled into the hose. Fuel storage is normally in double walled tanks set in a lined and boxed in area. Sewer discharge is monitored daily and all plants must have an approved system.

The agencies issuing the drilling permit set the ground rules and they also monitor the overall drilling program. Provided they do not put prohibitive restrictions in the permit we can meet and often exceed their requirements.

Once drilling operations are complete, the rig will be demobilized to Prudhoe Bay. Normal procedure is to clean up the location after demob and then return again in the summer to pick up any debris that was frozen in.

Other than a wellhead sticking up, many locations are difficult to find once final clean up has been done.

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IV. REGULATORY FRAMEWORK IN ARCTIC NATIONAL WILDLIFE REFUGE (ANWR)

A. INTRODUCTION

The mitigation measures directly applied as part of the opening of ANWR are not the only applicable mitigation measures. We believe the EIS in its discussion of potential impacts and mitigation should take fuller account of the extensive local, state and federal regulatory system already in place, and which has mitigated essentially all major impacts for existing North Slope developments. Oil and gas operations

which take place within the State of Alaska, whether they be conducted on federal, State, Municipal or private lands, are governed by a broad array of regulatory programs to insure the prevention or mitigation of environmental impact. The Arctic National Wildlife Refuge is no exception to this rule. The 1002(h) report does not acknowledge the importance of these programs, which are above and beyond any operating conditions and stipulations which the Department of Interior, Fish & Wildlife Service will impose on operations in that area.

B. FEDERAL PROGRAMS

On federal lands such as ANWR, federal agencies provide the primary regulatory structure governing oil and gas operations. The Department of the Army, Corps of Engineers and Environmental Protection Agency are responsible for implementing programs established by the Clean Water Act and the Clear Air Act. The Corps of Engineers is responsible for administering the Section 404 program which governs the deposition of fill materials in "waters of the United States," which includes wetlands. In its lead agency role it accepts comments from all interested state and federal agencies as well as the public in developing conditions and stipulations to mitigate or prevent any environmental impacts related to fill operations. Many of these conditions and stipulations in the

past have extended to restrictions on operations not directly related to the actual construction fill operations. By the imposition of these stipulations and conditions the interested agencies and the public have strictly controlled the type and quantity of operations which take place in those areas falling under the jurisdiction of the Corps of Engineer's program.

The Environmental Protection Agency and Fish & Wildlife Service play key roles in the management of the Section 404 program. Although the Corps of Engineers is the lead federal agency in managing the program, the Environmental Protection Agency has the authority to veto any Corps of Engineers' approval of a project which it considers to be a detrimental fill. Though this authority is rarely used, the potential that it might be used gives the Environmental Protection Agency a substantial voice in project reviews. Under the Fish & Wildlife Service Coordination Act the Fish & Wildlife Service also has substantial influence over what stipulations and conditions are imposed on a project, specifically relative to how such projects might impact fish and wildlife in the vicinity of the project area. Though the Fish & Wildlife Service does not have an absolute veto, it does have the capability of elevating a decision made at the local level of the Corps of Engineers to the headquarters offices of the Corps of Engineers and Fish & Wildlife Service in

Washington, D.C. This authority has a similar affect to that of the Environmental Protection Agency veto authority described above. Fish & Wildlife Service uses this authority more frequently. Such elevation makes the review process even more exhaustive and is one more guarantee that impacts will be prevented or mitigated, even when the quality and scale of impact is questionable.

The Environmental Protection Agency has primary authority over two important regulatory programs -- the Clean Water Act discharge program known as the National Pollution Discharge Elimination System (NPDES) and the Clear Air Act permitting program known as Prevention of Significant Deterioration (PSD). The NPDES program regulates the discharge of water or other fluids from a "point source." A point source is any means of transmitting or carrying or disposing of water or other liquids such as a pipeline, outfall line, hose or even a tanker truck. As a part of the Clean Water Act, this program dovetails with that of the Corps of Engineers under Section 404 to provide a complete system of regulatory coverage of water quality. The PSD permit regulates the discharge of elements into the air from operation of equipment, machinery, motors, and other devices. Both the NPDES and PSD programs require intensive coordination between the applicant and the Environmental Protection Agency, including the providing by the

applicant of large amounts of detailed specifications and chemical analyses. In the case of the PDS application, in particular, the process may take years to complete.

The regulatory umbrella described above provides complete coverage of land, water and air quality concerns. Superimposed on that coverage that is proposed by the Fish & Wildlife Service through the stipulations is proposed for application throughout the 1002 area, as well as the coastal zone management certification requirements described below.

C. STATE COASTAL ZONE MANAGEMENT

State agencies have the opportunity to influence the federal regulatory program on federal lands through the State of Alaska Coastal Zone Management Program. The State program was conceived with federal authorization under the Federal Coastal Zone Management Act of 1972. Since the approval by the federal government of the State program, it is required that federal agencies receive from the State of Alaska a certification that a given project or permit approval therefor, is consistent with the federally approved State Coastal Zone Management Program. Until the State of Alaska approves the administration of the State program by a local area, the Office of the Governor, Division of Governmental Coordination acts as

a clearing house for the comments from all interested State agencies. The ANWR lands fall within the coastal zone, as defined by the State program, and are therefore subject to this consistency requirement.

The interested State agencies include agencies such as the Department of Environmental Conservation and the Department of Fish and Game which are the counterparts of the federal Environmental Protection Agency and Fish & Wildlife Service. Accordingly, this program provides yet another layer of regulatory mitigation or prevention of environmental impacts.

D. CONCLUSION

The existing panoply of regulatory programs vitiates a perceived need for additional regulatory control. Any management program conceived by the Fish & Wildlife Service should take into account these programs which are already in place and not duplicate or layer further upon these programs.

V. TRANSPORTATION - SEA & ROADS

The discovery and subsequent production of large quantities of oil and gas in remote areas of the Arctic brought about the development of innovative logistical support systems,

insuring timely delivery of supplies and equipment under severe conditions without damage to the fragile environment.

A network of snow trails, offshore ice roads and ice landing strips combine to provide environmentally sound water transportation. Summer transportation may be accomplished utilizing barges and CATCO type low ground pressure vehicles.

Exploratory well pads made from ice have replaced the gravel pad further lessening the impact of exploration.

Equipment designed for the environmentally sensitive tundra has been developed and exhaustively tested in Alaska and Canada. The hovercraft and hoverbarges were designed to transport loads over water, sea ice and tundra without damaging the surface. For local tundra travel CATCO designed a top roller driven airbag tractor which traverses the delicate summer tundra without lasting effect. After many years of Arctic experience, industry has developed the equipment and more importantly an attitude of sensitivity in the work force so exploration and production can develop fields without environmental damage.

Transportation from coastal staging areas to particular well locations is easily done over the tundra by

all-terrain vehicles or by ice roads. Ice roads are constructed of ice and fresh water which allows conventional trucks to transport cargo over four to six inches of ice. This ice protects the tundra. Exhaustive tests have been done on the effects of ice roads on tundra degradation and compacting. The end results are no long term effect.

All-terrain vehicle design has evolved from tracked caterpillar type units, to low pressure tracked units, to rubber tired units and finally to low pressure soft pliant airbag units. The designing and utilization of the CATCO all-terrain vehicle has proven that operations over tundra in summer and winter operations can be completed with no degradation to the tundra. CATCO offers an innovative strategy in off-road heavy cargo transport. Designed to protect fragile ecosystems and get the job done, the CATCO is a lightweight vehicle that looks and handles like a truck but rolls on pliant, low-pressure airbags which allow the vehicle to "float" heavy loads over the ground. With this cushioning effect and a unique system of suspension and locomotion the CATCO can operate throughout the year on all types of terrain with a minimum of environmental disturbance. Most importantly is CATCO's experienced work force; when combined with the unique CATCO all-terrain equipment has an unsurpassed record of environmental safe operations in over 14 years of operation in the Alaskan Arctic.

The annual Sealift has developed equipment and techniques which allow the cost effectiveness of modular construction methods in developing production facilities. Since 1969 over thousands of tons of modules and general cargo have been delivered to Prudhoe, Kuparuk, Milne Point and Endicott fields. Development of ANWR would be considerably easier due to the perfected techniques of Prudhoe Bay.

VI. INTERNATIONAL COMMUNICATIONS

A Canadian government official, speaking at the ANWR hearing in Anchorage, contended that the oil and gas leasing issue should take into consideration the concerns of his country. The official reflected a sentiment that opening the coastal plain to leasing could damage the integrity of the Porcupine caribou herd, and thereby hurt the interests of Yukon Territory residents.

In addition, he said the U.S. Interior Department has not solicited input from Canadians regarding this "international issue."

In evaluating these comments, the following should be considered:

During the mid 1970s, the Canadian Arctic Gas Study Ltd., and its counterpart, the Alaskan Arctic Gas Study Company, engaged in a $200 million research project that examined the impact of development on caribou and other aspects of the arctic environment. The studies indicated that the impact of development could be minimized.

In addition, since the mid 1970s the state of Alaska and the United States Fish and Wildlife Service have discussed with Canadian officials mutual concerns about management of the Porcupine caribou herd. The discussions were motivated by pending settlement of lands issues, and proposed oil and gas leasing within the range of the herd.

Talks were suspended in 1980 pending resolution of domestic issues on both sides of the border. ANILCA resolved a major conservation issue for Alaska and the United States, and the Canadian government reached settlements with the Natives by 1985. These events set the stage for subsequent international negotiations. Now the two countries are nearing the point where an agreement can be written that will promote international coordination of management of the Porcupine caribou herd. The pending agreement will ensure the continued integrity of the herd.

National
Wildlife Refuge
Association

11405 Hawkins Lane
Anchorage, Alaska 99516
January 26, 1987

Mr. William P. Horn
Assistant Secretary for
Fish and Wildlife and Parks
U.S. Department of the Interior
Fish & Wildlife Service
2343 Main Interior Building
18th & C Street, N.W.
Washington, D.C. 20240

Attn: Division of Refuge Management

Dear Mr. Horn:

This supplements previous comments made by the National Wildlife Refuge Association (NWRA) as transmitted January 15, 1987 by Mr. Forrest A. Carpenter regarding the draft Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment (1002) report released for public review on November 24, 1986.

To reiterate NWRA's position, we cannot support the Interior Department's recommendation of leasing the 1002 area, and we instead favor the "no action alternative" and urge that the Arctic NWR be managed for its intended purposes. This position is predicated in part upon the inadequacies of the 1002 assessment report. We suggest this report be redrafted to improve overall objectivity, organization, accuracy, completeness, etc., if indeed it is to be used as a decision-making document.

Our previous memorandum dealt with concerns in a general way and provided some examples in their support. These comments here deal with technicalities as a means of further substantiating the reasons underlying NWRA's position on this issue. These comments are neither complete nor exhaustive because this complex issue, together with the extensive deficiencies of the draft 1002 report, make the task of providing a comprehensive review too unreasonable for me to undertake at this time. Although these comments represent the tip of the iceberg, they amply demonstrate that the 1002 report is badly flawed. Our position is consequently well justified.

Chapter I, Purpose and Need for this Report is overly complicated, disjointed and superfluous in some instances. The purpose(s) of this report are not expressed in succinct terms; background material is excessive in some instances, incomplete in others; topical material is awkwardly organized. The organizational problem can be alleviated by placing the topic, Program Description and Implementation, together with the subtopic, Report Preparation, on page iv (now blank). Pages iv and v in the final report would thus have two topics: 1) Program Description and Implementation, and 2) Report Preparation which would include "Contributions to the Report" material appearing in pages iv through 11 of the draft document.

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Dedicated to the preservation and perpetuation of the National Wildlife Refuge System.

The Baseline Study of Fish and Wildlife Resources section should be moved to the Fish and Wildlife Resources section on page 27 and the Oil and Gas Exploration Program section to page 47 to improve continuity and clarity, as well as to avoid cluttering the introductory chapter if there is to be one. A concisely written introduction would suffice in lieu of draft chapter 1. The introduction would incorporate the existing introductory material, report purposes and a more comprehensive review of legislative history (aside from ANILCA deliberation period as reported). The latter is important background material for readers to have a complete and accurate insight of the establishing process, resource values, and the vulnerability of these values under leasing incursions. In sum, the introduction should be limited to study purposes and scope, and that background material required to put problems and requirements in perspective. Guideposts should be included to help orient the reader.

In Chapter II, Existing Environment, the text contains misleading, contradictory, and inadequate information.

Page 21, Water Resources, the lead statement that "water resources are very limited" contradicts the reporting of 12 major riverine systems (29 percent of the 1002 area) and extensive wetland habitats (99 percent of the 1002 area).

Page 27, Fish and Wildlife Resources section inappropriately refers first to treaty obligations. This is not in context with the Existing Environment Chapter. Treaty and congressional obligations should be elevated to a separate, clearly-defined section and discussed in terms of their relationships to oil and gas leasing.

As mentioned, the page 11 Baseline Study of Fish and Wildlife studies should be part of the introduction (lead paragraphs) to the Fish and Wildlife Resources section beginning on page 27. The baseline study effort should be better described in terms of when and where studies were performed. Were studies, for example, limited to summer field periods or were they conducted throughout the year?

Baseline studies are ordinarily performed to determine specific biological parameters as a basis for monitoring change attributed to consequential factors. Considering this as a baseline study purpose, the species-specific information reported for some mammals, birds, and fish in the Fish and Wildlife Resources section does not reflect such a baseline study approach. We understand that the final baseline and 1985 update reports were not prepared in time for the results to be incorporated in the 1002 report. If this is true, then a statement to this effect should be made.

In certain instances, life history aspects presented for specific species are irrelevant and without bearing on 1002 report purposes.

Page 29, next to last paragraph, reference is made to an estimated 2- to 3 thousand post-calving caribou using the 1002 area and an additional 1,000 caribou located west of the Sadlerochit River and north of the Sadlerochit Mountains. Do these caribou use the 1002 area or not?

Page 30. The section on muskox does not report the number of animals using the 1002 area. If use varies seasonally, an average annual use figure would be important to document.

The Moose section does not recognize the average number of moose ranging in the 1002 area. In view of the 60 some staff years represented in the baseline study effort, i.e. 57 separate filed studies conducted over a five-year period, we would expect a substantive accounting of 1002 area moose and other large mammal populations. The statement that "moose numbers are probably less than 25 animals" should be a highlight of the lead paragraph rather than relegated to a supportive paragraph as drafted, for this single remark is the most meaningful "observation" in this section. Again, a crucial need is to quantify mammal use of the 1002 area, and while winter moose populations occurring outside the 1002 area is a noteworthy subject, such remarks have less importance and can thus be relegated to subordinate paragraphs.

Page 31, Dall Sheep. This section is superfluous unless Dall sheep occur within or proximal to the 1002 area. What is the linear distance between their Sadlerochit Mountain rangelands and the southern edge of the 1002 area? Mention of traditional Dall sheep range characteristics has no relevancy to the purposes of this report.

Page 31, Wolves. This section has no substantive value. Using a density estimate reported by biologist Mech is invalid for the Arctic Coastal Plain. To see a wolf in the 1002 area would be an absolute rarity. A partial reason for wolf (and wolverine) scarcity along the coastal fringe is their vulnerability to Native hunters using snowmachines. Some life history material here is not relevant to report requirements.

Page 31, Arctic Foxes, has no substantive value. Ideally, it would be useful to show density estimates for the 1002 area during years of low, moderate, and high levels of abundance, but evidently this was not an objective of the baseline studies unfortunately.

Page 31, Wolverines. It is utterly ridiculous to use density figures reported by Magoun (an unexploited wolverine population in the mountainous foothill habitats of the Petroleum Reserve) as a basis to estimate a heavily exploited wolverine population occupying flat open terrain of the coastal plain. Wolverine, like wolves, would expectedly be as scarce as hen's teeth here during the optimum observation period of winter. How many wolverines were observed when they scavenged caribou during May and June, and in June and July when they preyed on birds and eggs as reported? Do ADF&G pelt sealing records reveal the locations wolverines were actually taken?

Page 32, Brown Bears. This section has substantive content and this, along with the caribou presentation, serves as a baseline information model that should be used to report other mammals of socioeconomic significance.

Page 32, Arctic Ground Squirrels and Other Rodents. This section contains life history information of little importance to the report's purposes. Ground squirrel density estimates should have been obtained during periods of low, moderate, and high levels of population abundance. In the absence of such information, this section should merely describe species present and a statement to the effect that arctic rodent populations exhibit cyclic fluctuations.

Page 39, Subsistence Use. With reference to the second paragraph statement that, "aside from Kaktovik, villages dependent upon PCM caribou are considered only generally," appears to be overly simplistic. Arctic village and Old Crow, for example, may have a greater need of PCM caribou than Kaktovik residents who have greater access to marine and fish resources.

Page 41, last paragraph, with reference to whaling, lead sentences are confusing. What is meant by "historic period?"

Page 45, Recreation. This section contains little quantified information on recreational use of the 1002 area. If there is an explanation for not having conducted a recreational use survey during the five-year study period, it should be presented in this section.

Wilderness and Esthetics. This section does not provide enough descriptive background to adequately inform the reader about wilderness qualities. Are abandoned DEW-line sites part of the wildland environs or deemed to be obtrusive and in conflict with wilderness classification? We find this section scant--considering the importance of wildland resources relative to the implications of oil and gas leasing.

Page 46, first paragraph, reference the statement that the entire 1002 area could meet the criteria. We suggest, truthfully, that the word "does" should be used in place of "could."

Chapter III, Assessment of Oil and Gas Potential and Petroleum Geology of the 1002 Area points to disproportionate reporting of assessed resources. This is a wildlife refuge, not a petroleum reserve. As drafted, the oil and gas potential was described in 24 pages of a single chapter compared to 11 pages and sectional treatment of fish and wildlife resources.

Page 50, Significant Findings and Perspectives. This section, reference Figure III-2, contradicts the proposition that the 1002 area is the "most outstanding prospect in the USA." This figure compares estimated recoverable reserves with proven fields. Recoverable amounts (95%) depicted are far below that of largest known fields.

Page 54, in reference to the statement that "exploratory drilling would resolve the questionable presence of Ledge Sandstone rocks, as an indicator of oil deposit," it appears to conflict with the full leasing recommendation in lieu of the further exploratory drilling alternative.

Page 91, Chapter V, Alternatives. The statement in reference to not leasing or developing the "traditional core calving area" merits an explanation as to why this exclusion instead of the "concentrated calving" area. The use of the terms "concentrated" and "core" is confusing. Plates (maps) contained in the report envelope are difficult to interpret. We suggest clearly delineating the peripheral boundaries of the traditional core and concentrated calving areas on these maps.

Page 93, reference to comprehensive conservation planning (CCP) process in second paragraph, it is prudent to include the 1002 area, "the most biologically productive part of the refuge," in the ongoing CCP effort for obvious reasons. Again, this is a refuge, not an oil reserve, and Congress must render a decision on both the Interior Department's 1002 report recommendation and the "preferred alternative" advanced by CCP document for the Arctic Refuge. If the 1002 area leasing recommendation prevails, what management category, i.e., intensive, minimum, and traditional, will apply to the 1002 area?

Page 94, reference to ANILCA, Section 1010, implies use of motorized equipment throughout the entire refuge when, in fact, this section applies only to the most southerly part of the refuge. Impartial or distorted reporting of this nature reflects negatively on agency credibility.

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Pages 97-98, Chapter IV, Environmental Consequences, in reference to FWS mitigation policy, this bureaucratic verbosity does little to improve the quality of this report nor the reputation of the FWS. If it comes to employing mitigation measures, it would seem necessary to consider steps to minimize degradation of the wildland resource which, after all, is a prime factor for originally designating the Arctic Range. The habitat resource categories may fit a typical refuge, but the Arctic Refuge's wildland uniqueness warrants special consideration.

Page 99, Alternative A, reference the environmental effects of ice roads and airstrips, and reported nil effects on arctic tundra, is without scientific basis. Repeated use of ice structures alters the microclimate and prolonged physical changes would indeed effect tundra ecology. A number of studies relative to motorized equipment and ice road use support this thesis. Scars left by the "Hickel Highway" (ice road used to freight supplies to Prudhoe Bay during Hickel's administration as governor of Alaska) are still much in evidence today.

Pages 104-105, Sadlerochit Special Spring Area, in reference to use of water, the best mitigation measure in this special case would be avoidance. Under no circumstances must water removal be allowed. The statement that "full leasing, and implied use of spring water, would have negligible effect on this special area" is an absurdity.

Page 108, reference next to the last paragraph, on effects of leasing the 1002 area on caribou calving. According to this report, the Interior Department's recommendation blatantly violates FWS mitigation policy. The loss of existing habitat value conflicts with the purpose of refuge establishment and flaunts congressional management and conservation mandates.

Page 111, Mitigation section, in reference to measure numbers 8 and 9 whereby herd size would be monitored toward determining adverse effects of leasing, should not be viewed as a mitigative measure unto itself. This is a procedural activity and not mitigative by definition. Annual surveys are standard refuge and state game management practices. Other measures reported are too general and nebulous to be as definitive as this section should be for a decision-making document.

Pages 114-125, concerning conclusive effects on major species, are misleading, incomplete, and incorrect. Alterations of habitats, particularly in productive riparian zones associated with development and water removal, would have substantial effects on moose and other wildlife. Increased hunting and sportsfishing pressure would have an adverse effect on population composition and productivity. To say that regulatory

adjustments could be made to offset use effects is too simplistic and irrational considering that the regulating mechanism is already overburdened and stressed from addressing regulatory problems in the more accessible parts of Alaska, let alone the remote Arctic. Intelligent conclusions are difficult to draw in light of the superficial baseline studies pertaining to wolves, Arctic fox, and wolverine. Major declines in respective populations and brown bears can be anticipated. The statements that "brown bears are not readily displaced by human activities" and "bears along the TAPS corridor became habituated to development" are absolute absurdities. As a wilderness critter, brown bears are readily displaced by human activity. Immature and yearling family groups exhibit a proclivity to habituate human developments, but this should not be construed to mean all brown bears react accordingly. Black bear habituation poses a different problem. The loss of immature and family group brown bears, either through habituation or natural mortality factors, is a normal aspect of population ecology. Other population components, mature males and females, females with young of the year, and many subadult bears will be affected by leasing developments. The conclusion dispelling the impact on fish does not recognize the effect of water removal.

We could elaborate further upon this report, but quite candidly, the quality of this report should reflect the ability of the authors rather than the comprehensive input of its reviewers. Considering the time, personnel, and funds allocated for the 1002 assessment study, we who understand what's going on and what may happen have every reason to be disappointed with the Interior Department's recommendation and the myopic manner in which it was formulated.

Sincerely yours,

Richard J. Hensel
Alaska Representatives

RJH:sw
33C/160a

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ANIMAL PROTECTION INSTITUTE OF AMERICA

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January 23, 1987

U. S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, DC 20240

The Animal Protection Institute requests that the following comments on the Arctic National Wildlife Refuge Draft Coast Plain Resource Assessment be entered into the hearing record and addressed more fully in preparing the final plan. Having read the assessment, we are opposed to oil and gas development in the areas of the Arctic National Wildlife Refuge (ANWR) as proposed by section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA).

The Department of the Interior's selection of Alternative A - "Full leasing of the 1002 area" - completely ignores the findings of the U.S. Fish and Wildlife Service that a long-term commitment to oil and gas development, production, and transportation would inevitably result in long-term losses in fish and wildlife resources, subsistence uses, and wilderness values.

The report minimizes the impact of development on the Porcupine caribou herd with the statement that the TAPS pipeline has had "minimal impact on wildlife resources" and projects this conclusion to the circumstances surrounding the Porcupine herd. We believe that this is not a valid assumption, since the Central Arctic caribou herd does not migrate from a winter range to a coastal calving ground as does the Porcupine herd. The density of calving caribou on the Porcupine calving grounds is 14 times greater than the density of calving caribou

continued . . .

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on the Central Arctic herd's calving grounds.

In light of the reported displacement of calving Central Arctic caribou resulting from oil development at Prudhoe Bay (1), it is reasonable to expect that not only will displacement of calving occur on the ANWR, but that displacement will be more severe due to the increased density of caribou on the ANWR calving grounds. This is alluded to by the statement on page 112 of the report which says (in reference to calving Porcupine caribou), "Given the geography of the calving areas and the current densities in those areas, the availability of suitable alternative habitats is not apparent." Clearly, if calving caribou are displaced, they will be displaced to habitat not conducive to successful calving which would result in a population decline for the Porcupine herd.

Immediately after calving, herds of caribou cows and calves form in the area south of Camden Bay (a proposed drilling site). These herds move constantly to forage and find habitat providing shelter from the millions of mosquitos which hatched around calving time. Mosquitos are a major cause of calf mortality. It has been demonstrated (Curatolo and Murphy, 1983) that mosquito-harassed caribou herds do not readily cross under elevated pipelines. The development of main and subsidiary pipelines south of Camden Bay would provide an additional stress on the caribou at a time when it could not be tolerated, e.g. when newborn calves and their mothers have the lowest energy reserves of the year. We believe this would magnify the effect of calving displacement and lead to further decreases in the size of the Porcupine herd.

The Interior Department's recommendation also ignores the USFWS finding that muskoxen - a species successfully reintroduced to the Arctic Refuge - could be affected adversely by the destruction of habitat values on nearly 75 percent of the areas heavily used for calving. A decrease in the productivity of muskoxen, due to displacement of calving activity, appears to be in direct opposition to the ANWR's stated goal of encouraging a healthy growth of the muskoxen population.

As reported by USFWS biologists in the assessment, other wildlife species (vertebrate and invertebrate) and native plant species will be impacted, some to a greater degree than others, but all will be adversely affected by direct oil and gas development, auxiliary activities, and possible contamination from spills and leakages. To

disrupt critical breeding areas of caribou, muskoxen, and waterfowl, among other wildlife, in order to recover an unsubstantiated amount of oil when producing wells are currently being capped throughout the United States, provides a weak argument for the full or partial leasing of the ANWR at this time. Equally nonsensical is the practice of promoting oil drilling on the North Slope based on current and future consumption estimates, while at the present energy conservation programs are tossed aside in favor of more consumptive choices.

The Animal Protection Institute of America takes a firm position in believing that opening the Arctic National Wildlife Refuge to oil and gas exploration will set a precedent to opening other refuges and wilderness lands to exploitation detrimental to the health of native plant and animal species and is in direct conflict with the goals of the Department of the Interior and its divisions to protect and preserve these species as national treasures and for the benefit of the people of the United States and future generations.

We recommend that the Secretary of Interior designate the Arctic National Wildlife Refuge as a wilderness area.

Most sincerely,

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CAS/bms

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ARCTIC AUDUBON SOCIETY

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U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, NW
Washington, DC 20240

January 30, 1987

Dear U.S. Fish and Wildlife Service:

The Arctic Audubon Chapter of the National Audubon Society is pleased to respond to the U.S. Fish and Wildlife Service's (hereafter FWS) Report and Recommendation to the Congress of the United States regarding the future management of the coastal plain area of the Arctic National Wildlife Refuge (Arctic Refuge). Arctic Audubon, with a membership of 320 residents, recently "adopted" the Arctic Refuge as part of the National Audubon Society's "Adopt-A-Refuge" program. This reflects the special interest of chapter members in the Refuge and it commits us to active service toward wise and benevolent stewardship for the Refuge.

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The FWS Report and Recommendation to Congress, which is a resource assessment of 1.55 million acres of coastal plain within the Arctic Refuge and a recommendation for management policy, was mandated by Section 1002 of the 1980 Alaska National Interests Lands Conservation Act (ANILCA). The "1002 area" (that part of the Arctic Refuge defined as the "coastal plain" by Section 1002(b) of ANILCA) required special treatment, independent from the Comprehensive Conservation Management Plan process for the rest of the Refuge, due to Congressional hesitation to act on this part of the refuge without accurate and adequate information regarding both the oil and gas potential of the area and the wildlife and wilderness values. To gather comprehensive information, to provde it to Congress in comprehensible and useful terms, and to recommend management policy for the area based on this data, was the point of the report.

In brief, we disagree with the Executive Summary of the 1002 report and belive that the Arctic Refuge is best managed under Alternative E, with wilderness designation. This is the best way to permanently protect the refuge in a manner consistent with the purposes for which it was established, the conservation of unique wildlife and wilderness values.

Arctic Audubon finds the report profoundly flawed. There are numerous errors in scientific detail and there are illustrations of bad faith in the execution of the process. The following comments, while not totally inclusive of all objectional assumptions and items, summarize our response to the "1002 report."

PRECONCEPTIONS AND BIAS

It should be kept in mind that it required a lawsuit by several Alaskan environmental organizations to make the FWS "1002 report" available to the public and open to public comment. Although court action required public hearings and time for public comment, FWS held hearings in only two Alaskan locations, Anchorage and Kaktovik. This omitted two critical locations for hearings: Arctic Village, a Native village south of the Arctic Refuge which will certainly feel impacts from any decision regarding its resources, and Fairbanks, the hometown of one of the organizations originally requesting hearings. Fairbanks is the northernmost urban area in Alaska and is the home of thousands of citizens with interest in the future of the Arctic Refuge. Arctic Audubon had to allocate membership dues for plane fare to have our organization represented at the Anchorage hearings, as did other small, nonprofit organizations.

Furthermore, the two hearings were held during the first week of January, close on the heels of Christmas and New Year's during which many people are out of down, and decidedly inconvenient for those of us who remained. And, finally, the period for public comment was originally only 60 days as compared with a more usual 90 day comment period, and was extended by two weeks only after the request of the Governor of Alaska.

This peculiar timing and haste on the part of FWS is attributed by agency personnel to the fact that the report was late and they were hurried. However, the report was more than three months past deadline already. The decision to make up time lost by government personnel, at the expense of public comment on what is by law a public process, seriously calls into question agency regard for citizen input.

In addition to the above difficulties, the report itself contains many subtle indications of bias toward industrial development of the Arctic Refuge. These include :

a)language patterns favoring development, i.e., on page 84 and with increasing frequency thereafter, "will" instead of "would" is used when describing oil development, thus strengthening the assumption of this eventuality;

b)very tentative language when discussing wilderness values, i.e., page 131 states, "Most recreationists...might perceive the existence of oil facilities in the area as lessening the quality of that experience." We think "would" is more accurate than "might";

c)the disproportionate discussion of oil and gas values (24 pages) when compared to the discussion of wildlife values (11 pages) and to the startlingly cursory discussion of wilderness values (five paragraphs).

CONFUSING AND CONTRADICTORY PRESENTATION OF EVIDENCE

More important than a suspect process and some questionable overtones to the text, however, is the confusing and oftentimes misleading manner in which the scientific research and data are presented. The confusion is so extreme that the report contains numerous contradictory statements and conclusions on pivotal issues. Some examples, which do not exhaust the list which has been culled from the report, follow:

a) By discussing the oil-bearing geology of the Prudhoe Bay area and by noting the proximity of the Arctic Refuge area to Prudhoe, the report suggests that the geology of the 1002 area is similarly, significantly oil-bearing. The evidence is confused:

Point: "All of the oil production in the Prudhoe Bay-Kuparak River field areas is from rocks of the Ellesmerian sequence." (p.54)

"The Ledge Member [of the Ellesmerian sequence] ...is the main producing reservior at the Prudhoe Bay field." (. p. 56)

"The Shublik [shale, of the Ellesmerian sequence] is considered to be an important oil-source rock for Prudhoe Bay oil." (p.56)

"Parts of the Kingak [shale, of the Ellesmerian sequence) are thought to contain enough organic matter to be a source rock for some of the Prudhoe Bay oil and gas." (p.56)

"Analyses of different rock units throughout northeastern Alaska (-location of the Arctic Refuge) indicates that the Shublik Formation, Kingak shale, pebble shale unit, Hue Shale, and shales in the Canning Formation may be potential oil or gas source rocks. The first three units are considered to be the source for the oil in the Prudhoe Bay field." (p. 62)

Counter-point: "Analysis of the oils from seeps and stained outcrops in or adjacent to the 1002 area, and of the different potential source rocks, suggests that the Hue Shale is the most likely source rock in the 1002 area. None of the sampled oils are similar to Prudhoe Bay oil." (p.62)

"In addition, the distribution of the Shublik and Kingak is not known, and because of the pre-pebble shale erosion, these rocks may not be present in much of the 1002 area." (p.62)

"If most of the Ellesmerian rocks are missing in most of the 1002 area, the assessment number would be reduced considerably." (p.54)

"Well control west of the 1002 area and seismic data indicate that most of the Ellesmerian sequence is missing in the northwestern quadrant of the 1002 area, but seismic data suggests that a significant part of the sequence may be present in the eastern part of the area." (p.54)

"Such fault-bounded blocks [as the Ellesmerian rocks] are well known in the Prudhoe Bay area, but have not been identified thus far on the seismic data in the 1002 area." (. p. 67)

These confusing and contradictory statements attest to the wisdom of the suggestion on page 54: "If most of the Ellesmerian rocks are missing in most of the 1002 area, the assessment number would be reduced considerably. Drilling one or two wells in critical areas would resolve this question." But these statements could not support the conclusion on page 50: " The 1002 area is clearly one of the most outstanding prospective oil and gas areas remaining in the United States" since the evidence of what it may contain is unclear.

It should be remembered that the whole discussion is within the context of an 81% chance that no oil will be located at all, let alone the 5% conditional probability that, if any oil at all is found, it will be of the Prudhoe Bay field size. The computation of conditional probability puts the liklihood of a large oil find, realistically, in the arena of 1%.

Regarding consideration of gas as a potential resource in the 1002 area, the conclusion above appears to be directly contradicted by a passage from the same page, "Gas was not included in the calculation of economically recoverable resources. Gas resources are unlikely to be economic at any point in the time period being considered."

II. On page 50, the bar graph at Figure III-2 compares the estimated recoverable reserves of oil on the Arctic Refuge with those of proven fields. For all possible prospects on the refuge, the most likely estimates are well below most of the largest known fields. Yet the paragraph at the top right of the page (cited above) concludes that the area is one of the most outstanding prospects in the United States. This conclusion does not follow from the graph on which it is supposedly based. Rather, the graph indicates that there is a 95% chance to the contrary. The use of this bar graph and the statistics it claims to show are confusing and misleading.

III. Similarly, the statistical chart on page 50 (Table III-1) is ambiguous and potentially misleading. The caption states that the "figures do not reflect the risk that economically recoverable oil resources may not exist in the planning area." Does this mean that the risk (This refers to the 81% chance that there is no economically recoverable oil in the 1002 area at all, as discussed in the report.) ...is not calculated in to the figures presented for the 1002 area, or that the same risk is not calculated into the figures for all areas being compared? If the former is true, the comparison (the point of this chart) is invalid. If the latter is true, all relevant data (the conditional risks for the other areas) is not provided and the comparison is useless. Either invalid or incomplete, the "data" presented are confusing.

IV. A paragraph on page 106 discusses that studies have noted an increase in the Central Arctic Caribou Herd since the Prudhoe Bay oil field has been developed in their area. (Oil industry documents make frequent use of this fact.) However, the report correctly states on the same page that,

"Analogies comparing the effects of current oil development on the Central Arctic Herd and effects of potential 1002 area development on the Porcupine Caribou Herd must be drawn with caution. ...the PCH would interact with oil development much more extensively and intensively than the CAH has interacted with oil development in the Prudhoe Bay area."

The discussion of mitigation measures beginning on page 111, which admits that Resource Category 1 (no loss of habitat) is impossible should oil development take place, concludes that even with the mitigating stipulations, the population decline and change in distribution could be as severe as from 20-40% of the Porcupine Herd. (Paragraph 3, page 112; also summarized on page 144). In the same paragraph on page 112, the report states that the estimate is uncertain, due to the many variables involved, the lack of experience with this herd, and the difficulty in quantifying impacts.

The significance of this projection for the Porcupine Herd is not so much the figures themselves as another consideration: the Baseline Study reports for the Arctic National Wildlife Refuge, required by Section 1002 (c) of ANILCA, and upon which much of the wildlife data for the coastal plain report was to have been based, was not made final and distributed until the third week in January. It is difficult to make or evaluate population projections at all, and especially so without access to baseline studies. It is unclear how this projection of a possible 20-40% herd reduction or dislocation was computed, and without clarity on this point, the figure is worse than uncertain, it is meaningless. The impact of oil development on the Porcupine Caribou Herd could be significantly less than the 20-40% figure or it could be several times more severe.

Nowhere in the 1002 report is it acknowledged that projections of wildlife populations and the impacts upon them by industrial development are wildly unpredictable, and therefore, that suggested mitigation measures are merely theoretical constructs.

V. The narrative discussion of the contribution that the possible 1002 area oil would make toward reducing national dependence on imported oil states,

"Production of oil from the 1002 can also help achieve this Nation's national economic and security objectives..." and

"Thus, the 1002 area's oil may be able to significantly reduce the economy's vulnerability to world oil market changes." (p. 164) and

"In summary, the 1002 area has a very significant potential to contribute to the national need for oil." (p. 166)

However, the data which support these statements is presented in Table VII-2 (p. 162) and the data there are unclear. Do these figures reflect the conditional probability regarding whether oil will be found in the 1002 area at all? If not, they are misleading. If so, do they reflect the high, optimistic projections of potential oil reserves? Or do they reflect the lower, conservative projections? Without this information, the use of the statistics as evidence for anything is ridiculous. The presentation of data is confusing and irresponsible.

VI. In the discussion of Alternative A and the impacts of this alternative on recreational uses of the areas, the report states that some hunted and trapped species might be displaced, thus lessening opportunities for these activites. The report continues,

"Because much of that displacement would be from the area in which firearms could not be discharged and access would be restricted, the net effect on hunters would be negligible." (p. 131)

The report writer has neglected to consider that "firearms could not be discharged and access would be restricted" when he concludes that the impact on hunting will be negligible. On the contrary, it appears that hunting would be prohibited. Where? Over how much of the 1002 area? Within all private lease holdings?

It is important to recall that although wilderness status and other conservation designations are charged with the alledged unfairness of a land "lock up", there is no greater "lock up" than private ownership or private management which precludes public access.

The statement regarding negligible impacts on hunting is misleading and is contradicted in the very paragraph which contains it.

VII. The discussion of Alternative B includes the statement that the impact of this alternative on the muskox population would be the same as under Alternative A (p. 134). Impacts of Alternative A are considered to be "major", with the possibility that the animals would be displaced from 71% of their high-use, year-round habitat (p. 114). Yet, the discussion of Alternative B and muskox concludes with, "Therefore, effects of limited development would be moderate." (p. 134) These statements are inconsistent. Would the impact be major or moderate ?

VIII. A final example of confusing and incomplete data follows: the report states that one exploratory well would require as much as 15 million gallons of water (p. 76). The report also states,

Specific locations and sources of water and gravel for exploration and development activities have not been identified; and it is understood that these resources, especially water, are not readily available on the 1002 area. (p. 75).

The report refers to this absence of the necessary water and gravel as an "engineering problem" (p. 76) but does not address that it is poses tremendous economic and environmental problems also. The report suggests possible scenarios which might locate "a suitable water source" but it does not settle on one solution over the others.

This omission calls into question all projections of economically recoverable oil since apparently the cost of "the major engineering problem" (p. 76) is not computed into the formula. Further, it calls into question all assessments of imapcts on wildlife and habitat since the report does not discuss answers about where the 15 million gallons of water per well will come from.

These are but a few examples, some critically important and some less so, of contradictory statements within the report and of the confused presentation of data and evidence. They suggest that the report was prepared with haste that jeopardizes its validity or that conclusions were drawn on the basis of something other than the research provided. Nowhere is this more graphically illustrated than by the following statements, when compared with the whole conclusion drawn by the report:

"If most of the Ellesmerian rocks are missing from most of the 1002 area, the assessment number would be greatly reduced. Drilling one or two wells in critical areas would resolve this question." (p. 54)

"Only actual exploration can provide the information needed to determine the extent and distribution of the resources, and, therefore, the potential benefit to the economy." (p. 166)

In the face of such clear recommendations in the text, the numerous admissions of inadequate evidence and uncertain projections, much confused data, and the option of a Management Alternative (Alternative C) which would respond explicitly to all three, the Interior Secretary's Recommendation is drafted instead in support of Alternative A, the full leasing to private development interests ofthe whole 1002 area. Why?

The report says clearly,

"The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America." (p. 45)

and: "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge." (p.46)

Despite these outstanding natural values and the acknowledgement of the serious, deleterious effects on them from industrial development, ("Oil and gas development will result in wide-spread, long-term changes in wildlife habitats, wilderness environment, and Native community activites." p.6) the Department of Interior recommends full leasing. The recommendation is supposedly on the basis of the "1002 report" the body of which, in fact, explicity recommends that more information is needed before we really know what oil potential exists.

<u>The Secretary's recommendation is inconsistent with the data presented by the Fish and Wildlife Service and there is no rationale provided for the radically development-oriented recommendation made by the report.</u>

<u>INCOMPLETE COVERAGE</u>

In addition to the biased overtones and in addition to confused and contradictory presentation of evidence, there is a third major area of concern about the "1002 report." This is the vacuum within which it seems to have been written and the lack of information provided to Congress regarding numerous relevant contexts. For example, the report :

1. leaves out discussion of the fact that pro-development and pro-conservation interests have negotiated extensively on Alaska's north slope acres already with the result that almost 90 per cent of the slope is open to oil and gas leasing. The expansion of the Arctic Refuge in 1980 (ANILCA) was a compromise position which reserved only 2 million acres of the North Slope for conservation. The "1002 report" should make this context clear and perhaps would have, had it not skimmed so rapidly over the legislative history of the area and the background of Congressional intent.

2. leaves out discussion of impacts on fish and wildlife habitat from oil and gas development within the 1002 area, <u>given that the rest of the coastal plain is already available for development.</u> I.e., the report suggests that the population decline and change in distribution of the Porcupine Caribou Herd could be as great as 20-40%, but this assumes there is remaining, similar, adjacent habitat for the animals to relocate to. Similarly, the report suggests that the muskox population could be displaced from 71% of their high-use, year-round habitat, and the assumption is that they would go somewhere else. Since the Arctic Refuge is the sole remaining land area on the north slope protected from oil and gas development, the report should have analysed impacts on wildlife <u>given that the rest of the plain may also be developed.</u>

3. leaves out discussion of the additional 24 million acres of nearshore (state) and offshore (federal OCS) lands available in the adjacent Beaufort Sea for oil and gas leasing. The current activity in this area, from the amounts of oil and gas available and amounts produced to impacts on north slope and offshore wildlife and habitat is pertinent to decisions regarding the 1002 area.

4. leaves out discussion of the oil resources available within the National Petroleum Reserve-Alaska , the 37,000 square mile reserve established by the Federal Government in 1923 due to its high oil potential. This national resource was specifically set aside to be

explored and developed in time of national need, but despite charts in the 1002 report which graph the alledged scarcity of reserves, this area (in as close proximity on the west to the Prudhoe Bay field as the Arctic Refuge is on the east) is omitted.

5. despite the many claims regarding our national need for petroleum resources, the report leaves out discussion of the 1986 National Appliance Energy Act. This legislation would have provided a no-risk, certain savings of millions of barrels of oil (not to mention billions of dollars on utility bills) which would have made development of the Arctic Refuge unnecessary. Passed overwhelmingly by both houses of Congress, President Reagan vetoed this bill. He has also opposed the establishment of fuel efficiency standards for automobiles and the continuance of the 55 mile/hour speed limit. Claims by the Department of Interior that the nation needs new oil loose their teeth when the Administration acts as if the nation doesn't. This and other similar energy-saving plans should have been discussed in Chapter VII: National Need for Domestic Sources.

6. leaves out discussion of the politically sensitive and highly secretive proposed land swaps between the federal goverment and Native corporations, whereby lands within the 1002 are to be traded into private ownership. Clearly, private inholdings in the area affect management plans, and these very controversial swaps are germane to the 1002 report. The swaps themselves undermine directives to DOI in ANILCA, and the lack of discussion regarding them in the 1002 report undermines the integrity of the report.

7. leaves out discussion of Chevron's test well drilled within the coastal plain (on private land) which produced significant information about the potential for oil and gas in the area. These proprietary data are available to only a few . Even the existence of these data, however, was omitted from the report.

8. leaves out discussion of research on environmental impacts of the Prudhoe Bay development on air and water quality, which would be extremely important information for any similar industrial development in similar country. Additional research and impact studies on wildlife populations, many of which were conducted within the boundaries of the 1002 area and done by FWS staff, were not reviewed in preparation of the report. A partial listing of pertinent studies on arctic oil development impacts is attached to this letter as Appendix A.

9. leaves out discussion of wilderness, for all practical purposes. The report includes five short paragraphs about potential wilderness status for the 1002 area, but neglects to mention the two formal wilderness studies that have been conducted for the 1002 area, including the USFWS (1973) study for the entire wildlife range and a second study (Thayer, 1982) conducted on the 1002 area specifically. Both studies found the 1002 area especially suitable for wilderness status, but none of this information is reflected in the five paragraphs of the present 1002 report which address wilderness.

   The omission of a thorough wilderness review, which was mandated by ANILCA Section 1317 for all nonwilderness lands in the national parks and national wildlife refuges, is egregious. Furthermore, wilderness review for the 1002 area is specifically required by ANILCA Section 1004 as well. Wilderness status for the 1002 area is not being addressed in the Arctic Refuge Comprehensive Conservation Planning process because that process explicitly excludes the 1002 area. But the 1002 planning process has also shunned the wilderness review required by law. .

<u>RECOMMENDATION TO THE DEPARTMENT OF INTERIOR</u>

Although, as indicated above, a reasonable conclusion from the text of the 1002 report as it is now written would be Alternative C, the report has serious omissions and biased emphases. Significantly, it failed to adequately address the Public Land Order which created the Arctic National Wildlife Range in 1960 and the purpose of that land stated there: "to preserve...unique wildlife, wilderness and recreational values." In 1980 when the passage of ANILCA changed the Arctic Range to the Arctic Refuge, the following explicit and primary purposes were added to the management directive:

1.to conserve fish and wildlife populations and habitats in their natural diversity;

2.to help the United States fulfill its international treaty obligations;

3.to provide opportunities for continued subsistence uses by local residents; and

4. to ensure the water quantity and quality of the natural area.

There is no interpretation of the 1002 report which does not admit to the fact that oil and gas exploration and development in the 1002 area will seriously affect the wildlife and wilderness values listed within the original legislation which created the Arctic Refuge. While there may be debate on whether portions of the wildlife can be maintained during oil development, it is incontrovertable that , as wilderness, the area will be destroyed. The coastal plain is flat. The air there is pristine, and crystal clear. Even small sounds carry easily and almost eerily over the undisturbed flatlands, and the presence, even ten miles in the distance, of oil wells, burning industrial wastes, and aircraft, would be a travesty.

Hence, Arctic Audubon joins with the National Audubon Society and the environmental community across the nation in recommending to Congress Alternative E for management of the 1002 area. Only true wilderness status is grand enough for this remaining area of untouched Arctic coastal plain. And only this choice is wise enough to protect this land in the name of current and future national interest.

Your consideration of our comments and recommendations is greatly appreciated.

Sincerely,

April E. Crosby, Conservation Committee Co-Chair
Arctic Audubon Society

Attachment

cc: Honorable Steve Cowper, Governor
Senator Frank Murkowski
Senator Ted Stevens
Representative Don Young
Representative Bennett Johnston

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Comments re.: Department of Interior
November 1986 Draft Arctic N.W.R.
Coastal Plain Resource Assessment

From: Martha K. Raynolds
1099 Farmers Loop
Fairbanks, AK 99709

I appreciate the opportunity to comment on the Draft ANWR Coastal Plain Resource Assessment, and sincerely hope that the deficiencies pointed out in my comments and others' will be addressed in the final document. I thought most of the report was well prepared, but found several problems with Chapter VI Environmental Consequences, and found the Executive Summary to be a very poor representation of the contents of the report. I also disagree with the Interior Department's conclusion that Alternative A, full leasing of the coastal plain, should be the recommended alternative.

1. Water and Gravel Resources
The problems caused by lack of water and gravel resources on the coastal plain are not adequately addressed. Although their scarcity is mentioned, the alternative measures which would be required to extract the gravel and water required for development are not fully described. Consequently, the impacts which would be caused by gravel and water extraction are not covered in Chapter VI.

2. Central Arctic Caribou Herd
The impacts of development on the Central Arctic Caribou Herd (CAH) are not adequately described. The discussion in Chapter VI does not include the impacts due to the pipeline and road which would be required to join the 1002 area to the Trans-Alaska Pipeline (TAPS). This east-west connecting corridor would be a prerequisite for development of the 1002 area. It would have a very significant impact on the CAH, by cutting across its summer habitat, used for calving and insect relief. The impacts of this pipeline and parallel road must be included in the discussion of the impacts of development of the 1002 area. The impacts to the Porcupine Caribou Herd are thoroughly addressed.

3. Petroleum Resource Potential
Chapter III states that there is a 19% chance of there being an economic size accumulation of oil and gas on the coastal plain. The Executive Summary does not even mention the 81% probability that NO economic oil or gas exists in the coastal plain. It only discusses the probable size of such an accumulation, should it occur. This is very misleading. The full probabilities of finding oil and gas should be presented very clearly in the summary.

4. Discussion of Impacts in Executive Summary
The Executive Summary glosses over the impacts of development as described in Chapter VI. The statement, "Most adverse effects would be minimized or eliminated through carefully applied mitigation....exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources. Hence it is reasonable to assume that development can proceed on the coastal plain and generate similar minimal effects.", is EXTREMELY misleading. First, the impacts to caribou, muskox, and snow geese, as described in Chapter VI are MAJOR impacts that cannot be mitigated. Secondly, development at Prudhoe Bay has had some very significant impacts on wildlife in the area. And thirdly, the Prudhoe Bay area is not directly comparable to the 1002 area. The ANWR coastal plain provides much more critical habitat for caribou, muskox and snow geese than Prudhoe Bay ever did. Most of the impacts of the recommended Alternative A are very clearly stated in Chapter VI, and should be included in the Executive Summary.

5. Recommended Alternative
Personally, I would recommend Alternative E. If and when oil and gas resources become so scarce and precious (as they are clearly NOT right now) that we should risk the wildlife and wilderness resources of the ANWR coastal plain, an act of Congress could allow drilling. Until such time, the coastal plain should be protected. If development interests are so strong that drilling cannot be prevented, why is Alternative C not adequate? The report states that even under Alternative A, considerable further exploration would have to be carried out before any companies would be interested in leasing. If preliminary exploration needs to be done, why not allow that and THEN review the data and assess the tradeoffs with more complete information to decide whether to open the 1002 area to leasing?

Signed _____
Martha K. Raynolds
Biologist

Date _____

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TESTIMONY

ON BEHALF OF THE

CONCERNING THE DRAFT
ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

FOR A PUBLIC HEARING

IN ANCHORAGE, ALASKA

JANUARY 5, 1987

Arctic Audubon Society
P.O. Box 82098
Fairbanks, Alaska 99708

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I am presenting this statement on the draft report to Congress required by Section 1002 of the Alaska National Interest Lands Conservation Act on behalf of the Arctic Audubon Society. The Arctic Audubon Society is the most northerly chapter of the National Audubon Society. The chapter is composed of 320 members, mostly from the Fairbanks area. The chapter plans to submit more extensive written comments at a later date.

People of Fairbanks have historically been extremely interested in the Arctic National Wildlife Refuge from its beginning. Arctic Audubon Society members as well as other segments of the Fairbanks community were instrumental in originally establishing the refuge in 1960 as the Arctic National Wildlife Range to preserve its unique wilderness, wildlife, and recreational values.

Last year the Arctic Audubon Society adopted the Arctic Refuge under the National Audubon Society's Adopt-a-Refuge Program. The chapter has become actively involved with refuge management issues and intends to work closely with Arctic refuge staff in Fairbanks. Fairbanks is the closest major population center to the refuge and the second largest city in the state. For these reasons we feel that it is particularly irresponsible of the Interior Department to not hold a public hearing in Fairbanks on this important matter so crucial to the future of the Arctic Refuge and Alaska.

Another community where a public hearing should rightfully be held is Arctic Village. The draft report to Congress states that one of the major environmental impacts of full oil and gas leasing would likely be a population decline of the Porcupine Caribou Herd. The report also states that the people of Arctic Village and the village of Old Crow in Canada depend largely on this caribou herd for subsistence. By not holding a hearing in Arctic Village the Interior Department is effectively depriving residents of their most meaningful way of providing input to the report.

We have reviewed the draft report to Congress and find one of its major deficiencies to be that the conclusions and recommendations drawn are not supported by the report itself. The report states that there is only a 19 percent chance of finding an economically recoverable oil prospect on the coastal plain. The report further states that if recoverable oil is found, there is a 95 percent chance that it would produce no more than 600 million barrels of oil. For comparison, the Prudhoe Bay field is estimated to have originally contained about 9 billion barrels of recoverable oil, or 15 times as much oil.

According to the report, the chances of the Arctic Refuge producing a Prudhoe Bay equivalent oil reserve is only five percent. These figures and other information given in the report about the geology, in our opinion, do not support the report's conclusion that the area is "the most outstanding oil and gas frontier area in North America." If the report is right, then it leads also to the conclusion that instead of drilling for more oil in our few remaining large pristine wilderness areas, we need to instead search for alternative energy sources that will not run out nor require sacrificing the natural character of our last wilderness habitats.

The report also goes on to predict that if full leasing is implemented major negative impacts would likely occur on the Porcupine Caribou Herd, muskox, and snow geese. Less serious, but nonetheless detrimental, effects would occur to the Central Arctic caribou herd, wolf, brown bear, polar bear, and golden eagle. The report predicts that full leasing would also have a major adverse impact on subsistence in the region.

One of the most important major effects would be the loss of the last area on the North Slope of Alaska that we still have an opportunity to set aside as wilderness. The two million acre coastal plain represents a small fraction of the North Slope. The 23 million acre National Petroleum Reserve and millions of acres of state land in the Prudhoe Bay region have already been committed to oil and gas exploration and development. Additionally some 24 million acres of near and offshore lands are available for oil and gas leasing in the adjacent Beaufort Sea. The Arctic Refuge coastal plain is the only region on the North Slope that is not opened to oil and gas development. Must we grant access to the entire North Slope for the oil industry? Is

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this a fair balance in the eyes of the American people? We absoultely cannot afford to compromise the last virgin tract of Arctic coastal plain.

The 1002 area is the last stand for wilderness on the North Slope. Because of its remoteness and isolation from the rest of industrialized America it stands as a symbol of this country's pristine natural areas and the concept of true wilderness. If it is lost to development it will be a major statement by our society that we really aren't concerned about preserving undisturbed regions on the earth for future generations. It will mean that we are driven by our gluttony for cheap energy and the corporate dollar. It will mean that no place on earth is really sacrosanct from human development no matter how high our ideals.

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We believe that the Interior Department is not complying with ANILCA Sections 1004 and 1317 which both call for a wilderness review of the Arctic Refuge coastal plain. The report to Congress certainly does not, in our opinion, satisfy this requirement. Since the coastal plain is being left out of the refuge comprehensive conservation planning process, it will not receive the wilderness review that has been a normal part of that procedure for other refuges. We believe that it is wrong and premature for the Secretary to be making a recommendation for full leasing to Congress before complying with these wilderness review provisions of ANILCA, and we draw this to the attention of Congress.

Finally, we would like to bring one other aspect concerning the coastal plain to the attention of the Secretary and Congress. In recent months the Department of Interior has conducted land exchange negotiations involving the 1002 area. We believe it is premature for the Secretary to consider trading away the 1002 area prior to Congress reviewing the coastal plain resource assessment. We believe that the department is circumventing the intent of Section 1002 of ANILCA by taking such negotiation action, and funding such action with taxpayer dollars. We recommend that the department cease all land exchange negotiation work involving the coastal plain.

In closing, our view is that the coastal plain entirely meets the standards for classification and protection as wilderness, with the exception of two DEW line sites. The area area deserves full wilderness protection perhaps more than any other area in the United States today. We believe that once the Interior Department conducts a meaningful wilderness review it will discover this as well. We are unconvinced by the report to Congress that leasing the area for oil and gas is wise and in the national interest considering the balance between the area's wilderness and wildlife values and its potential oil and gas resources as stated in the report.

We urge the Secretary to conduct a thorough wilderness review as required under section 1317 and 1004 of ANILCA, and ultimately recommend that the coastal plain be designated as wilderness. Wilderness status will protect the coastal plain

from industrial development and provide an Arctic region which will remain undisturbed for future generations of mankind and wildlife. We hope the Secretary will have the foresight, insight and courage to take such action.

REMARKS OF JACOB ADAMS ON
THE DEPARTMENT OF THE INTERIOR DRAFT REPORT
CONCERNING THE ARCTIC NATIONAL WILDLIFE REFUGE,
ALASKA, COASTAL PLAIN RESOURCE ASSESSMENT

KAKTOVIK PUBLIC MEETING
January 6, 1987

My name is Jacob Adams. I am an Inupiat Eskimo from Barrow, Alaska and President of the Arctic Slope Regional Corporation.

I am pleased to have the opportunity to comment this evening on the Secretary of the Interior's draft report concerning resource assessments and recommendations for the Arctic National Wildlife Refuge Coastal Plain.

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The North Slope of Alaska has been and continues to be our people's home. We use these lands to maintain our culture and traditional lifestyle, for a variety of subsistence uses and for other purposes. As users and residents of the North Slope's lands, we have for centuries faced the issues of using the land's resources while respecting and conserving that same land and its living resources. Our use of the land and its resources is a dynamic and changing process; it is not static preservation, but rather is something that must be lived and experienced.

More recently, the Inupiat Eskimo of my generation have had to balance the benefits of change and tradition in our culture.

We have learned to speak English while trying to preserve our Inupiat language. We have benefited from technology, but remain subsistence hunters. We have a cash economy, but we still highly value and rely on the Inupiat Eskimo tradition of sharing. We have

sought to combine the best elements of a cash and subsistence lifestyle in a manner that gives us, the Inupiat residents of the Arctic, the opportunity to participate in the chance location of mineral resources while ensuring the continued vitality of our living resources.

My people and the shareholders of ASRC have major cultural, subsistence and economic interests in the decisions that will be made based on the Coastal Plain Resource Assessment Report. As the Report rightfully points out, the Inupiat Eskimo Village at Kaktovik has survived as a community because of "strong family cultural ties, ties to the land, and economic opportunity for both jobs and subsistence."

Our people have traditionally used and continue to use today the ANWR and the Coastal Plain for subsistence, cultural and other traditional purposes. We are also beneficiaries of increased economic activity in the North Slope that has resulted from oil and gas development.

Today, ASRC and Kaktovik Inupiat Corporation are the owners of 92,000 acres of highly prospective private land located within ANWR and adjacent to and within the Coastal Plain area.

Our interests in the Coastal Plain area, as its residents and stewards, and as shareholders of ASRC, are unique and balanced. As President of ASRC, I think it essential that our views on the future of the Coastal Plain be given careful consideration so that my people's interests will be protected by Congress' decisions concerning uses of the Coastal Plain.

I would like to say, generally, that we support the Report's proposed Alternative A and agree with the recommendation by the Secretary of the Interior to fully lease the Coastal Plain to develop oil and gas resources, provided that appropriate measures are taken to protect continuation of and access to wildlife resources and ensure coordinated and efficient oil and gas

activities. We think that the Secretary's recommendation is consistent with our people's desire for a balanced approach to the use and conservation of all of the land's resources. We do not feel that any of the other alternatives would accomplish our objectives; in particular, I would note that we find the wilderness designation alternative most objectionable to meaningful use of the area by our shareholders.

Simply stated, we favor development of the Coastal Plain in a manner that is compatible with our long-term interests in protecting the environment, the fish and wildlife and human values of the residents of the North Slope.

As residents and stewards of the North Slope lands, my people have watched oil development over the past 20 years at Prudhoe Bay and Kuparuk.

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Because of our interests in the effect of this development on the environment and wildlife that is central to our way of living, we have followed these developments with some skepticism. Nevertheless, we have been very impressed with the energy industry's gains in planning, in technology and in operating projects in the Arctic environment - particularly those on shore.

We have read with interest the Report's conclusions concerning the projected effect of development on the wildlife that is important to our people's subsistence. The report notes that the full leasing program of the proposed Alternative A would have minor effects on fish, waterfowl and bowhead whales--species that are important to our subsistence needs and traditions.

The Report also notes that the impact of a full leasing program could be greatest on the caribou, a resource which is important to our people, especially those here at Kaktovik.

We question the Report's conclusion that oil and gas development would result in a major population decline of the Porcupine Caribou herd. We believe that this conclusion is erroneous for two reasons.

First, we do not believe that development necessarily will result in increased harvests. Though Kaktovik residents will continue to hunt caribou to meet their subsistence needs, non-subsistence hunting should be severly limited to prevent significant reductions of the herd.

Second, we do not think that development activities, of themselves, will threaten the caribou. Even the Report acknowledges that there is insufficient experience to support the conclusion that development will necessarily result in a significant decline in the number of Porcupine Caribou. In fact, all the relevant experience to date indicates that caribou and the oil industry can and do successfully coexist.

The coexistence of caribou and development is a concern we have faced before when the Prudhoe Bay oil field was developed in the mid-1970s. Many of the same questions that were asked then about the effect of development on the Central Arctic Caribou Herd are being asked now about the Porcupine Caribou Herd.

Will they be diverted by traffic, roads or pipelines? Will their calving habits be changed?

Scientific studies and our own experience show that the Arctic Caribou Herd has not been weakened or reduced by development at Prudhoe Bay, Kuparuk and Milne Point. Oil industry operations within those general regions do not appear to have affected the calving success of the caribou.

In fact, the Central Arctic Herd has increased at a rate of 12-18 percent per year during the past decade.

We are convinced that experience gained by the exploration and development of energy sources within the last 20 years will lead to the development of new energy production facilities that can be operated very compatibly with the caribou and other living resources of the Coastal Plain. We know that it will require careful regulation and will increase project costs, but we believe a productive balance can be achieved.

Our own local governments and companies have brought their experience and knowledge to bear on the energy development process, resulting in sensitive and effective decisions. The lands we own within ANWR were cooperatively placed under a regulatory scheme and set of stipulations that has demonstrated the compatibility of living resources and energy development.

As a people reliant on our land and its resources, we are sensitive to the long-term significance that development of the ANWR Coastal Plain may represent. We think that sound environmental studies and mitigation measures have been and will be successful in limiting the adverse effects of development. We are also confident that the existing and improving technologies can ensure the integrity of the environment during oil and gas operations.

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We agree with the Report's recommendation that leasing in the "core calving" areas of the caribou in the southeastern corner of the Coastal Plain be done in the final phase of exploration and development. This phased leasing would allow for ongoing evaluation of development impacts so that appropriate mitigation measures could be developed for the more sensitive environmental areas. This will also ensure adequate opportunity to monitor and ensure continued viability of the Procupine Caribou Herd and access to the caribou for subsistence use by residents of Kaktovik.

In addition to being residents of affected lands and the lands that are adjacent to the Coastal Plain, we wish, as Americans, to express our concern about these significant land use decisions that will be made soon.

No one disputes that the Coastal Plain of ANWR represents the best on-shore prospects for oil and gas in the United States today. Widely accepted studies show that current North Slope oil production will decline significantly in the next 15 years.

Without the development of new and best prospects such as that which is apparant in the ANWR Coastal Plain, our country places itself in a more perilous position as a hostage to foreign supplies of oil.

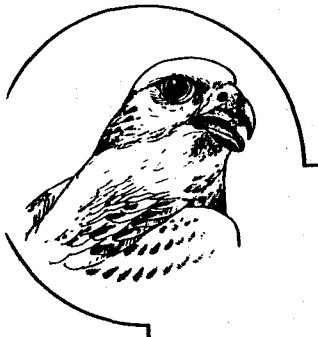
Exploration and development of Arctic Oil and gas usually takes more than ten years from the initial discovery to first production. To anticipate this country's future needs and to reduce the dependence on foreign sources of oil, we as Americans, believe it important that decisions be made today to explore and develop the oil resources of the ANWR Coastal Plain.

We do not believe that the issue of development in the ANWR Coastal Plain requires an "either/or" decision with respect to conservation of important fish and wildlife resources. Though diverse goals are presented by petroleum development and conservation of these resources, the record of prior petroleum development on the North Slope supports our belief that these goals are not mutually exclusive.

These goals can be successfully reconciled to ensure the continued availability of our subsistence resources, meet the need for this country's additional, dependable energy supplies and preserve the wilderness of nearby lands.

We support the recommendation of the Secretary of Interior in the draft Coastal Plain resource assessment. We are confident that a balanced program of development and conservation can be implemented. We look forward to continued participation in the implementation process.

Thank you.



ANCHORAGE
Audubon Society, Inc.
A CHAPTER OF THE NATIONAL AUDUBON SOCIETY

January 23, 1987

Office Box 101161
Anchorage, Alaska
99510

U.S. Fish and Wildlife Service
Attention: Division of Refuge Management
2343 Main Interior Building
18th & C Street, N.W.
Washington, D.C. 20240

Re: Comments of Anchorage Audubon Society on the Draft Arctic National Wildlife Refuge Coastal Plain Assessment

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Dear Sir or Madam:

The Board of Directors of Anchorage Audubon Society on behalf of its 1400 members urge that leasing or land exchanges on the coastal plain of the ANWR be deferred at this time. Based on the information in the 1002 report we believe that it is not in the long-term conservation, economic or national security interests of the US to open the coastal plain to leasing now. We recommend that additional information be gathered to better assess the hydrocarbon potential of the coastal plain, the wildlife and ecosystem values before making a leasing decision. Further, a national energy policy must be established which provides real alternatives to the exploitation of our remaining wilderness lands.

The Anchorage Audubon Board agrees with the finding of National Audubon Society's Alaska Regional office that the Department has left us no reasonable alternative but to oppose its recommendations because of the serious shortcomings in its resource assessment process for the coastal plain of the ANWR outlined in the Testimony on the 1002 Report given by David R. Cline on January 5, 1987. We find the report deficient in essential information, particularly on oil and gas potential, the national need for developing this oil and compromises already made to Arctic wilderness values.

ANWR was established to preserve for all time the spectacular wilderness ecosystem of northeastern Alaska. Major compromises have already been made on Alaska's North Slope between development and conservation interests. These compromises have resulted in current land jurisdictions that essentially make almost 90 percent of the Slope potentially available for oil and gas leasing. Additionally, 24 million acres of nearshore (state) and offshore (federal OCS) lands are also available for leasing in the Beaufort Sea. These policies lead us to question if any public wilderness lands along the Arctic coast of Alaska will be considered sacrosanct.

Despite the outstanding natural values pointed out in the draft assessment report and the fact that the chance for discovery of an economically recoverable oil field is only 19 percent, the Department of Interior is recommending that the entire coastal plain be made available for leasing to the oil industry. Meanwhile, officials of the Department are conducting negotiations in secret to trade away refuge lands on the coastal plain to private interests. This action subverts the entire assessment report process, preempts Congresional options, and could lead to privatization of the refuge. Apparently, little was learned by the Department of Interior from their St. Matthew Island experience where a federal judge ruled that Interior officials made serious errors in judgement in their attempt to trade away wilderness lands to oil interests, and that the land trade was not in the public interest.

It is difficult to accept the premise that oil resources of the Arctic Refuge are critical to fulfilling growing national energy needs, when there is no national energy plan in place and since President Reagan recently vetoed the National Appliance Energy Act of 1986. This act, supported by both houses of Congress, would have saved the nation both millions of barrels of oil and billions of dollars on utility bills by the year 2000, thus making exploitation of the Refuge totally unnecessary.

The Audubon Energy Plan which National Audubon Society has developed with input from energy experts, industry, government and the academic community provides a practical, step-by-step alternative to the Administration's energy policy of opening up the remaining wilderness lands in the United States for leasing. The plan shows that proper planning and policy development at the federal level will enable the U.S. to produce more goods and services while actually improving the environment.

We urge the Administration to take reasonable administrative and legislative action to promote cost-effective conservation. The adoption of a well thought out National Energy Plan will preclude the leasing of our last remaining pristine areas.

The Administration practice of offering tens of millions of acres of public lands each year at a time when oil prices are at their lowest level raises serious question about whether the entire federal leasing program amounts to a giveaway to the oil industry. This flood of lease offerings is helping drive down the price of leases and bringing an unfair return to the taxpayers for use of non-renewable public resource.

Less than 6 percent of oil resources in Alaska are estimated to lie beneath designated or potential wilderness lands. In the lower 48, only 4% of the wilderness heritage remains. Unless the nation maintains the sanctity of designated and potential wilderness areas, even that small percentage will disappear. The Audubon Energy Plan demonstrates that there are practical alternatives to exploiting the last of our wilderness areas. The U.S. can leave wilderness alone and still solve its oil import problem. The total amount of oil and gas under wilderness lands is too small to justify the abandonment of the nation's remaining wilderness heritage.

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The Anchorage Audubon Society is not an anti-development group. We expect that more than 95 percent of oil and gas resources on federal lands will eventually be tapped. Howeve, we believe that leasing on the coastal plain should be deferred until there is more information about the oil and gas potential and the impacts on wildlife and ecosystems.

Your consideration of our comments and recommendations is greatly appreciated.

Sincerely,

Sandra Cosentino
President

cc: David R. Cline, Regional Vice President, National Audubon Society
Alaska Congressional Delegation, Washington, D.C.

DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print

Name DAVID R. CLINE

Mailing Address [redacted] 308 G ST. PH 219

ANCHORAGE, AK. 99501

Check appropriate box below:

☐ I am here to offer my own views.

--or--

☒ I am speaking for NATIONAL AUDUBON SOCIETY
(please enter name of organization you represent)

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National Audubon Society

ALASKA REGIONAL OFFICE
308 G STREET, SUITE 217, ANCHORAGE, ALASKA 99501 (907) 276-7034

TESTIMONY

ON BEHALF OF THE

NATIONAL AUDUBON SOCIETY

AT A PUBLIC HEARING ON THE

DRAFT

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

BY

DAVID R. CLINE
REGIONAL VICE PRESIDENT FOR ALASKA
NATIONAL AUDUBON SOCIETY

Anchorage, Alaska
January 5, 1987

My name is Dave Cline, and I am the Alaska Regional Vice President for the National Audubon Society. I am testifying today on behalf of the Society including its 2,600 members in Alaska.

After carefully examining the "Resource Assessment Report" for the coastal plain of the Arctic National Wildlife Refuge, we are convinced it is not in the long-term conservation, economic or national security interests of the United States to open the coastal plain to leasing at this time. We urge, therefore, that no leasing or land exchanges be permitted by Congress, and that the U.S. Fish and Wildlife Service be directed to protect and manage the entire Arctic National Wildlife Refuge consistent with the conservation purposes for which it was originally established by Congress.

We wish to commend the many dedicated resource professionals in the U.S. Fish and Wildlife Service, U.S. Geological Survey and Bureau of Land Management who gathered information for the assessment report, often at great personal risk and sacrifice. Because of their many contributions, the outstanding wildlife and wilderness values of the coastal plain have been reconfirmed and understood better than ever before.

As one of the oldest and largest conservation organizations in the United States, the National Audubon Society has a long history of involvement in the Arctic National Wildlife Refuge. We recognize it as a very special national treasure. Dedicated friends in conservation, including Olaus and Margaret Murie, worked long and hard for its establishment in 1960 to preserve a portion of the eastern Brooks Range of arctic Alaska for its outstanding wilderness values. Thus, unlike many other refuges in the system, the Arctic Refuge was established not out of a singular need to conserve wildlife, but to preserve for all time the spectacular wilderness ecosystem of

northeastern Alaska as a whole. Audubon strongly supported this far-sighted action, and so too enlargement of the refuge in the Alaska National Interest Lands Act of 1980 (ANILCA). Over the years we have worked with other conservationists to protect the refuge from a series of threats from development interests.

In this debate over the future of the Arctic Refuge and its coastal plain, it is vitally important to realize that major compromises have already been made on Alaska's North Slope between development and conservation interests. These compromises have resulted in current land jurisdictions that essentially make almost 90 percent of the slope potentially available for oil and gas leasing. This is not to mention the additional 24 million acres of nearshore (state) and offshore (federal OCS) lands available in the adjacent Beaufort Sea. A mere 2 million acres of of the entire North Slope has been committed to conservation purposes in the Arctic Refuge. Now most of that is under siege by development interests. The questions must be asked: Where will the compromising stop? Aren't there any public wilderness lands along the Arctic coast of Alaska that should be considered sacrosanct?

It is also important to note that this 18 million-acre refuge is the second largest unit in the National Wildlife Refuge System, and the largest and most spectacular arctic wilderness sanctuary for wildlife in the world. Wildlife species of particular national and international concern include the 180-thousand-member Porcupine caribou herd (whose calving ground is on the refuge coastal plain), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds, and Arctic char and grayling.

When considered in conjunction with the North Yukon National Park that adjoins it on the east, the Arctic Refuge

constitutes an international commitment to the protection of nature. Major industrial developments on either of these units is clearly incompatible with their purposes.

We agree with the Department of the Interior (on page 45 of the draft assessment report) that:

> "The Arctic Refuge is the only conservation system unit the protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America."

and (on page 46) that:

> "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge. Caribou migrating to and from the 1002 area and the post-calving caribou aggregation offer an unparalleled spectacle."

Despite these outstanding natural values, and the fact that the chance for discovery of an economically recoverable oil field is only 19 percent, the Department of the Interior is recommending that the entire coastal plain be made available for leasing to the oil industry. The Department has left us no reasonable alternative but to oppose its recommendations because of the following serious shortcomings in its resource assessment process for the coastal plain:

1) Failure to point out that the compromise to establish the Arctic Refuge in 1960 to preserve its unique wildlife, wilderness and recreation values resulted in the remainder of Alaska's vast North Slope and adjacent offshore waters being made available for oil exploration.

2) Failure to release for public review and comment geologic information critical to the 1002 assessment process. This gives those who could profit from exploiting refuge resources advantage over those who actually own those resources--the American people.

3) Failure to reveal its proposed land trades with various Alaska Native corporations and the State of Alaska, and to demonstrate how such trades will serve in the public interest.

4) Failure to justify full leasing when prospects for discovery of even one major economically recoverable oil field on the coastal plain is only 19 percent (pages 49 and 68), and with the market value of leases depressed because of the world oversupply of oil.

5) Failure to conduct a comprehensive economic analysis to show how the benefits to the Alaska and national economies can be optimized from leasing, both in the short and long term.

6) Failure to provide evidence that the Department will ensure that air and water quality will be protected from toxic chemicals and other pollutants such as those creating problems in the Prudhoe Bay oilfield.

7) Failure to explain how adequate water and gravel supplies will be obtained after finding that "...specific locations and sources of water and gravel for exploration and development activities have not been identified; it is understood that these resources, especially water, are not readily available on the 1002 area," (page 75.)

8) Failure to explain why it wouldn't be in the strategic

interests of the United States to purchase more foreign oil at current low prices for addition to our nation's "Strategic Petroleum Reserve" rather than lose income to the federal treasury by further flooding a depressed lease market through opening the Arctic Refuge.

9) Failure to evaluate cumulative impacts on the Arctic Refuge from oil and gas lease sales on more than a million acres of adjacent state lands (Camden Bay, Demarcation Point and Prudhoe Bay uplands) and 21.2 million acres of OCS leases (Sale 97) in the Beaufort Sea scheduled for July 1987. The latter sale, just off the refuge coast, is the largest oil and gas lease sale ever held in the Arctic Ocean.

10) Failure to thoroughly discuss alternative energy policies that if implemented could make the nation energy secure without exploiting the Arctic Refuge.

11) Failure to assure that scarce refuge staff and funds will not be diverted from refuge conservation programs to monitor and regulate industrial activities on the coastal plain. (Since the coastal plain resource assessment was initiated in 1982, more than 90 percent of the refuge budget has been devoted to the 1002 assessment process, resulting in the almost total neglect of the overall refuge conservation program.)

12) Failure to recognize that a North Yukon National Park adjoins the Arctic Refuge and that the United States has responsibilities to cooperate with Canada in protecting shared wildlife resources.

13) Failure to address the need for cooperative management of the Porcupine caribou herd with Canada through the international management agreement that has been negotiated over the past several years.

14) Failure to hold public hearings in all Alaskan communities that will be directly affected by the proposed action, and to make an adequate number of copies of the assessment report available in a timely manner.

Unfortunately, a series of citizens' lawsuits proved necessary during the assessment process to assure that the law was followed, and citizen monitoring of government activities was required as well to learn of industry activities taking place on the Arctic refuge. And, despite the magnitude of resources at stake and the seriousness of the consequences of the decision on people both in Alaska and throughout the nation, the Department of the Interior chose not to make this report available for public review and comment. A citizen lawsuit was necessary to make the report available. Then, after being forced to release the report for public review, the Department abbreviated the comment period to 60 days over the Christmas holiday period. This is not the way a democracy like ours should work.

In addition to Audubon's long history of involvement in wildlife conservation, another major priority goal of the Society is to "promote national strategies for energy development and use, stressing conservation and renewable energy resources." In an effort to achieve this goal, we have developed an energy plan with input from energy experts in industry, government and the academic community. This was done in the realization that energy is a major factor in determining the quality of human life. It furthers the production of goods and services, but its production and use can seriously impact the quality of the environment.

The Audubon Energy Plan is a practical, step-by-step alternative to the Administration's energy policy of exploiting the last remaining wilderness lands in the United States. It shows that proper planning and policy development at the federal level will enable the United States to produce more goods and services while actually improving the environment. The environmental pay-off will be cleaner air, purer water, and less pressure to exploit wilderness lands and wildlife habitat such as that in the Arctic Refuge.

True, the Audubon Plan requires the introduction of regulatory measures that correct imperfections in the marketplace, such as efficiency standards for home appliances and fuel economy standards for automobiles. Such reliance in our Plan on modest measures to promote cost-effective conservation stands in contrast to the approach taken by the Administration, which holds that conservation should be left solely to the marketplace, no matter how far economists tell us individual markets are operating from the cost minimum, no matter how much energy is being wasted as a result. When this blindspot toward energy conservation is combined with the Administration's skepticism towards environmental protection, it is perhaps not surprising that the Administration makes drilling in wilderness areas one of the pillars of its energy policy. Fortunately, the recent bipartisan show of support in Congress for appliance efficiency standards indicates that the Administration is out of touch with the country when it comes to tolerance of modest conservation regulations. We are confident that a Presidential veto of the appliance bill in the upcoming session will be overridden by Congress. We are also confident that, when the choice is clearly put, Congress will decide to enact additional conservation legislation in order to preserve our national treasures such as the Arctic Refuge (as well as to save consumers money.)

In the meantime, and as long as this Administration refuses to take reasonable administrative and legislative action to promote cost-effective energy conservation, we will have no choice but to oppose attempts to open the Arctic Refuge to oil and gas development. Audubon has worked hard, particularly at the state level, to get appliance efficiency standards enacted. In New York, we initiated the process that led Governor Cuomo to introduce a tough efficiency standards bill last year. Massachusetts Audubon played a similar role in getting a bill introduced (and passed) in Massachusetts. Audubon members are well aware that preservation of wildlife and protection of the human environment requires wise husbanding of our energy resources.

Audubon has been actively involved in efforts to develop a long-range comprehensive management plan for the Arctic Refuge. However, we have not been party to any actions that would preempt a thorough review of the mandated assessment report, waiting to judge it on its merits, waiting to see if there were a few key areas in which drilling could be allowed without risking serious interference with wildlife and the wilderness quality of the land. Instead of a complete and objective report with viable management options, we found the 1002 report biased, contradictory, and lacking essential information. The only possible excuse for this report is that Interior must not really be serious, but is floating a totally unreasonable position in the hopes of maximizing its bargaining power in Congress. If so, the tactic is likely to backfire by completely alienating those organizations willing to keep an open mind on resource exploitation in the Arctic Refuge. Certainly, this has been the effect on the National Audubon Society.

The major undiscovered deposits of oil and gas on federal land holdings are thought to lie off the coast of the lower 48 states and Alaska. Thus, in the next two decades, as known

onshore reserves are depleted, offshore development will become more important. Relatively little offshore land is currently off-limits to energy development. Most of these deposits will eventually be tapped.

The fact that all federal lands have not yet been leased does not mean that development is proceeding too slowly. These leases will be much more valuable ten to twenty years from now. If the government were to lease all these lands at once, it would get an unfair economic return for the taxpayers.

Judged in this context, the Reagan Administration is making a serious mistake in rushing to lease virtually the entire U.S. Outer Continental Shelf (OCS)--almost a billion acres--and onshore prospects as well. The practice of offering tens of millions of acres of public lands each year at a time when oil prices are depressed raises very serious questions about whether the entire federal leasing program is amounting to a giveaway to the oil industry.

By flooding the market with lease offerings, it is clear that the administration is helping to drive the price of leases down, thereby providing the oil industry with an opportunity to lease large acreages at bargain-basement prices. Evidence of this downward pressure on lease prices in overwhelming:

* The average bid per acre under the Reagan Administration's 5-year program has been less than half that under the Carter program ($1,092 per acre versus $2,381 per acre), (Washington Post, November 8, 1983.) Before Interior went to area-wide leasing in 1982, the average price per acre for OCS lease bids in Alaska was $2,794. After area-wide leasing was initiated, OCS lease sales in Alaska netted an average of only $1,229/acre, (OCS Report, MMS 86-0067, September 1986.)

* The General Accounting Office found that the number of bids per tract declined from of 2.44 bids to 1.65 bids under the area-wide program.

* GAO estimated that "the federal government received about $7 billion (or a discounted value of $5.4 billion in 1984 dollars) less than it would have received if the same acreage were under the tract selection program," (GAO Report, RCED-85-66, 1985, p.i.v.)

* Even the industry recognizes the lease price depression caused by area-wide leasing--the Oil and Gas Journal reports that "offshore producers agree that acreage costs on area-wide lease sales are lower than under the previous nominated tract concept because more acreage is offered at one time." (Washington Post, November 8, 1983.)

Aside from the economic arguments against leasing so much so fast when oil prices are depressed, there is a compelling conservation argument. Huge lease offerings involving tens of millions of acres make it impossible to do meaningful environmental impact analyses. Additionally, they make it extremely difficult for states like Alaska to conduct rational development planning.

In Alaska, less than 6 percent of oil resources are estimated to lie beneath designated or potential wilderness lands, including those in the Arctic National Wildlife Refuge. Clearly, Congress and the federal government have made sure that lands with the vast majority of highest potential for oil and gas have been excluded from consideration as potential wilderness.

Relatively little oil and gas is estimated to lie under wilderness lands. When this country was first settled by

Europeans, 100 percent of the land area corresponding to the 48 states was wilderness and teeming with wildlife. The unrestrained pressure of civilization has steadily eroded wilderness areas to a small percentage of the total--4 percent in the lower 48 states. To those who assign value to wilderness, it is incomprehensible that anyone would object to protecting the nation's last remaining fragments. Unless the nation maintains the sanctity of designated and potential wilderness areas, even that small percentage will disappear.

There will always be proposals to use wilderness and critical habitats for other purposes, particularly energy and mineral development. But little wilderness will be left if the engineers are allowed to scour the land for the next thirty years and beyond--building new roads and drill sites, returning for a closer look each time the price of energy or minerals jumps, and returning whenever a new technology allowing recovery of formerly inaccessible resources is developed.

The National Audubon Society believes that a nation like ours with a 200-year history should look at the wilderness preservation issue in a time frame that spans hundreds of years rather than decades. Only with such perspective can the nation pass on to succeeding generations the wilderness resources that are still intact.

The fact is that wilderness such as that on the Arctic Refuge coastal plain serves a variety of valuable, noncommercial uses: wildlife habitat, watershed protection, scientific study, fishing, hunting, camping, hiking, and most other forms of dispersed, low density outdoor recreation. Such wilderness lands offer also the spiritual lift of peaceful, truly natural settings.

Although not every oil industry organization takes the

limited view on wilderness protection espoused by such organizations as the American Petroleum Institute, there is obviously a clash in values between advocates of exploitation and those whose favor preservation--a dispute that must continuously be settled through the political process. The Audubon Energy Plan has been developed with this dispute in mind. The Plan demonstrates that there are practical alternatives to exploiting the last of our wilderness areas. The United States can leave wilderness alone and still solve its oil import problem. The total amount of oil and gas on wilderness is too small to justify the abandonment of the nation's remaining wilderness heritage.

Under the Audubon Energy Plan, the mean risked estimate of 1.6 billion barrels of oil and the 1.6 billion barrel equivalent of natural gas estimated to lie under land already legally designated as wilderness would remain underground forever. The same would be true for the 2.3 billion barrels of oil and the 2.5 billion barrel equivalent of natural gas estimated to lie under wilderness land that has yet to be formally designated as wilderness, (A. Stege and J. Beyea, "Oil and Gas Resources on Special Federal Lands: Wilderness and Wildlife Refuges," Annual Review of Energy, Vol. 11, 1986, pp. 143-161.) Because wilderness land would never be exploited under the Audubon Plan, there would be no need for exploration.

The estimates for oil in wilderness lands given above assume a mean risked estimate of 600 million recoverable barrels of oil for the Arctic Refuge. In contrast, the Draft Coastal Plain Resource Assessment mentions a figure of 3.2 billion barrels, without clearly specifying whether or not the estimate is "risked." (We suspect it is not.) Clarification on this point is needed from Interior. If the 3.2 billion figure is risked, that is, already incorporates the risk of finding no oil (81%), Interior would be claiming that there are 2.5 billion

more barrels of oil likely to be found in wilderness lands than in the estimates we have been using. Nevertheless, even an additional 2.5 billion barrels would not change the fact that a very small percentage of U.S. oil is in potential and designated wilderness lands. The percentage of U.S. oil resources on these lands would rise from 3.5% to 5.8%.

Certainly, any exploration that may eventually be permitted on these areas should be made by nonintrusive methods, such as satellite survey. Nonintrusive methods are currently inadequate for confirming existing Interior estimates, but the situation will no doubt change in the future. Fifty years from now, technologies for identifying natural resources will have surpassed the crude methods available to energy companies today. With such a small percentage of U.S. land remaining as wilderness, it would seem wise for the nation to be patient in confirming Interior's estimates.

As has been indicated, the National Audubon Society is not blindly opposed to resource extraction on federal lands. We expect that more than 95 percent of oil and gas resources on federal lands will eventually be tapped. The Society stands ready to work with oil and gas companies to help them develop environmentally sound methods of exploration and extraction that are suitable for the great percentage of land, both public and private, on which such activities need not be prohibited completely. Audubon will continue to insist, however, that exploitation of resources on public lands be carried out carefully in a manner that protects the environment and wildlife. Audubon will continue to oppose oil and gas exploration in any situation where government agencies or energy companies move hastily, without fully assessing the environmental and economic effects of activities or providing adequate safeguards for their implementation. This appears to be one of those cases.

It is argued by industry that the coastal plain of the Arctic Refuge must be leased now because it will take at least fifteen years to develop any oil fields discovered there. It must be remembered that following discovery of oil at Prudhoe Bay in 1968, oil was flowing through the 800-mile-long Trans Alaska Pipeline (TAPS) by June of 1977, a period of only 9 years. All that would be needed should oil production be permitted on the Arctic Refuge would be a 100 to 150-mile-long pipeline spur (at maximum) to tie into TAPS. Our guess is that industry could bring an oilfield on line in the refuge within 5 years should it someday prove in the national interest to do so.

It is an illusion to believe that leasing on the coastal plain of the Arctic Refuge will solve the economic problems of the North. After all, its whole purpose is to deliver northern oil to homes and industries in the South--or perhaps the Orient. Indeed, rather than solving the North's economic problems, it may accentuate them. For evidence of this, we need look no further than the situation in Alaska today. With the Trans Alaska Pipeline carrying oil at near full capacity, the state is going through one of the most serious economic recessions in its history. The result in many cases is lost dreams and destroyed careers.

The situation on the Arctic Refuge obviously calls for bold and courageous political leadership at both the state and national levels. For politicians to be holding out the promise that yet another great oil bonanza lies beneath the Arctic tundra just waiting to be exploited only postpones the day when all Americans must begin to live within their means by implementing cost-effective conservation measures.

On page 6 of its assessment report, Interior states:

"Oil and gas development will result in widespread,

long-term changes in wildlife habitats, wilderness environment, and Native community activities. Changes could include displacement and reduction in the Porcupine caribou herd."

We agree but do not believe that it is in the best strategic, economic or conservation interests of the United States to recommend making such sacrifices on the finest Arctic wildlife and wilderness sanctuary in the world at a time of a world oversupply of oil and with hundreds of millions of acres of other federal and state lands available for exploration.

It has been said by many that we are now at our Last Frontier in Alaska. This has different meaning to different people. To some it offers opportunity for resource development and the jobs and material benefits delivered. To others, it is wildlife and wildland spectacles which constitute a heritage to be preserved for generations of Americans. The decisions we make on the Arctic Refuge therefore are not simply about oil fields and caribou herds. They are decisions that strike to our very deepest concerns as a nation.

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The National Audubon Society feels the Department of the Interior is making a serious mistake in recommending that the coastal plain of the Arctic Refuge be sacrificed to industrial development. The facts convince us that America can achieve energy security without exploiting the last great arctic coastal wilderness in the United States.

We believe that U.S. Senators Howard Metzenbaum and Paul Tsongas were right when in the 1979 debate on the Alaska Lands Act they stated:

"It appears as if the "forbidden fruit" syndrome is operating with regard to the Arctic National Wildlife

Range. Regardless of how bitter that fruit may be, there are some oil and gas companies which will want to invade this last stretch of north slope arctic land unimpacted by man. What the Congress does with regard to this fragile area will be an indication of how wisely we are going to conserve the nation's natural resources in the future. We can afford to make this Range the "last place to go" in the search for energy and we should. We urge the Senate to study the arguments on both sides of this issue, for we believe strongly that aside from high emotions which have surrounded the debate on this issue, the facts support protection for the Range at this time..." (Report of the Committee on Energy and Natural Resources, United States Senate, No. 96-413, November 14, 1979, page 421.)

The National Audubon Society therefore strongly opposes leasing of the coastal plain for oil and gas development at this time, and recommends that the U.S. Fish and Wildlife Service be directed to manage the entire Arctic Refuge consistent with the conservation purposes for which it was established.

Your consideration of our comments and recommendations is greatly appreciated.

CANADIAN WILDLIFE FEDERATION / LA FÉDÉRATION CANADIENNE DE LA FAUNE

PATRON
Her Excellency the Right Honourable
Jeanne Sauvé, P.C., C.C., C.M.M., C.D.
Governor General of Canada

PATRON
Son Excellence la très honorable
Jeanne Sauvé, C.P., C.C., C.M.M., C.D.
Gouverneur général du Canada

February 5, 1987

U.S. Fish and Wildlife Service,
Attention: Division of Refuge
Management,
2343 Main Interior Building,
18th and C Streets, N.W.,
Washington, D.C.
20240 U.S.A.

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Dear Sir/Madam:

Please find enclosed the submission of the Canadian Wildlife Federation on the issue as to whether or not the 1002 area on the Arctic Refuge Coastal Plain in northeastern Alaska should be opened up for oil and gas activity.

Yours sincerely,

Stephen Hazell,
Counsel.

SH/sb
Encl.

1673 Carling Avenue, Ottawa, Ontario K2A 3Z1 TEL. (613) 725-2191
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SUBMISSION OF THE
CANADIAN WILDLIFE FEDERATION
TO THE U.S. DEPARTMENT OF THE INTERIOR
REGARDING THE
DRAFT ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

Who We Are

The Canadian Wildlife Federation (CWF) is Canada's largest non-governmental conservation organization with over 500,000 members and supporters, as well as affiliates in each of the twelve provinces and territories of Canada. Since the 1960s, CWF has closely monitored northern wildlife and conservation issues with special emphasis on petroleum development. The Federation was instrumental in the establishment of the Task Force on Northern Development, and the establishment of the Canadian Arctic Resources Committee in 1971.

The Canadian Wildlife Federation was involved in proceedings surrounding the proposed Mackenzie Valley Pipeline in the Canadian Northwest Territories, which was to transport oil from the Canadian Arctic along the Mackenzie Valley to Alberta. CWF action included participation in both sets of National Energy Board hearings on the Mackenzie Valley Pipeline, the creation of the Public Interest Coalition and the maintenance of an on-going secretariat to coordinate action during the hearings. The CWF also intervened in a 1971 lawsuit in U.S. courts concerning the construction of the Trans-Alaska Pipeline to represent the interests of Canadian wildlife.

Summary

The Canadian Wildlife Federation wishes to express to the Government of the United States our deep concern about the draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment (the 1002 Report), and our profound disagreement with the draft Recommendation of the Secretary of the Interior (chapter VIII) that the Congress enact legislation making the entire 1002 area of the Arctic Refuge available for oil and gas leasing.

The CWF has three major concerns about the draft Recommendation of the Secretary and the 1002 Report. First, the Recommendation of the Secretary of Interior contradicts to the point of misrepresentation statements about the impacts of petroleum development on wildlife and the environment in preceeding chapters of the 1002 Report.

Second, the 1002 Report neglects that migratory and itinerant wildlife species of Alaska/Yukon such as caribou, polar bear, lesser snow geese, fish and marine mammals are shared by the United States and Canada. Development of the 1002 area will have significant adverse impacts on such transboundary species shared by the two nations, not to mention the traditional use of those species by Canadian aboriginal people.

Third, acceptance and implementation of the draft Recommendation by the Government of the United States would be a clear signal to Canada and Canadians that the United States does not view bilateral efforts to conserve shared natural resources, such as the Porcupine caribou, to be of great importance.

The Canadian Wildlife Federation urges the Government of the United States to protect the 1002 area by establishing it as a wilderness under Alternative E.

Secretary's Recommendation

The CWF is distressed by the contradictions between the draft Recommendation of the Secretary of Interior and other chapters of the 1002 Report. The Recommendation ignores or glosses over statements identifying serious environmental impacts on wildlife and concludes--contrary to the evidence of the 1002 Report--that "the Prudhoe Bay experience leads one to be optimistic about the ability to explore and develop the hydrocarbon potential of the 1002 area without significant deleterious effects on the unit's wildlife resources." These conflicts are discussed in detail in the Government of Canada's position paper on the 1002 Report, but a few of the more striking are summarized here.

The Recommendation states that "Development would proceed with the goal of no net loss of habitat quality" (p. 170), whereas the Report concludes this goal is impossible in that an unavoidable impact of Alternative A would be "Loss of habitat values on approximately 78,000 acres of caribou calving habitat..." (p. 131-32).

The Recommendation states that "most adverse environmental effects would be minimized or eliminated through mitigation..." This is not a fair or reasonable interpretation of the 1002 Report; mitigation measures are not possible or were not proposed for three species that would be most heavily affected by development -- Porcupine caribou, lesser snow geese and polar bear (p. 111).

The Recommendation declares that adverse impacts on the Porcupine caribou herd (PCH) can be mitigated using the lessons learned at Prudhoe Bay, noting that the "Central Arctic caribou herd has increased substantially during the period that development has occurred within the heart of its range (p. 169). This statement is belied by the 1002 Report: "because of the greater density of PCH on their calving grounds, the PCH would interact with oil development much more extensively and intensively than the CAH (Central Arctic herd) has interacted with oil development in the Prudhoe Bay area. Analogies comparing the events of current development on the CAH and effects of potential 1002 area development on the PCH must be drawn with caution" (p. 106).

The factual contradictions between the Recommendation and the remainder of the 1002 Report are so numerous as to lead the CWF to suspect that the serious adverse impacts on wildlife described in the Report were purposefully downplayed in order to enhance the arguments for the full development option, Alternative A.

Shared Resources

An uninformed reader of the Secretary's Recommendation could be forgiven for wondering what possible interest Canada and Canadians have in a domestic U.S. issue about whether or not a potential Alaska oilfield should be explored and developed. For the Recommendation does not make even a passing reference to the fact that the United States and Canada share many of the wildlife resources of the North Slope. Aboriginal Canadians harvest 80% of the annual take of Porcupine caribou; these Canadians will bear the brunt of an American decision to develop the 1002 lands. According to the 1002 Report, the full-scale leasing and development of the 1002 lands will lead to a major Porcupine caribou population decline and change in distribution of 20 to 40%.

Unfortunately, the draft 1002 Report itself ignores or underestimates the impacts of petroleum development on the Canadian aboriginal communities of the Mackenzie river and northern Yukon regions. The wildlife, especially the caribou, are critical to the largely subsistence economy of these aboriginal communities; a significant decrease in abundance of transboundary species could have catastophic economic and social effects, and might result in overexploitation of other species.

The International Porcupine Caribou Agreement

There is growing awareness in Canada, the United States and other nations that sovereign rights to develop and use shared natural resources must be tempered and limited by international measures that ensure the conservation of such resources in perpetuity. Canada and the U.S. were the first nations to agree in the Boundary Waters Treaty of 1911 to limit their exploitation of transboundary water resources for mutual benefit. The Migratory Birds Convention of 1916 and also the Great Lakes Water Quality Agreements of 1972 and 1978 are striking examples of the success that can be achieved by international cooperation in conservation.

The as yet unsigned International Porcupine Caribou Agreement (initialled by chief negotiators of Canada and U.S. on December 3, 1986) is the most recent example of the clear understanding in both nations that bilateral cooperation is the key to conserving the shared natural resources of the two nations. The proposed Agreement recognizes that the Porcupine caribou are a unique and irreplaceable resource that must be conserved for the use of future generations. The proposed Agreement would establish a joint board to advise U.S. and Canadian governments on conservation measures that should be implemented to conserve the caribou.

It need hardly be stated that the proposed Agreement and the draft Recommendation are irreconcilable.

The acception and implementation by the United States of the Secretary of Interior's draft Recommendation would be a clear signal to Canada and Canadians that the United States does not view the proposed Agreement and bilateral efforts to conserve shared natural resources to be of great importance.

The Canadian Wildlife Federation trusts that this is not the case. We urge the United States Government to designate the 1002 area as wilderness.

DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print

Name JAMES ALLEN

Mailing Address 22 NISUTLIN DRIVE

WHITEHORSE, YUKON TERR.

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☑ I am speaking for COUNCIL OF YUKON INDIANS
(please enter name of organization you represent)

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PRESENTATION TO THE
PUBLIC HEARINGS
ON THE ANILCA SECTION 1002 REPORT

Anchorage, Alaska
January 5, 1987

by

[redacted] ALLEN

Vice-Chairman
Economic Development Department

Council for Yukon Indians

(MR/MS CHAIRMAN/PERSON, DEAR PANEL MEMBERS):

IT IS WITH A GREAT DEAL OF ANTICIPATION THAT I HAVE BEEN LOOKING FORWARD TO SPEAK, ON BEHALF OF THE COUNCIL FOR YUKON INDIANS, BEFORE THIS PUBLIC HEARING TODAY.

ALLOW ME, FIRST OF ALL, TO COMMEND THE UNITED STATES INTERIOR DEPARTMENT FOR THE IMPORTANT FORUM IT HAS PROVIDED HERE.

FOR YOUR INFORMATION, THE COUNCIL FOR YUKON INDIANS IS AN UMBRELLA ORGANIZATION REPRESENTING APPROXIMATELY 6,000 YUKON INDIANS, WHO ARE CURRENTLY NEGOTIATING, WITH THE GOVERNMENT OF CANADA, A COMPREHENSIVE LAND CLAIM SETTLEMENT IN THE YUKON.

MY REASON FOR BEING SO ANXIOUS TO MEET THIS PANEL TODAY, IS NOT ONLY BECAUSE MANY OF MY PEOPLE IN THE YUKON SHARE FAMILY TIES WITH MANY OF OUR ABORIGINAL ALASKAN NEIGHBOURS, BUT ALSO BECAUSE WE FREQUENTLY SHARE THE SAME RESOURCES.

BY THIS I MEAN CERTAIN WILDLIFE RESOURCES - WILDLIFE WHICH DOESN'T KNOW OF BOUNDARIES BUT FREELY CROSSES BETWEEN ALASKA AND THE YUKON, SUCH AS THE MIGRATING PORCUPINE CARIBOU HERD, BECAUSE IT REQUIRES A LARGE HABITAT TO SURVIVE.

AMONG THE MUTUAL PROBLEMS OF ABORIGINAL PEOPLE ON BOTH SIDES OF OUR BORDER, I AM CERTAIN, PERHAPS THE MOST COMMON IS THAT IN THE RECENT PAST WE OFTEN HAD TO REFUTE ARGUMENTS FROM OUR GOVERNMENTS AND INDUSTRY THAT WE NO LONGER NEED OR USE OUR TRADITIONAL WILDLIFE RESOURCES AS WE ONCE DID ...

LET ME ASSURE YOU, THIS IS SIMPLY NOT SO. HUNTING, FISHING AND TRAPPING BY NATIVE NORTHERNERS ARE FAR FROM BEING THE HISTORIC RELICS OR CULTURAL LEGACIES SOME CRITICS TRY TO MAKE THEM.

QUITE TO THE CONTRARY, OUR HARVEST OF WILDLIFE RESOURCES IS AN ON-GOING, LEGITIMATE ECONOMIC ACTIVITY. TRANSLATED INTO HARD CASH - (IF WE MUST PUT A PRICE TAG ON IT) - THE WORTH OF THE ANNUAL SUBSISTENCE ECONOMY TO THE YUKON AMOUNTS TO MILLIONS OF DOLLARS. WHILE ITS SOCIAL VALUE CANNOT BE PUT INTO MONETARY TERMS, OUR SUBSISTENCE ECONOMY HAS REMAINED CENTRAL TO THE YUKON INDIAN WAY OF LIFE.

IN PARTICULAR, THE IMPORTANCE OF THE PORCUPINE CARIBOU HERD TO NORTHERNERS HAS BECOME EVIDENT TO ALL THOSE WHO HAPPEN TO LIVE IN COMMUNITIES WHOSE ABORIGINAL RESIDENTS DERIVE THEIR NUTRITION FROM THE SEASONAL HARVEST OF THE HERD.

ONE OF THE KEY ELEMENTS TO THE SUCCESSFUL SETTLEMENT OF THE YUKON INDIAN LAND CLAIM IS MY PEOPLE'S GUARANTEED ACCESS TO WILDLIFE, BOTH IN TERMS OF HARVEST AND MANAGEMENT RIGHTS. THE GOVERNMENTS OF CANADA AND YUKON RECOGNIZE THIS FACT.

TO THE COMMUNITIES IN THE NORTHERN YUKON, BUT FIRST AND FOREMOST TO OLD CROW, THE SURVIVAL OF THE 150,000-STRONG PORCUPINE CARIBOU HERD IS, OF COURSE, JUST AS CRUCIAL.

REGARDING THE PORCUPINE CARIBOU, WE CAN REPORT SIGNIFICANT RESULTS.

THE FIRST MILESTONE (BY OCTOBER 1985) WAS A 'MADE IN CANADA' PORCUPINE CARIBOU HERD AGREEMENT. IT WAS STRUCK BETWEEN THE YUKON AND NORTHWEST TERRITORIES, AND BETWEEN THREE LEVELS OF GOVERNMENT AND THREE NATIVE ORGANIZATIONS.

WITH THE SIGNING OF THIS AGREEMENT, THE ABORIGINAL PEOPLE OF THE TWO CANADIAN TERRITORIES ACHIEVED A MAJOR ROLE IN TERMS OF THE MANAGEMENT OF THE HERD. THIS PROGRESSIVE EVENT, WE KNOW, WILL ENSURE THAT THE HERD WILL SURVIVE FOR MANY GENERATIONS TO COME.

THE SECOND MILESTONE (BY DECEMBER 1986) WAS THE SIGNING OF THE TENTATIVE DRAFT OF A CANADA - UNITED STATES AGREEMENT FOR THE INTERNATIONAL MANAGEMENT OF THE PORCUPINE CARIBOU HERD.

I AM PERSONALLY CONCERNED, HOWEVER, THAT THE LATTER AGREEMENT DOESN'T INCLUDE PROVISIONS PERTAINING TO THE UNITED STATES' PROPOSALS TO OPEN UP THE ALASKAN COASTAL PLAIN FOR OIL AND GAS DEVELOPMENT.

AND THIS BRINGS ME TO THE PURPOSE OF THIS HEARING.

THE PORCUPINE CARIBOU CALVING GROUNDS, AS WE ARE WELL AWARE, FALL INTO THAT FAIRLY NARROW AND ECOLOGICALLY FRAGILE STRIP OF COASTAL PLAIN BETWEEN THE BRITISH MOUNTAINS AND THE BEAUFORT SEA ... WHEREBY THE LARGER PORTION OF THE HERD'S CALVING GROUNDS LIE IN THE ALASKAN ARCTIC WILDLIFE REFUGE.

THE 'UNITED STATES RESOURCE ASSESSMENT' IN FRONT OF ME, LADIES AND GENTLEMEN, PROPOSES FULL LEASING ... OR, WITH OTHER WORDS ... THE OPENING OF THE ALASKAN COASTAL PLAIN FOR OIL AND GAS EXPLORATION AND PRODUCTION ACTIVITIES.

IN MY MIND, THIS MEANS THAT A LOT OF NORTHERN PEOPLE WILL SUFFER - VERY MUCH SO, I AM AFRAID, SINCE THE REPORT GOES ON TO ADMIT TO THE REAL POSSIBILTIES OF NEGATIVE IMPACTS ON THE PORCUPINE CARIBOU HERD AND OTHER WILDLIFE RESOURCES.

MORE SPECIFICALLY, I UNDERSTAND THE REPORT TO SAY THAT OIL AND GAS DEVELOPMENTS MAY AFFECT 78% OF THE TOTAL ALASKAN PORCUPINE CARIBOU CALVING GROUNDS ... (I URGE YOU TO EXAMINE THIS PERCENTAGE FIGURE IN VIEW OF NO, OR AT LEAST VERY LITTLE, OTHER AVAILABLE REPLACEMENT HABITAT).

WITH RESPECT TO A PROJECTION OF CARIBOU POPULATION DECREASE, I FURTHER UNDERSTAND THE REPORT TO SAY, THAT BETWEEN 10% AND 40% OF THE HERD MAY POSSIBLY BE AFFECTED.

BEYOND THE IMPACTS ON CARIBOU, ADVERSE IMPACTS, WE ARE TOLD, CAN BE ANTICIPATED FOR WATER FOWL, MUSKOX AND POLAR BEARS.

IN PLAIN LANGUAGE, THE REPORT TELLS THAT THE PORCUPINE CARIBOU HERD, FOR ONE, IS IN SERIOUS DANGER OF BEING DRASTICALLY REDUCED.

PERHAPS AS ALARMING ... THE HERD, IF DISTURBED, MAY CHANGE ITS MIGRATORY PATTERNS. THIS MEANS, THAT THE HERD COULD BYPASS THE COMMUNITY OF OLD CROW, AND TO DO SO AT SUCH A DISTANCE THAT IT WOULD HAVE THE SAME RESULT AS A REDUCTION OF THE HERD ITSELF.

FOR OLD CROW IN THE NORTHERN YUKON, CARIBOU IS AND HAS BEEN, SINCE THOUSANDS OF YEARS, MY PEOPLE'S LIVELIHOOD. FOR YUKON INDIANS ANY DISTURBANCE TO THE PORCUPINE CARIBOU HERD IS THEREFORE UNACCEPTABLE.

FOR THE RECORD, LET ME MAKE MYSELF PERFECTLY CLEAR: OIL AND GAS LEASES GRANTED ON THE ALASKAN COASTAL PLAIN, AND WITHIN THE HERD'S CALVING GROUNDS, ARE EQUALLY UNACCEPTABLE TO US.

I SPOKE EARLIER OF THE SHARING, BY ALASKAN AND YUKON ABORIGINAL PEOPLE ALIKE, OF MIGRATORY WILDLIFE RESOURCES. WHAT WE ARE REALLY TALKING ABOUT, ARE OUR INTERNATIONAL WILDLIFE RESOURCES.

IN THIS SENSE, MY PERHAPS MOST IMPORTANT POINT IS THAT THE 'UNITED STATES RESOURCE ASSESSMENT' REPORT HAS FAILED TO EXAMINE THE TRANSBOUNDARY EFFECTS OF ALASKAN OIL AND GAS ACTIVITIES. ON THIS LAST ACCOUNT, AS WELL, THE REPORT ITSELF IS UNACCEPTABLE TO US.

LET ME CLOSE BY SAYING, THAT PRIOR TO ARRIVING HERE AS AN INTERVENOR BEFORE THIS PANEL, I HAVE SCRUTINIZED MY ARGUMENTS AND MOTIVES CAREFULLY.

IF YOU WILL, ALASKA AND THE YUKON ARE NEIGHBOURS SHARING THE SAME BACKYARD. I THEREFORE APPEAL TO YOU, AND ON BEHALF OF YOUR YUKON INDIAN NEIGHBOURS, TO GIVE OUR CONCERNS THE ATTENTION THEY DESERVE. I APPEAL TO YOU TO ACKNOWLEDGE US AS YOUR CANADIAN PARTNERS IN THE MANAGEMENT AND PRESERVATION OF OUR WILDLIFE RESOURCES ON WHICH, WHETHER YOU LIKE IT OR NOT, WE DEPEND ON BOTH SIDES OF THE BORDER.

I FULLY BELIEVE THIS TO BE AN ATTAINABLE OBJECTIVE.

THANK YOU.

Defenders OF WILDLIFE

January 23, 1987

Mr. William Horn, Assistant Secretary
Department of the Interior
18th and C Sts., NW
Washington, D.C. 20240

Re: Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment and Legislative Environmental Impact Statement

Dear Mr. Horn:

A careful review of the Resource Assessment confirms Defenders of Wildlife's position that the wisest and best use of the Arctic National Wildlife Refuge coastal plain is to protect the outstanding wildlife and wilderness values of this area. In the long run it is not in the conservation, economic or national security interests of the United States to develop this area; in fact just the opposit is true. We strongly recommend that this area be placed in the National Wilderness Preservation System.

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These comments are submitted on behalf of Defenders of Wildlife and the Fund for Animals. Defenders is a national, non-profit organization dedicated to protecting, conserving, and enhancing this country's rich abundance and diversity of wildlife and wildlife habitat. On behalf of its over 80,000 members Defenders is pleased to submit these comments on the Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment and Legislative Environmental Impact Statement (draft assessment).

We commend the dedicated professionals of the Fish and Wildlife Service (FWS), Bureau of Land Management (BLM), and U.S. Geological Survey (USGS) for their efforts in preparing this draft assessment.

Furthermore, as evidenced by our participation in the suit brought by conservation organizations to ensure the opportunity for meaningful pubic comment on this draft, we appreciate the opportunity for public participation in the planning process and believe that it is critical to the development of a final document.

Unfortunately, Freedom of Information Act requests had to be filed to find out what the Department of the Interior was doing with regard to the future of the Arctic Refuge, and several lawsuits (some of which are still ongoing) were necessary to ensure that the Alaska National Interest Lands Conservation Act (ANILCA) and the National Environmental Policy Act (NEPA) were followed.

To date, environmental organizations have won all the suits filed against the Department of the Interior (DOI) regarding the Arctic National Wildlife Refuge. The major results of this litigation includes: (1) FWS's primary jurisdiction over the

study (rather than USGS) was reaffirmed; (2) some information which would otherwise not be available was made public; and, (3) this draft assessment was released for public comment. hearings. and review.

Following the court ordered release of the draft resource Assessment for public comment with a very short comment period of 60 days over the Thanksgiving and Christmas/Channuka holiday season. Defenders and several other goups requested that the public comment deadline be extended. The comment deadline was subsequently extended to early February 1987.

Recently, the Department of the Interior. in yet a further attempt to block meaningful public input on the draft assessment, requested the Appeals Court to review its December 24 decision in favor of public participation and DOI's responsibility to respond to comments. The actions by the Department of the Interior are inconstructive, strike at the roots of our democratic system, and give everyone including conservationists a reason to be skeptical of the Reagan administration's position regarding the need to lease and develop the coastal plain of the Arctic National Wildlife Refuge.

This skepticism is only increased by the Administration's pocket veto of the National Appliance Energy Act of 1986 (passed overwhelmingly by both houses of Congress), and its opposition to establishing fuel efficiency standards for automobiles and continuing the 55 mile per hour speed limit. Futhermore, Department of the Interior officials are conducting secret negoiations to trade away the subsurface of the refuge coastal plain to private interests and DOI's subsurface geologic information is available to everyone except the public. All in all, the Department of the Interior's actions do not describe an open administration. putting their cards on the table for public review. Rather, secrecy appears to be the byword of the administration.

The Arctic National Wildlife Refuge. the second largest refuge in the National Wildlife Refuge System, is the most outstanding wildlife sanctuary in the world. It is truly the crown jewel of the National Wildlife Refuge System. In conjunction with the adjacent Norther Yukon National Park, this international wilderness and wildlife area is truly outstanding: a priceless international treasure to present and future generations. These attributes of the refuge are clearly put forward in the Resources Assessment which states:

> The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America (p. 45).

Criticisms of Secretary's Recommendations

Although some important aspects and issues of the draft assessment need clarification and others are completely unsubstantiated, many of its shortcomings center on what was left unsaid.

One of the most serious problems of the draft report that needs to be corrected is that the Secretary's Recommendation (Chapter VIII) to lease the entire coastal plain of the Arctic National Wildlife Refuge for oil and gas development is unsubstantiated and makes a mockery of the work that went into the body of the draft assessment. Specifically, the statement in the Secretary's Recommendation that "development of its potential oil and gas resources could make a significant contribution to the economy and security of the Nation. and could be done in an environmentally responsible manner based on lessons learned at Prudhoe Bay, on the 1002 area...and elsewhere" rings hollow when one reads the entire report. In fact, the report contradicts this statement.

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First. the recommendation to lease the area for development relies heavily on the argument that it will significantly improve our nation's national security. However, the report fails to analyse this statement and lacks any facts to back up the statement. Chapter VII states that if any oil is found in the 1002 area, at its high point of production (the year 2005), it will satisfy only four percent of U.S. oil demand. That leaves roughly 96 percent of oil consumed by the U.S. coming from elsewhere. Thus the draft report fails to demonstrate that development of the Arctic Refuge coastal plain will either make the U.S. energy self-sufficient. or be able to "significantly reduce the economy's vulnerability to world oil market changes" as stated on page 164. These false statements must be corrected to reflect the report itself.

Furthermore. the draft report fails to look at any comprehensive planned approach to U.S. energy needs. Such an approach would rely on conservation and alternatives to oil and gas that will make the United States less vulnerable to world oil market changes. Even the National Energy Policy Plan developed by the Department of Energy in 1985 states that energy conservation "has proven to be the most expeditious way to reduce the need for new or imported energy resources; and in fact it now contributes more to balancing our national energy ledger than does any single fuel source." Defenders believes that measures to increase energy conservation, such as the recently vetoed bill that would have reduced energy consumption by major appliances need to be implemented and examined in this report as an alternative to achieving energy security before one begins to cry wolf about the national need to develop the Artic Refuge.

The draft suggests that the only way to fill the U.S. need for energy resources is to develop the coastal plain of the Arctic Refuge. The refuge is put forward as a virtual panacea for

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the problem of American dependence on oil imports and need for energy resources. However, this conclusion is an illusion. and misleads the American public rather than dealing with the long term problem. Significantly. the draft fails to look at alternatives for meeting U.S. energy needs in the future. The final report should correct these problems.

The second part of the Secretary's recommendation. that development. "could be done in an environmentally responsible manner based on lessons learned at Prudhoe Bay. on the 1002 area...and elsewhere" is contradicted by the draft assessment's discussion of environmental consequences that leasing the entire 1002 area and will have on the wildlife that inhabit this pristine wilderness.

Specifically. page 106 cautions against comparing the experiences of the Central Arctic caribou herd and Prudhoe Bay development with the Porcupine caribou herd and possible 1002 development. The density, dynamics, movement. and traditions of the herds are different as is clearly pointed ut in the document. Page 112 states that the "changes in habitat availability and value from development, combined with increased harvest, could result in a major population decline..." of the Porcupine caribou herd.

The report points out the adverse affects that leasing the entire area will have on other wildlife:

1. Muskoxen - nearly 75% of high use calving habitat could be lost and could result in a major decline of the herd (p. 113). And, major negative effects on muskoxen population could occur (25-50% of population may decline or change distribution (p.114).

2. Polar Bears - because of the small number of bears the population can sustain little mortality. Moderate impacts can be expected. The study notes that development is not likely to effect the overall survival of the species so long as similar intensive development does not occur along the entire north coast of Alaska and Canada. However, the study fails to analyse cumulative impacts of development in arctic Alaska and Canada.

3. Snow geese - major reduction or change in distribution from loss of habitat and loss of feeding areas. Number of geese staging in 1002 area is expected to reduce by 50%.

These impacts on the wildlife. described in the draft assessment, are significant. The report also fails to demonstrate how development could take place in an "environmentally responsible manner" with regard to water and gravel resouces and air and water pollution. In fact. again. just the opposite is true: the report demonstrates that one would not be acting in an environmentally responsible manner if they agreed to this type of development on the refuges's coastal plain.

Other Criticisms of the Draft Assessment

Besides this considerable lack of support in the assessment for the Secretary's recommendation for full-scale leasing and development of these refuge lands. there are several other serious shortcomings in the resource assessment for the coastal plain of the Arctic National Wildlife Refuge:

1. Failure to look at alternative energy policies and other ways to achieve national energy security. The National Environmental Policy Act demands that alternative ways to meet objectives (meeting the national need for energy appears to be the goal of this environmental impact statement) should be examined. A thorough analysis of alternative energy programs and policies that would make development of these lands unnecessary is needed.

2. Failure to justify leasing the area in light of there only being a 19% chance of discovering oil and gas.

3. Failure to develop a comprehensive and rigorous economic analysis, including how leasing and development during a time of depressed market value for leases and oil due to an oversupply of oil, will benefit the national economy.

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4. Failure to develop a realistic assessment of the marginal probability of economically recoverable oil and gas being found on the coastal plain of the refuge. This failure results in an overestimate of the Net National Economic Benefit. The (NNEB is based on several assumption including the minimum field size likely to be economically produced, and the future oil price.) In the most likely scenairo. the draft assumes that by the year 2000 the price of oil will be $33.00 per barrel (p. 72) in 1984 dollars. To reach this value the price would have to grow at an average rate of 4% per year (starting from an oil price of about $18 per barrel).

The Mineral Management Service of the Department of the Interior uses three oil price growth rates in calculating the margional probability of economically recoverable oil being found in OCS areas: 0, 1, and 2 percent per year (MMS - Proposed Program 5-Year Outer Continental Shelf Oil and Gas Leasing Program for January 1987- December 1991, Detailed Decision Document. Feb. 1986, Appendix F). The 4 percent growth rate used by DOI in this draft assessment is twice the highest growth rate assumed by the MMS. (Using the optimistic assumption of an oil price of $40.00 per barrel means that the yearly growth rate is approximately 4.9 percent.) Why has the Department of the Interior used growth rates in this draft assessment which are higher than that used by the MMS? Defenders recognizes the uncertainty of estimating future prices of oil, but believes that this assessment should follow the standard proceedure used by the MMS.

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Furthermore. instead of just giving the 19% and 26% figures the draft assessment should show that these percents are simply two possible financial and economic scenarios. The assessment should provide a spectrum of percentages in order to give a full analysis of the situation. For example, the draft assessment should include a probability distribution for prices and costs as well as field sizes.

The effect of the high oil price assumptions by DOI is to project a much higher profitability rate for the oil-producing projects than would be the case for an oil price estimate in keeping with MMS projected growth rates.

5. According to the draft assessment (p. 165) the value of the Net National Economic Benefit from the average field size of 3.2 billion barrels is likely to be $14.6 billion. The 95th percentile shows that the NNEB (with optimistic economic assumptions from a field size of 9.2 billion barrels will be $9.4 billion. To get the total expected value of the NNEB from these field sizes. the DOI should have multiplied by the marginal probability (19 percent), to yield values of $2.8 and $1.8 billion respectively for the NNEB. These are the values that should be used to estimate the monetary benefits that are derived from oil and gas production in the 1002 area. Furthermore. keeping in mind the point made in #3, if the NNEB is calculated using an oil price estimate that is too high, the benefits of producing oil will be over-estimated, and the resulting balancing of the costs and benefits of the project will be misleading.

6. Failure to explain why the United States should develop and expend its oil resources during an oil glut (when prices are low and oil readily available). Furthermore, the assessment should explain why. with the current low oil price the U.S. wouldn't better serve its national security interests by purchasing more oil for the nation's Strategic Petroleum Reserve. and saving U.S. oil.

7. Failure to release for public review geologic data critical to determining the possible resources of the 1002 area. The federal government. state of Alaska. and oil industry have the information, only the American public does not have the same advantage.

8. Failure to address the effects of. and ensure the control of air and water pollution and other toxic chemicals (drilling muds. and oil spills), such as those found at Prudhoe Bay, on the wildlife population of the refuge if it was developed.

9. Failure to demonstrate how water and gravel supplies will be obtained without damaging the environment. In light of the following statement found on page 75 the water and gravel issues need to be much more fully analysed: "...specific locations and sources of water and gravel for exploration and development activities have not been identified; it is understood that these resources. especially water. are not readily available on the

1002 area."

10. Failure to analyse the cumulative impacts of development from oil and gas leases, including: Beaufort Sea OCS (Sale 97) - 21.2 million acres; adjacent state lands - over one million acres; and, lands in Canada. These cumulative impacts must be addressed in the environmental impact statement.

11. Failure to deal comprehensively with the Native villages that will be affected by development. Although. Kaktovik is discussed in some detail, Arctic Village and Venetie in Alaska, and Old Crow and other villages in Canada are hardly mentioned. except to say that effects on them will be secondary and therefore are not discussed in the assessment. Furthermore, the list of contributers to the report lacks either an anthropologist or a sociologist.

12. Failure to explain why it will take 10-15 years to bring the 1002 area on line when Prudhoe only took nine years.

13. Failure to discuss the proposed land trades. the effects this will have on the area; why the Department of the Interior believes that this would be the best route to go if the area were opened, and what other options DOI has looked at or is considering.

14. Failure to discuss the Northern Yukon National Park, and the international treaties applicable to the wildlife from this area.

15. Failure to consult with the Canadian government before releasing the draft document, even though Section 1005 of ANILCA expressly requires consultation.

16. Failure to discuss the Porcupine caribou herd agreement with Canada currently being considered and the need to cooperatively manage this international wildlife.

17. Failure to analyse when Prudhoe Bay reserves will deminish. given that West Sac and Milne Point other known reserves are not being developed at this time.

18. Failure to mention that in Alaska. less than 6 percent of U.S. oil reserves are estimated to be under designated or potential wilderness areas. including the Arctic National Wildlife Refuge. Congress made sure that those lands with the greatest potential for oil were excluded from wilderness designation or potential designation.

Conclusion:

Oil development in this crown jewel of the National Wildlife Refuge System will result in the loss of its wilderness character and in the decline of its wildlife. Defenders of Wildlife believes that the crux of this issue is not to see how much

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wildlife could be saved if it moved elsewhere or adapted to the development. Rather the wildlife must be saved in its wilderness setting. This refuge is not the place to see if we can manage the wildlife and keep up its numbers while development occurs. the rest of the north slope has already been devoted to that course. The refuge was established to protect wildlife in wildlands and that continues to be its greatest value to this and future generations.

We agree with the Interior Department's statement that:

"Oil and gas development will result in widespread, long-term changes in wildlife habitats. wilderness environment. and Native community activities. Changes could include displacement and reduction in the Porcupine caribou herd." (p. 6)

However, this statement only points out more clearly that development of this area should not occur. we should not "change" the wildlife habitat or the wilderness environment of this area. Furthermore, Defenders believes that there is no need for further exploration of the area. because this area should not be developed, and if practices to conserve energy and find alterntives are implemented -- it may never have to be developed. Defenders of Wildlife therefore strongly urges the Department of the Interior to recommend that the entire 1.5 million acre area of the Arctic National Wildife Refuge be designated as part of the National Wilderness Preservation System.

We greatly appreciate your consideratio of these comments.

Sincerely.

Amy Skilbred
Alaska Specialist

AS:dlt

Commments of Amy Skilbred, Alaska Specialist for Defenders of Wildlife before the U.S. Department of the Interior, Regarding the Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment, January 9, 1987.

Good day. I am Amy Skilbred, Alaska Specialist for Defenders of Wildlife. Given the time constraints on oral statements for this hearing, I will briefly summarize Defenders main concerns with the Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. Defenders will be submitting more detailed written comments by the January 23 deadline.

Before getting into our concerns I commend the staff of the Fish and Wildlife Service, Bureau of Land Management, US Geological Service, and Mineral Management Service for the considerable time and effort they have put in developingthis draft assessment.

One of ~~the major~~ blatant problems with the report is that it does not substantiate the Secretary's Recommendation (Chapter VIII) to lease the entire coastal plain of the Arctic National Wildlife Refuge for oil and gas development.

Specifically, the statement in the Secretary's Recommendation that "Development of its [the 1002 area's] potentail oil and gas resources could make a **significant contribution to the economy and security** of this Nation, and could be done in **an environemently responsible manner** based on lessons learned at Prudhoe Bay, on the 1002 area...and elsewhere" rings hollow to someone who has read the entire report.

The recommendation to lease the area relies heavily onthe argument that it will significantly improve our nation's national security. Let's look at exactly how significant the report says the contribution to the economy and security of this Nation" will be if development proceeds. Chapter VII shows that if any oil is found in the 1002 area, at its high point of production (2005), it will only satisfy 4.1 percent of U.S. oil demand. That leaves roughly 96 percent of oil consumed by the US coming from elsewhere. To say that this would be a significant contribution to the economy, or that it would contribute significantly to National security is highly subjective at best

Certainly, any additional barrel of oil produced may reduce U.S dependence on a barrel offoreign imports but development of the

plain of the Arctic National Wildlife Refuge will not make the U.S. energy self-sufficient, nor will it be able to "significantly reduce the economy's vulnerability to world oil market changes" as stated on page 164.

To tell the American public that this is the case is misleading Only a comprehensive and planned approach to U.S. energy needs emphasizing conservation and alternatives to oil and gas will make the United States less vulnerable to world oil market changes.

It is interesting to note the references that are made to the National Energy Policy Plan developed by the Department of Energy in 1985. This Plan states that energy conservation "has proven to be the most expeditious way to reduce the need for new or imported energy resources; and in fact it now contributes more to balancing our national energy ledger than does any single fuel source."

Conservation of oil resources should be the cornerstone to any national energy policy. However, the conclusion of the report does not mention the role conservation would play rather it stresses the overriding national need and national security interests in developing the 1002 area and puts forward the coastal plain of the refuge as a virtual panacea to the problem of American dependence on imports. Development of the Arctic Refuge will not solve national security questions which arise because of the U.S. dependence on imports.

Defenders believes that measures to increase energy conservation, such as the recently vetoed bill that would have reduced energy consumption by major appliances (saving approximately 1 billion barrels of oil by the year 2000) need to be implemented before one begins to cry wolf about the national need to develop the Arctic Refuge.

The second part of the Secretary's recommendation states that development "Could be done in an environmentally responsible manner based on lessons learned at Prudhoe Baly, on the 1002 area...and elsewhere" and goes on to say that "although, circumstances within the 1002 area may be somewhat different, the evidence derived from the Prudhoe Bay experience leads one to be quite optimistic about the ability to explore for and develop the hydrocarbon potential of the 1002 area without significnat deleterious effects on the unit's wildlife resources. These statements again fail to convince anyone who has read the report that the Porcupine Caribou will not be greatly affected by development in. In fact, the statement is contradicted by the discussion of environmental consequences of leasing the entire 1002 area (page 112) which states that "These changes in habitat

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availability and value from development, combined with increased harvest, could result in a major population decline..." of the PCH.

The same chapter also goes to lenghts to make it clear to the reader that the dynamics, and density differences between the PCA and the CAH (page 106) caution against one drawing any conclusions about the effects leasing the entire 1002 area will have on PCH, from CAH's experiences at Prudhoe Bas, as appears to be done in the Secretary's Recommendation.

The draft chapter of the Secretary's Recommendation appears almost to have been developed separately from the assessment itself.

Besides the lack of support for the conclusion in the assessment itself, there are several other omissions and inadequacies in the report. Including:

1. Cumulative impacts of development are not addressed. Several places in the assessment mention possible off shore development in the Beaufort Sea and the probability of additional State and private development if the refuge is opened to leasing. According to the National Environmental Policy Act these cumulative impacts mus be addressed in an environmental impact statement.

2 The draft fails to include the "risked" estimates throughout the chapter assessing the oil and gas potential of the 1002 area. The assessment cites a document by the Mineral Management Service called Estimates of Undiscovered, Economically Recoverable Oil and Gas Resources for the Outer Continental Shelf as of July 1984. This MMS document consistently gives the "marginal probability of hydrocarbons" along with the "Risked mean" when comparing areas that have yet to be developed. The draft assessment fails to do this in Figure III-2, and Table III-1 thus skewing the information.

One of the most sailant points about any possible development in the 1002 area is that there is less than a one in five chance of finding anything. This point is underplayed throughout the document and not even mentioned in the executive summary or the Secretary's Recommendation. Only if this condition is met will any oil be recovered from the refuge's coastal plain. The odds are one in five, a crap shoot that industry may well be willing to take, but not necessarily a gamble with a unique national treasure that should be allowed

By factoring in this 19 percent marginal probability the "risked probability" is reached showing that the mean estimate [illegible]

sharply reduced from 3.2 billion barrels to 0.6 billion barrels (barely two months worth of oil at present rates of U S consumption).

3. THE MOST LIKELY, AND OPTIMISTIC ECONOMIC SCENARIOS FOR DEVELOPMENT ARE BASED ON CRUDE OIL MARKET PRICE OF $33 AND $40 PER BARREL IN THE YEAR 2000. GIVEN TODAY'S PRICE OF $18 PER BARREL AND USING THE MINERAL MANAGEMENT SERVICE'S GREATEST ESTIMATE OF GROWTH (INCREASE IN BARREL PRICE), 2%, $33.00 PER BARREL WILL NOT BE REACHED UNTIL THE YEAR 2023. IN FACT DOI HAS USED AN ESTIMATE OF 5.1% AND 5.9$ GROWTH PER YEAR, RESPECTIVELY, CONTRARY TO MMS'S CUSTOMARY PRACTICE OF USING 0, 1 AND 2% GROWTH.

4. The draft assessment fails to deal comprehensively with the Native villages that will be affected by development. Although, Kaktovik is discussed in some detail, Arctic Village and, Venetie in Alaska, and Old Crow in Canada are hardly mentioned, except to say that effects on them will be secondary and therefore not discussed in this assessment. We believe that this critical factor in assessing the impacts of developing the coastal plain of the refuge needs to be discussed. Furthermore, the list of contributers to the report does not include either an anthropolgist or a sociologist, leaving one to question the importance placed on the effect development may have on subsistence.

5. Besides the effects on the caribou, already mentioned and the thorough job done in the report, muskoxen and snow geese and polar bears in the 1002 area stand to be aversely affected by development.

Based on a thorough review of the report and other information Defenders of Wildlife believes that the 1002 area of the Arctic National Wildlife Refuge should be recommended for inclusion in the National Wilderness Preservation System, as its highest and best value is for the wildlife found in this pristine and unique arctic ecosystem.

January 19, 1987

Sandy O'Brien
Conservation Chairperson
Dunes Calumet-
Audubon Society
5603 Mississippi St.
Hobart, IN 46342

U. S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior Building
18 and C Streets NW
Washington, D.C. 20240

Dear Sirs and Madams:

This letter pertains to the draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. The Dunes Calumet Audubon Society has a number of concerns about the oil and gas leasing and this draft report.

"The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge" and virtually the entire 1002 area would qualify as wilderness under the Wilderness Act the draft report states on page 46. Although the mean conditional estimate of economically recoverable oil is an impressive 3.2 billion barrels, there is an 80 percent chance that no economically recoverable oil will be found. Even under the 3.2 billion barrel full leasing estimate, only 4.17 percent of national oil demand is projected to be filled by the 1002 area during its peak of production in the year 2005. The 1002 area is projected to provide only 0.91 percent of national demand in the year 2000. While it could be helpful, the 1002 area can hardly free the U.S. from the economic and national security hazards of foreign oil dependence. While the mitigation recommendations in the draft report seem very thoughtful, we feel the 1002 area is too valuable to risk in gas and oil development. The Arctic Refuge has just one coastal plain. Other areas such as the Alaskan state lands west of the Canning River could be found to be productive and able to take over when the Prudhoe Bay fields decline.

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The draft report does not mention much of the effects of natural gas development other than the effects would not be much greater than oil alone since gas was not expected to be economically recoverable in the next 30 years. Congress should have more information than that if it is to decide if gas leasing should occur with the oil leasing process.

The effect of the inevitable accidental spills of crude oil and refined petroleum products is minimized in the report. The 1978 spill of 658,000 gallons and the 1979 spill of over 200,000 gallons must have at least killed a great deal of vegetation. The consequences to the abundant coastal marine fish, birds, and wildlife of a spill there would be major. The 50,000 barrel maximum spill design of the valve locations on TAPS still allows for a large spill. Detecting and trying to clean up a spill would be very difficult during the frequent fog, blowing snow, and whiteouts of the 1002 climate.

The Native Inupiat Eskimos in Kaktovik would suffer the loss of their traditional subsistance way of life with the oil development of the 1002 area. Although they have recently entered partly into cash economy, they can still pursue their traditional culture and subsistance without oil development. The monetary benefits to those individuals who get jobs during the development could easily be outweighed by the loss of the traditional life of the group, including the aesthetics of the wilderness they now use. The Inupiat of Canada who depend on the Porcupine Caribou herd would be affected too.

Major to moderately severe effects from oil development on caribou, muskoxen, wolves, wolverines, brown bears, polar bears, snow geese, golden eagles, and on vegetation, wetlands, and terrain types as described in the report are too great of a price to pay for the benefits of oil from the 1002 area of the Arctic Refuge. The scientific value of having undisturbed arctic ecosystem to study would be lost as well.

The draft report, although it acknowledged the importance of vegetation and briefly described 17 cover types and 6 terrain types, did not mention anything about the botanical diversity of the 1002 area. Only about six vascular plants were mentioned specifically, and five of these were by common name. It is difficult to convey the biological worth of the 1002 area without adequate description of the flora in the report.

Thank you for noting our comments on the draft report and opposition to oil and gas leasing.

Very sincerely yours,

Sandy O'Brien
Conservation Chairperson
Dunes Calumet Audubon Society
5603 Mississippi St.
Hobart, IN 46342

ENVIRONMENTAL DEFENSE FUND

444 Park Avenue South
New York, NY 10016
(212) 686-4191

February 3, 1987

U.S. Fish and Wildlife Service
2343 Main Interior Building
18th and C Streets, N.W.
Washington, D.C. 20240

Attn: Division of Refuge Management

Gentlemen:

Enclosed are the comments of the Environmental Defense Fund on the Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment.

Sincerely,

Michael Oppenheimer
Senior Scientist

MO/la

Enclosure

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COMMENTS OF THE ENVIRONMENTAL DEFENSE FUND

on

DRAFT ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT,

November 1986

These comments of the Environmental Defense Fund on the proposed Draft ANWR Coastal Plain Resource Assessment are limited to discussion of potential impacts of development on air quality, acid deposition, and the consequences thereof. We shall argue that air quality-related impacts are potentially significant. The Assessment is characterized by a near total absence of discussion of such impacts, and reports no air quality modeling. It is thus seriously deficient.

1. The Draft Assessment is virtually devoid of discussion of potential impacts of development on air quality.

The Assessment is seriously deficient in this regard. In particular, there is no discussion of the possible consequences for biota of low levels of air pollution below the NAAQS. Nor is there any discussion of the size or consequences of the deposition of these pollutants into the terrestrial environment. Nor is there any discussion of potential impacts of such deposition on aquatic ecosystems. Nor is there discussion of mitigating alternatives involving monitoring or technological control of emissions.

2. Potential ambient levels of ozone (O_3) are significant in terms of impacts on terrestrial ecosystems.

Ozone is a well known phytotoxin. Although studies of ozone effects on plant species common to ANWR area are lacking, it may be assumed that the effects of ozone noted for a wide range of other species, both annual and perrenial, will occur. These effects include reduction in photosynthesis and visible leaf damage. It is suspected that ozone contributes to long term growth reductions observed broadly for forests in the eastern U.S.[1/]

3. Projected concentrations of ozone are significant in this context.

NO_x, hydrocarbon and carbon monoxide emissions from development activities may be expected to increase ozone concentrations. Annual mean ozone measurements during 1979-80 at Prudhoe Bay indicate an increase of 3-4 ug/m^3 due to activity at the site with total annual means exceeding 50 ug/m^3 (about 25 ppb). ANWR development may be smaller than that at Prudhoe Bay; an air emissions ratio of 1/3 is estimated for the two sites. A rough estimate suggests that incremental O_3 concentrations near the ANWR site may be larger than 1 ug/m^3 above background values. The effects of such increases are not considered in the Assessment. Nor is any air quality modeling presented for the specific site involved. Furthermore, the measured values characterize a period of low activity at Prudhoe Bay. Air quality modeling based on 1986-87 activity levels at Prudhoe Bay indicate factor-of-10 increases for NO_x compared to 1979 measured values. Although models are conservative, and NO_x increases cannot be translated easily into concommitant O_3 changes, much higher NO_x concentrations may mean much higher O_3, both at the site and downwind.

Even incremental increases of 1 ug/m^3 must be considered as significant since no damage threshold for plants due to ozone has been developed. In addition, the observed background values at Prudhoe Bay, as elsewhere, are large, so that biological consequences may occur for small pollutant concentration increases. For instance, observed damage to some plants in much less extreme environments has been observed for total ozone levels as low as 40 ppb in regions where background levels may be considerably higher than those in the Arctic.[2/] Thus, relatively small anthropogenic ozone increments may cause biological change.

4. The Assessment contains no air quality modeling of the downwind increases in ozone.

Ozone is a secondary pollutant which forms in pollutant plumes as transport occurs away from the source. Maximum incremental ozone concentrations may occur tens or hundreds of miles downwind. In this case, such concentrations could occur on the north slope of the Brooks Range.

5. Potential impacts of NO_2 concentrations and related acid deposition are significant in terms of impacts of terrestrial and aquatic systems.

Large increases in local acid deposition may occur due to NO_2 emissions at the site. NO_2 is a known phytotoxin as well as a source of precipitation and surface water acidification. Based on the Prudhoe Bay measurements, NO_2 increments on site of 0.5-1.0 ug/m^3 in annual mean concentration may be

expected. Using a dry deposition velocity of 1 cms^{-1} this increase can be converted to an incremental deposition value of up to 3 kg NO_2/ha-yr. NO_2 will be largely converted to nitric acid before deposition to soils and in surface water. Wet deposition of NO_3 from these emissions will also contribute to acid deposition. Based on the Prudhoe Bay measurements, total acid deposition at ANWR may be equivalent to as much as 5.0 kg/ha-yr sulfuric acid deposition. These values are somewhat below thresholds for episodic total acidification of lakes in sensitive drainage basins (~9 kg/ha-yr). However, if model values of NO_x concentrations from 1986-87 operations at Prudhoe Bay are scaled to the ANWR site, dry deposition alone far exceeds threshold values for acidification of surface waters on an annual or episodic basis. In the Arctic, transient pools of meltwater may be important environments for some animals, and sources of food for others. Since food chain disruptions occur when pH drops to only about 6.0, even partial acidification from these emissions may have substantial environmental impacts. NO_2 is a relatively important source of acidification in such environments because snowmelt occurs in periods of low biotic activity when soils are frozen. Thus, the NO_2 emissions expected at the ANWR site must be considered significant. Again, no modeling is available for downwind concentrations. Based on the Prudhoe Bay model values, some acidification also may occur for waters at higher altitudes on the North Slope. Since no modeling is presented, no quantitative conclusion is possible.[3/]

With respect to terrestrial ecosystems, negative impacts have been noted for NO_2 in specific, and acid pollutants in general, for a variety of

terrestrial species including lichens. For low concentrations and Arctic species, considerable uncertainty exists on potential impacts.[4/] Again, local plume impaction as well as downwind effects may be important. No air quality modeling or discussion of downwind impacts is presented.

6. In summary, the Assessment contains almost no discussion of and no quantitative assessment of acid deposition and air quality related impacts.

These impacts are potentially very significant.

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FRIENDS OF THE EARTH

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COMMENTS AND TESTIMONY OF

FRIENDS OF THE EARTH

REGARDING THE U.S. DEPARTMENT OF INTERIOR'S

DRAFT ARCTIC NATIONAL WILDLIFE REFUGE
COASTAL PLAIN RESOURCE ASSESSMENT
AND REPORT TO CONGRESS

O-217

PRESENTED BY

CYNTHIA E. WILSON
EXECUTIVE DIRECTOR OF
FRIENDS OF THE EARTH

AT THE

U.S. DEPARTMENT OF INTERIOR

WASHINGTON DC

JANUARY 9, 1987

Committed to the preservation, restoration, and rational use of the ecosphere

Testimony on Draft Coastal Plain Resource Assessment

January 9, 1987

My name is Cynthia E. Wilson. I am the Executive Director of Friends of the Earth. By way of background, I was an Assistant to Interior Secretary Cecil D. Andrus during the Carter administration and coordinated all of the Department's work on the Alaska lands issue. The Arctic Wildlife Range was one of the areas which received an enormous amount of attention, and after careful consideration President Carter and Secretary Andrus recommended that the entire area be designated wilderness.

Prior to that, during eight years as the Washington representative of the National Audubon Society, I worked on the various Alaska related issues -- the TAPS pipeline, the proposals for the gas pipeline, and the Alaska Native Claims Settlement Act -- which arose during that period.

I have read the draft Coastal Plain Resource Assessment and frankly was not in the least surprised to find that full scale development is recommended despite the speculative nature of the information about potential oil and gas. Let me state our position clearly. Having read the information presented in the assessment, we remain opposed to development in the Arctic National Wildlife Refuge.

The report attempts to minimize the potential impact of development on the Porcupine caribou herd by claiming that the TAPS pipeline project had "minimal impact on wildlife resources," and projecting that experience to the Porcupine herd. As a matter of fact, displacement of the Central Arctic herd from traditional calving grounds as a result of oil development at Prudhoe has been well documented. (1) Most of the caribou who pose for pictures along the pipeline are bachelor bulls, whose behavior and requirements are quite different from cows with calves.

Even if you accept the characterization of "minimal" impact--which is subject to dispute--this a classic case of comparing apples and oranges. The fact is that the Porcupine herd is migratory, while the Central Arctic herd is not. The coastal plain in ANWR is relatively narrow and bounded by the Brooks Range on one side and the Beaufort Sea on the other. The concentration of caribou on the ANWR calving grounds is fourteen times greater than the concentration of caribou on the calving grounds of the Central Arctic herd. In a classic understatement, the report on page 112 states, "Given the geography of the calving areas and the current densities (of the Porcupine herd) in those areas, the availability of suitable alternative habitats is not apparent."

Although the calving grounds are only a fraction of the herd's

entire range, they are clearly the most crucial fraction. If this area is disrupted, the impacts could be severe. Calving grounds are selected because they offer a unique combination of conditions that favor survival. These include early snow melt, early growth of new plants, closeness to insect relief habitat and lack of predators. These conditions are not present in many parts of the Refuge.

The 1002 report does not show the complete calving grounds of the Porcupine herd, which includes the entire 1002 area. However, it does show the high use of the area between the Hulahula and Aichilik rivers. The places of concentrated calving activity vary from year to year and in some years, there are no "concentrated" areas.

During years when snowmelt is early, calving takes place north of the foothills, out onto the coastal plain. The conflicts with oil development in those years would be extreme. Since calf survival rates are higher when calving takes place north of the foothills (2), the impact of oil development on the caribou population would be higher in these years. This does not appear to have been considered in the 1002 report.

Right after calving, the caribou cow's energy reserves are at their lowest.At the same time, millions of mosquitoes hatch out and become a severe problem. Their harassment drives small "nursery bands" of caribou cows with calves into huge aggregates in an attempt to escape. In some years, tens of thousands of cows with calves gather near the coast south of Camden Bay--one of the proposed drilling sites.

To escape the insects, caribou move almost continually. Access to forage and habitat which provides relief from insects is crucial at this time, and insects contribute to the high death rate for calves. Research at Prudhoe Bay has demonstrated that large mosquito harassed groups of caribou do not readily cross beneath eleveated pipelines.(3) Disturbance from oil exploration and development activities would add stress at a point in the caribou's life cycle when additional stress cannot be tolerated.

We believe the proposal to lease the 1002 area, but delay work on the area described as "concentrated calving grounds" is simply a sop for public relations purposes. Once development begins in the Refuge, the impacts on the herd will likely be irreversible. Who will enforce the stipulations that are supposed to mitigate the impact -- where is the army of enforcement personnel which would be required and--just as important--once the oil companies have started work in the refuge, how will the Interior department resist the pressure to lease the concentrated calving area? Given how little we really know despite the years of information gathering, it seems unlikely that any firm conclusions can be drawn in the few years it will take to develop the bulk of the coastal plain.

In addition to the effects of the oil exploration and development on the wildlife rsources, we are concerned about the effects on traditional subsistence users dependent on the caribou. The indigenous people of Alaska and Canada have an ancient relationship with the caribou which is expressed by the Athabascan people as, "Every caribou has a bit of the human heart in him and every human has a bit of caribou heart."(4)

Oil development would reduce access to subsistence areas used by the village of Kaktovik, including loss of hunting opportunities in approximately one half of the 1002 area. Closure of a 5-mile corridor on either side of roads, pipelines and developed areas was recommended in a workshop of caribou biologists sponsored by the Fish and Wildlfie Service. Further restricting the caribou's hunting season was also recommended. (5)

I would also like to touch on one of the most glaring flaws in the 1002 report -- the use of a price per barrel of $33 and $40 in making calculations. Although we realize that by the time the Refuge could be developed, it is posible that prices will rise from today's $18 per barrel. But the fact that the viability of this proposal is premised on these prices shows the bias of this administration. Actually, when you look at the probability figures, and the industry's track record in predicting where giant fields will be found, you realize that the outcome is really a gamble.

The Reagan administration has vetoed legislation which would set energy efficient standards for appliances and dismantled virtually every energy conservation program, and then has the gall to tell us that we need to open up America's premier wilderness area because of national security. Baloney. If the administration is serious about reducing dependence on foreign oil, then it would be seriously working to promote energy conservation--instead of dismantling the solar collectors on the White House roof with great fanfare.

In the mid-seventies, we heard the same national security arguments when the energy industry attempted to stampede Congress into ramming a gas pipeline through the Arctic Wildlife Range. A coalition of environmental groups and leaders from the midwest managed to stem the hysteria and ultimately legislation was passed which set up a process for carefully selecting another route. But the irony is, ten years later that pipeline still hasn't been built and yet somehow we have managed to survive.

I have had the exhilarating experience of flying over the Arctic Refuge and seeing the vast herds of caribou. It is a sight I will never forget, and one which I hope future generations will have the opportunity to enjoy. It makes absolutely no sense to tear up this wilderness area on the chance that it may contain economically recoverable quantities of oil--especially when according to the report (p.50) fields in East Texas and elsewhere still have greater reserves which would be far easier to extract.

The American people are willing and able to practice conservation if our leaders show the way. Until alternative forms of energy are given more priority and an energy conservation program is in place, the only real reason to open the Arctic Refuge is greed.

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attached article for the record

DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print

Name Cindy Lowry

Mailing Address P.O. Box 104432
Anchorage AK 99510

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☑ I am speaking for Greenpeace
(please enter name of organization you represent)

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GREENPEACE U.S.A.

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TESTIMONY OF

CINDY LOWRY
ALASKA FIELD REPRESENTATIVE
GREENPEACE

BEFORE THE

FISH AND WILDLIFE SERVICE

HEARING ON THE

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT AND
DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

JANUARY 5, 1987

My name is Cindy Lowry and I am the Alaska Field Representative for Greenpeace, an international environmental organization dedicated to the protection of the natural environment and marine ecosystems. Our organization has offices in 17 countries and a membership of over 600,000 in the United States alone, including 1600 Alaskans. I am pleased to have this opportunity to present Greenpeace's comments on the Draft 1002 report and recommendation to Congress regarding the coastal plain of the Arctic National Wildlife Refuge.

Greenpeace is opposed to oil and gas development in environmentally sensitive areas, a category in which the arctic coastal plain certainly belongs. The report's recommendation to lease the entire coastal plain is absurd in that it fails to adequately address the detrimental impacts of oil development to the ecosystem as a whole. Not only is the onshore area at risk due to the inherent adverse environmental affects associated with development, but also the sensitive marine ecosystem offshore is placed in jeopardy as well. In addition, the report is lax in evaluating the cumulative effects of oil and gas development of offshore lease sale areas in both federal and state waters. We are also concerned that development of the coastal plain could accelerate the lease sale process in Outer Continental Shelf (OCS) waters.

As an example of the report's inadequacy, we make reference to its description of environmental consequences to marine mammals found on page 119. One sentence is allowed for "mitigation" of environmental impacts for seals and whales which states "No mitigation beyond that already outlined for other species." We find it highly unlikely that all marine species react alike to oil exploration activities. It is evident by this section alone that not enough is known about the effects of oil development on marine species that inhabit both the nearshore waters and the coastal plain itself.

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Experience has shown that oil development brings with it a type of onshore industrialization that communities are just beginning to understand. Oil refineries and transfer facilities deplete fresh water supplies and encroach on coastal wetlands and wildlife habitats. These facilities as well as offshore operations themselves have also become major contributors to steadily worsening air quality conditions. What is known and what remains uncertain both point to an inevitable decline and possible annihiliation of the subsistence lifestyle of the Inupiat.

In summary, the costs and risks to the environment inherent in oil and gas development outweigh any potential gains from the production of oil and gas on the coastal plain. The possibility of a few days of oil resources for the country simply do not warrant the risk of destroying this unique, fragile arctic environment and the adjacent sensitive marine ecosystem.

The U.S. government needs to develop a national energy plan. To continue using the ploy of national security and defense as a means of exploiting environmentally sensitive areas is unconscionable. Clearly, if the government does not perceive the necessity to develop a national energy policy whereby the efficient use of existing reserves is promoted and alternative technologies to reduce the need for oil are developed, then they should not object to the public demanding that environmentally sensitive areas be excluded from oil development. We urge that the unique arctic coastal plain be given the fullest protection in that of federal wilderness designation.

INTERNATIONAL PORCUPINE CARIBOU COMMISSION - ALASKA
P.O. Box 200908
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February 6, 1987

U.S. Fish & Wildlife Service
ATTN: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, DC 20240

SUBJECT: Comments on Draft 1002 Report to Congress

Gentlemen:

Thank you for the opportunity to review your Draft Report to Congress on the Arctic National Wildlife Refuge Coastal Plain Resource Assessment.

The IPCC's responsibility is to speak for the interests of those people in northeast Alaska and northwest Canada who rely upon the Porcupine Caribou Herd for subsistence.

O-222

First, you must know that our people are really angry about this report. It is unacceptable as written. We hope that our comments will help the Department do a better job in its Final Report to Congress. At this time the IPCC does not have a position for or against any alternative in the report. Our only purpose is to encourage you to meet your responsibilities to deal in good faith with the Native people of northeast Alaska and to help Congress and the general public to understand the importance of these decisions on our peoples. Our specific comments and recommendation follow:

1. With the exception of Kaktovik, your report fails to recognize or analyze the importance of Porcupine caribou to the many other villages of Alaska and of northwest Canada who utilize the PCH for subsistence.

   We believe it is essential that your final report describes the full range of use of Porcupine caribou by local communities. For those communities with a substantial dependence upon Porcupine caribou for subsistence (e.g., Arctic Village, Old Crow and Venetie), you should fully describe their use of and dependence upon Porcupine caribou, and how they would be affected if the herd declined or shifted its movement patterns away from village hunting areas.

   The report must analyze the possible effects each alternative could have on our culture, on alcoholism, and on the future of our communities. This should include all the alternatives, including what effects the Wilderness alternative might have on

subsistence access - like the problems in Anaktuvuk Pass and Noatak.

2. Your analysis failed to define the critical calving and post-calving grounds of the Porcupine Caribou Herd. This is essential information and must be addressed. In fact, by mapping just your "core" calving areas as "Resource 1" lands, you're hiding from people the truth about what lands are essential habitat for Porcupine caribou. Instead, you should define those lands used by the Porcupine Caribou Herd for calving and post-calving activities which together are critical to the future health and survival of this herd. From what our old people tell us and also from your own Fish and Wildlife Service studies, this essential habitat is much larger than the "core" calving area you defined in your map and report. You must address this issue honestly if people are to believe your reports.

3. For many years, your Department has rejected or failed to act on many Native allotments within the Arctic National Wildlife Refuge. You are recommending to open some of the most sensitive areas of this Refuge to exploration and possible development activities while still many, many allotments have not been granted yet. This shows again the disregard that your Department has held for the Native people who live in this region. We strongly recommend that the Department of Interior favorably adjudicate any outstanding Native allotment applications within the Arctic National Wildlife Refuge. In addition, allotment applications which were not accepted or which were rejected because of conflicts with the Wildlife Refuge should be re-adjudicated so that the Native people of the region may make a fair claim on those lands to which they would be entitled if it had not been a refuge.

4. Please expand the discussion of no-hunting corridors around development areas, including (a) a map of the areas that would be affected if these unwarranted no hunting zones were approved; and (b) a fuller discussion of why the Department feels justified in restricting Native subsistence hunting activities near oil developments in ANWR while permitting many more people to hunt near oil developments on the Kenai Wildlife Refuge.

5. How would the numbers for "economically recoverable oil resources" be affected if the price of oil did not go up as much as $33 (say $24 to $28)?

6. Under "standard for environmental protection" (p12), you say that development will be "conducted in a responsible manner that results in no unnecessary adverse affects." Does this change in any way your existing requirements that activities be "compatible" with the purposes of the ANWR including conserving the Porcupine Caribou Herd? The IPCC strongly believes that any activity within the range of the Porcupine Caribou Herd should

be compatible with the health and producivity of the herd and the subsistence needs of local people.

Thank you for the opportunity to comment. The IPCC will carefully look at your final report to Congress. It will be a big help to our people if it evidences an understanding of all the issues involved in this decision before it is discussed in Congress.

Sincerely,

for Jonathon Solomon, Chair
International Porcupine Caribou Commission

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DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print

Name LONNIE D. BROOKS

Mailing Address 6381 PIONEER DR

ANCHORAGE AK 99504

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☑ I am speaking for INTERNATIONAL ASSOCIATION OF GEOPHYSICAL CONTRATORS

(please enter name of organization you represent)

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ARCTIC NATIONAL WILDLIFE REFUGE

DECISIONS FOR TODAY--RESOURCES FOR TOMORROW

Testimony Given

to

UNITED STATES FISH AND WILDLIFE SERVICE

by

[redacted]

of

GEOPHYSICAL SERVICE INC.

5801 Silverado Way

Anchorage, Alaska 99518

on behalf of

INTERNATIONAL ASSOCIATION OF GEOPHYSICAL CONTRACTORS

In

Anchorage, Alaska

on

05 January 1987

DECISIONS FOR TODAY--RESOURCES FOR TOMORROW

I am Lonnie D. Brooks, Marketing Manager of Western U.S. for Geophysical Service Inc., the company that conducted most of the geophysical field work that formed the base for the petroleum resource evaluation included in the 1002(h) report. I am a geophysicist, registered in the State of California. I appear before you today testifying on behalf of the International Association of Geophysical Contractors, better known as the IAGC. The IAGC is an association whose members do virtually all the geophysical exploration for oil and gas in the free world.

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The IAGC is strongly supportive of the recommendation of Assistant Secretary Horn concerning the development of oil and gas in Alaska's Arctic National Wildlife Refuge and commends that recommendation to Secretary Hodel for inclusion in the final version of the ANILCA 1002(h) report that will be sent to Congress. We believe that recommendation to be required by the evidence presented in the report. Without question the 1002 area of the Refuge is one of the best places left in the world to look for oil and gas. We are very fortunate that it is located in the United States and should not pass up this gift with which we have been provided.

We agree with the writers of the report when they say that any adverse environmental effects of additional geological and geophysical exploration would be negligible. On page 99 the report says those effects could be expected to be the same as during the 1984 and 1985 seismic surveys, and on page 111 it says the effects from those surveys were negligible. The summer following those surveys, the USFWS ANWR Assistant Manager, along with two other persons, hiked across the Coastal Plain with a map of the seismic lines in hand. The hikers crossed 15 of the seismic lines and were able to detect visually only 7 of them.

The stage is being set for a very emotion charged public debate about the 1002 study area. Because of that it is likely that not all of the discussion about the Department's 1002(h) report will be based on the evidence. In 1971 J.E. Senungetuk published a book called Give or Take a Century in which the following statement appeared: "There has been a great outcry from the oil company combine, that the proposed pipeline, which would destroy Alaska's environmental integrity, is needed in order to make jobs available for the native people." This statement was made during the heat of the debate over whether or not to build a pipeline to carry crude oil from Alaska's North Slope to an ice free port in South Central Alaska. It was quite typical of the kind of emotional outpouring that occurred during that process from many good people of good will. The Trans Alaska Pipeline was destined to make the development of the oil fields of North Alaska possible, and Mr. Senungetuk's forecast was that it would destroy

Alaska's environment. But forecasts such as that of catastrophic consequences of the construction of the pipeline proved inaccurate.

We are likely to hear a great deal of the same kind of rhetoric during the debate over whether or not to open the Coastal Plain of Alaska's Arctic National Wildlife Refuge to additional exploration for and development of petroleum resources. Quite likely much of that rhetoric will be emotional in nature and extremely exaggerated with respect to possible negative consequences. Ironically, one of the principal causes of concern among professional environmentalists during the debate over the construction of the pipeline and the associated development of the oilfield at Prudhoe was the caribou that use the region, principally the Central Arctic Herd. Ironic because another caribou herd, this time the Porcupine Caribou Herd, is the focus of most concern and because not only did a decline in the range and size of the Central Arctic Herd not occur as a result of Prudhoe development, but the herd has more than doubled in size since that development. In the second paragraph of page 108 of the 1002(h) report, the authors go to some length to attempt to explain why the Central Arctic Herd did not decline following development, ignoring the fact that the problem for the antidevelopment enthusiasts is not to explain a lack of a decline, but to explain why the herd grew from 6000 animals to 14,000 between 1978 and the present. In protesting projections of Central Arctic Herd experience into the future of the Porcupine

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Herd in a development scenario, the authors of the report have stated in the first paragraph of page 106 the following: "Because of the greater density of PCH [Porcupine Caribou Herd] on their calving grounds, the PCH would interact with oil development much more extensively and intensively than the CAH has interacted with oil development in the Prudhoe Bay area." Even if one were to assume that such a statement is true, the link between that hypothesis and a negative impact on the animals of the PCH is very tenuous, because there has been no demonstration that a herd's interaction with facilities or anything else has any impact on the behavior of individuals in that herd. The authors make it seem as though they were talking about ants, not large mammals.

That habitat losses will occur is probably correct. That those losses will be major in the unqualified sense of paragraph 3 of page 107 of the report is not supported by the evidence accumulated during the years of interaction between the Central Arctic Herd and the development facilities at Prudhoe Bay and the Trans Alaska Pipeline. Even less supportable is the conclusion in paragraph 4 of page 112 that the loss of habitat will possibly lead to decline or displacement of the Porcupine Herd on the order of 20 to 40 percent. That projection needs to be understood as a possibility that is only minutely probable in the mathematical sense when reasonably projected from the data available. That also is the case with the statement in the second paragraph on page 112 which says that "the availability of suitable alternative habitats is not apparent." That statement is in stark contrast to

the data in the report. The map of Plate 2A shows the major insect relief areas either to be in the Brooks Range foothills out of the area proposed for development or on the coast where proposed mitigation measures would limit development operations to those that are absolutely essential such as port facilities. Additionally that map shows large portions of high use calving areas not to be where facilities are proposed and significant portions of those calving grounds to be completely outside the 1002 area. Therefore, a fraction of the habitat of a fraction of the PCH would be affected, for which there are alternative habitats within the PCH range!

The so called core calving area is called that because it has been used for calving in only 5 out of the last 14 years. But that same figure necessarily implies that 64% of the time the caribou have preferred to calve somewhere else. That completely destroys any contention that that area is irreplaceable in the life cycle of the herd. To support a claim that caribou can only calve one place one must be able to show they do not calve other places, and that obviously is not the case. The same rigors of the scientific method are applicable to the biological sciences that are applicable to the physical sciences. When one subjects less rigor and objective analysis to the living renewable surface resources, that are more easily observed and measured, than one does for the non-renewable subsurface resources, that are less easily observed and measured, then a bias results that fuels the irrational emotionalism. From the data displays in the 1002(h) report, and

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the documented evidence of the experience of the CAH, one should conclude that the PCH would not be expected to be significantly adversely impacted by a petroleum development scenario with appropriate mitigation measures, including monitoring of the PCH interactions with petroleum activities.

We support the testimony presented by the Alaska Oil and Gas Association, and further hold that it would be a national tragedy to forego the benefits that would accrue directly and indirectly to all Americans from the development of the oil and gas resources that may underlie the 1002 study area of the Coastal Plain of the Arctic National Wildlife Refuge. The benefits to so many should take their proper place when weighed in contrast to benefits to a few who oppose development in favor of preserving the privilege of an elite few who have the time and resources to invest in obtaining recreational access to an extremely remote region of Alaska's northland and want to enjoy that area without seeing any signs of development. Development of the 1002 study area of the Coastal Plain will involve a minuscule amount of the total area of ANWR, leaving an area bigger than the state of West Virginia for the special use of elitist outdoor recreationists.

Respectfully submitted,

INTERNATIONAL ASSOCIATION OF GEOPHYSICAL CONTRACTORS

Lonnie D. Brooks, Chairman
Alaska Regional Governmental Affairs Committee

National Audubon Society

National Capital Office 801 Pennsylvania Avenue, S.E. Washington, D.C. 20003 (202) 547-9009

January 23, 1987

Division of Refuge Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, DC 20240

Dear Sirs:

On January 9th, Mr. Peter A.A. Berle, President of the National Audubon Society, testified in the Department of Interior auditorium on the subject of the Draft Arctic National Wildlife Refuge Coastal Plain Resource Assessment. At the time of his testimony, he made a motion to submit to the formal record of these proceedings a research paper prepared by staff scientists for the National Audubon Society, titled "Oil and Gas Resources on Special Federal Lands: Wilderness and Wildlife Refuges," as published in the Annual Review of Energy 1986, Volume II, pages 143-61.

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Mr. Berle's motion was accepted by the hearing officer, and therefore, on behalf of Mr. Berle and the National Audubon Society, I hereby enclose a copy of that paper with, again, our formal request that it be incorporated into the full record of these proceedings as if read by Mr. Berle.

This is not a lengthy document, but it is extremely significant in the context of the escalating debate about whether it is appropriate to open the Coastal Plain of ANWR to limited or full exploitation for potential oil and gas resources. As Dr. Beyea shows, less than six percent of Alaska's oil is projected to lie within all Alaska wilderness, designated and potential -- including the coastal plain of the Arctic National Wildlife Refuge. President Berle emphasized this and related research findings in our formal statement, and noted that Audubon has prepared a National Energy Plan which points out our energy needs for the future can easily be met without further exploitation of any protected or potential wilderness, or other protected areas, such as National Wildlife Refuges.

It is because this paper, which has stood the test of peer review, is so significant, that we feel it must be incorporated into the record of these proceedings to assist the appropriate officials as they make recommendations for a final decision and position on this issue of vital concern to all of us.

Thank you for your consideration.

Sincerely,

Brock Evans
Vice President for
National Issues

1011F
Enc.

Ann. Rev. Energy 1986. 11: 143–61

OIL AND GAS RESOURCES ON SPECIAL FEDERAL LANDS: WILDERNESS AND WILDLIFE REFUGES

Alex Stege[1] *and Jan Beyea*

National Audubon Society, 950 Third Avenue, New York, NY 10022

Of all federal lands in the United States, wilderness and wildlife refuges are where pressures for resource exploitation most often conflict with environmental and conservationist objectives. Arguments in favor of federal leasing of these areas to energy developers have been bolstered by improvements in exploration methods, major oil price increases in the 1970s, the need to alleviate US dependence on foreign oil, and the expectation that previously unexplored federal lands would contain large oil and gas reserves. Advocates of energy exploitation, critical of increases in the amount of restricted land, have claimed that environmental restrictions on federal lands "lock up" significant energy reserves.

The following discussion critically examines this claim in light of recent reports indicating that very small amounts of oil and gas are located in regions where development is prohibited or severely restricted due to environmental regulations. We compare the significance of the environmental effects of oil and gas activities with the smallness of the recoverable oil and gas resources estimated to lie in wilderness lands, wildlife refuges, and other special, federally owned areas.

In order to describe the sensitive federal lands which are of primary concern in this paper and to clarify uncertainties arising from overlapping land categories, we begin with a few definitions.

[1] Current address: Center for the Biology of Natural Systems, Queens College, Flushing, NY 11367.

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DESIGNATED WILDERNESS

The Wilderness Act was established by Congress on September 3, 1964,

> to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition (1).

This Act, along with the Federal Land Policy and Management Act of 1976, initiated the National Wilderness Preservation System. The wilderness system consists today of 88.5 million acres of land that the federal government has formally designated as wilderness[2] (see Table 1). Designated wilderness, most of which is in Alaska, covers only 3.8% of the total US land area, including 17% of all National Forest land, 49% of all National Park land, 21% of all National Wildlife Refuge System land, and 0.1% of all Bureau of Land Management land. (See Appendix E in Stege & Beyea (2) for listings of acreages of designated and potential wilderness under the jurisdiction of each of the four agencies.)

Wilderness includes much of the country's most beautiful, biologically complex, unique, and primitive lands. Though sometimes labeled "single use" federal lands, wilderness areas in fact serve the public in many ways. The protection afforded wilderness lands is vital for many fish and wildlife habitats, watershed protection areas, historic preservation sites, and scientific study areas. Wilderness areas are also used for hiking, fishing, camping, and canoeing, and they offer the spiritual lift of peaceful surroundings. Public use of wilderness lands has increased dramatically; awareness of the fragility of these areas and concern for their protection have heightened correspondingly.

On designated wilderness, surface exploration (no drill holes) is allowed "if such activity is carried on in a manner compatible with the preservation of the wilderness environment" (3), as determined by the appropriate government agency (National Forest Service or Department of the Interior). Designated wilderness is also open to energy development in

[2] As defined by the Wilderness Act (1), wilderness is "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which 1. generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; 2. has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3. has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and 4. may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Table 1 Onshore US acreage, with a breakdown of federal land categories showing acreage for each category and percentages of the total lower 48, Alaska, and US land areas

Onshore US land category	Lower 48 states (millions of acres)	Alaska (millions of acres)	Total United States (millions of acres)
Federal land that is now, or may be in the future, severely restricted[a]	99.9 (5.1%)	139.1 (37.1%)	239.0 (10.2%)
Designated wilderness[b]	32.05 (1.6%)	56. 48 (15.1%)	88.53 (3.8%)
Potential wilderness[c]	48.9 (2.5%)	80.2 (21.4%)	129.1 (5.5%)
Special nonwilderness closed by statute[d]	8.0 (0.4%)	0.2 (0.1%)	8.2 (0.3%)
Special nonwilderness available subject to agency approval[e]	11.0 (0.6%)	2.2 (0.6%)	13.2 (0.6%)
Other federal land[f]	362.1 (18.3%)	187.9 (50.1%)	550.0 (23.4%)
Non-federal land[g]	1515 (76.6%)	48 (12.8%)	1563 (66.5%)
Total US land[g]	1977 (100%)	375 (100%)	2352 (100%)

[a] Tabulated from separate acreage totals for the National Park System (NPS), National Forest System (NFS), National Wildlife Refuge System (NWRS), and Bureau of Land Management (BLM). Three million acres (all in the lower 48 states) with water supply and reclamation as their dominant use (5) were subtracted from the total for all federally owned NPS acreage (4). NWRS acreage included 88.05 million acres of wildlife refuges and 2.1 million acres of waterfowl production and coordination areas (6).

[b] Designated wilderness acreages are current as of the designations of the 98th Congress (November, 1984) (6, 7).

[c] Potential wilderness acreage, broken down by governing agency, includes: NPS: Wilderness recommendations in Congress and wilderness studies in progress (8). Note that all NPS land in Alaska not designated as wilderness is listed as potential wilderness. NFS: Congressional wilderness study areas, pending recommended wilderness, and RARE II lands remaining in further planning (7). NWRS: Wilderness study areas and wilderness recommendations in Congress (Ron Fowler, US Fish and Wildlife Service, private communication, Nov. 16, 1984). All NWRS land in Alaska that was not designated as wilderness is listed above as potential wilderness, since these areas must be reviewed for wilderness suitability by December 2, 1985 (10). BLM: Wilderness study areas and instant study areas (Terry Woosley, US Bureau of Land Management, private communication, Dec. 17, 1984).

[d] Special nonwilderness restricted areas include: 1. all federally owned nonwilderness NWRS lands that were not purchased or acquired through gifts from private owners ("non-acquired withdrawn" lands) (12), 2. all federally owned nonwilderness National Park System lands except for 3.0 million acres with water supply and reclamation as their dominant use and 0.2 million acres in two National Recreation Areas in Washington (5); 3. 0.2 million acres of NFS National Monuments and 0.9 million acres of NFS National Recreation Areas (5).

[e] Special nonwilderness nonrestricted areas include: 1. all remaining nonwilderness NWRS acreage (approximately 4 million acres), which consists of lands acquired through purchase or gifts, and privately owned lands that NWRS is allowed to use through easement or lease. The mineral rights to these lands may or may not be owned by the federal government (Dom Cicerone, US Fish and Wildlife Service, private communication, Feb. 27, 1985); 2. 0.2 million acres in Lake Chelan and Ross Lake National Recreation Areas, Washington (5); 3. 0.3 million acres of NFS National Recreation Areas (5); 4. 6.5 million acres of the California Desert National Recreation Area (5), and the White Mountain National Recreation Area and the Steese National Conservation Area (14).

[f] Other federal land acreage includes remaining onshore federal lands. Total onshore federal acreage derived from (15).

[g] Total US and Alaska land areas were taken from (16). Federal land acreage was subtracted from total US acreage to yield nonfederal acreage.

areas where mineral rights are held by private owners and in areas leased from the federal government before the December 31, 1983, leasing deadline established by the Wilderness Act. Otherwise, designated wilderness is now closed to oil and gas activities by statute.

POTENTIAL WILDERNESS

As a part of the wilderness review process set up by the Wilderness Act and the Federal Land Policy and Management Act (17), the Departments of Interior and Agriculture must review certain roadless lands under their jurisdictions and report to the President on each area's "suitability or nonsuitability for preservation as wilderness" (18). These lands, under various stages of review, are grouped into the classification "potential wilderness." They include several federal land categories that have been identified as having wilderness qualities, but have yet to be formally designated as wilderness by Congress. Table 1 shows that there are about 129 million acres of potential wilderness in the United States (80 million in Alaska), or 5.5% of the total US land area.

According to the Wilderness Act, the wilderness qualities of potential wilderness must be protected to allow for possible future designation. The legislation establishing certain National Park Service, National Wildlife Refuge System, Bureau of Land Management, and National Forest Service lands that are listed as potential wilderness usually has similar requirements. How these restrictions on energy development are interpreted by the agency officials depends largely on the land management policies of the existing administration. The current policies of the Departments of Interior and Agriculture allow, within the guidelines of their interpretation of the mandated restrictions, oil and gas leasing, exploration, and possible development on potential wilderness lands that are not closed by other legislation.

For a more complete definition of potential wilderness broken down by federal agency, as well as a description of regulations and policies restricting oil and gas activities in each of the potential wilderness land categories, see Appendix A in (2).

NONWILDERNESS WILDLIFE REFUGES AND OTHER SPECIAL NONWILDERNESS LANDS

Although 90% of all National Wildlife Refuge System lands are designated or potential wilderness, 9.0 million acres of the refuge system in the contiguous 48 states are not (19). Created by a series of acts culminating with the 1966 National Wildlife Refuge System Administration Act (20), the National Wildlife Refuge System was designed "primarily" to protect fish

and wildlife resources. The system is under the jurisdiction of the Fish and Wildlife Service (Department of the Interior) and consists of just over 90 million acres, 77 million of which are in Alaska.

On about 5 million of the 9 million acres of National Wildlife Refuge System land outside of designated and potential wilderness, oil and gas leasing is prohibited by statute (12). Leasing of the remaining 4 million acres is not prohibited by statute, according to current Interior Department interpretation, although the Secretary of the Interior must first determine "that such uses are compatible with the major purposes for which such areas were established" (21). Nevertheless, the Department of Interior continues to follow its policy, established in 1958, prohibiting oil and gas leasing on wildlife refuge land in the lower 48 states (22).

Unlike the Wilderness Act, which specifies that wilderness must be roadless and undeveloped, the legislation establishing the National Wildlife Refuge System does not define how to determine the "compatibility" of oil and gas development with the purposes of the refuge. This lack of definition gives the Secretary of the Interior considerable leeway in deciding what activities should be allowed in nonwilderness wildlife refuges.

Other environmentally sensitive federal lands that are of concern in this paper include the nonwilderness parts of the National Park System (5.3 million acres), Forest Service National Monuments and National Recreational Areas (1.6 million acres), and Bureau of Land Management (BLM) National Recreation and National Conservation Areas (8.7 million acres). Of these 15.6 million acres, 3.2 million are restricted by statute and 3.2 million have water supply and control as the dominant use (5). The remaining 9.2 million acres are apparently available for oil and gas leasing subject to compatibility with their dominant use.

Another special federal land category that has restrictions on development is the Wild and Scenic Rivers System. Because it covers such a small area, largely within areas that fall in other federal land categories, the Wild and Scenic River System is not included in the tables or remaining analysis.

For a more complete description of nonwilderness wildlife refuges and other special nonwilderness lands, including regulations and policies restricting oil and gas development, see Appendix A in (2).

ENVIRONMENTAL IMPACTS OF OIL AND GAS EXPLORATION AND DEVELOPMENT

The following discussion attests to the need for stringent environmental regulations restricting energy development on wilderness, wildlife refuges, and other special federal lands. By evaluating the environmental effects of oil and gas activities, we will bring to light some of the social costs of

bypassing these regulations (that is, the loss of special values for which these lands were set aside).

Some of the immediate, short-term environmental impacts of oil and gas exploration on wilderness and other special federal land include:

1. increased soil erosion and siltation of streams (from deforestation, road construction, off-road vehicle travel, and landslides triggered by explosions used in seismic exploration),
2. disruption of surface and groundwater flow (by surface compaction, well drilling, and the extraction of large amounts of water for drilling activities) (24),
3. persistent loud noises (e.g. from networks of seismic exploration sites, where there often are continuous detonations of small explosions) (25).

In addition to the above impacts, the production of oil and gas causes air and water pollution from (*a*) oil, grease, and other contaminants left on the ground surface, (*b*) well blowouts and subsequent evaporation or burning of the oil, (*c*) mudpit flooding or leaching, and (*d*) pipeline ruptures or leaks (23).

Although brief in duration, many of these effects can nevertheless cause long-lasting or permanent destruction of wildlife habitat, depending on the success of reclamation. Overall, roads may be the single most destructive features of development. They make up a significant percentage of the area around oil and gas fields and greatly augment erosion. Roads also create dust and noise, fragment wildlife habitat, including hunting and migration routes, make possible wildlife injury or death from vehicular collisions, and increase uncontrolled human access to adjacent areas (26).

As an alternative to road construction, the use of helicopters for transporting equipment necessary for oil and gas exploration into remote or sensitive areas can be less environmentally destructive. Helicopter access is expensive, especially when heavy drill-rig equipment is needed for larger well sizes, and road access almost always becomes necessary during the development and production stages (25). This low-impact alternative to road access may become more viable with future improvements in helicopter technology.

The sensitivity of wildlife to human interference and habitat destruction depends to some extent on the timing and duration of the interference, and the species of wildlife involved. Some species have unusually narrow requirements for particular food, water, or cover. Many species with such narrow "niches" are unable to adapt to changes in the environment, particularly changes that occur during nesting, reproduction, or other sensitive periods. In addition, minor disturbances that occur continuously or repetitively may allow insufficient time for recovery. Periodic habitat destruction from repeated human encroachment, made possible by new

roads and stimulated every time the price of energy resources increases, can permanently scar an area and cause wildlife to disappear from it.

Disturbances that occur over a long period of time or cover a large area are usually caused by the "secondary effects" of expanding human populations attracted by energy development. Often overlooked, these secondary effects can cause greater detrimental impact than the more short-lived, intensive disturbances from the energy facilities themselves. Some of the effects of bringing large numbers of people into previously undeveloped lands include an increase in urbanization, consumption of limited water supplies, use of off-road vehicles, and construction of additional roads, power lines, and other utility corridors (27).

The effects wrought by influxes of people into areas where energy or minerals are being extracted have been an important part of the historic process of rapid, unplanned development that has resulted in the permanent loss of wilderness quality in over 95% of the land area in the lower 48 states.

The remaining lands with wilderness qualitities are particularly sensitive to the effects of oil and gas development, because they are generally found in remote areas with extreme climates, unstable hillslopes, and fragile vegetation. These conditions not only make wilderness lands more susceptible to surface disturbance but also often create insurmountable difficulties in reclamation. For example, landslides and other landscape scars often cannot be revegetated because the initial slope failure enhances continued downhill movement of soil. The disturbed hillslope becomes a conveyor belt of material that eventually reaches streams and fills in gravel beds vital for fish spawning. Revegetation is particularly difficult in arctic, alpine, and desert areas because plant recolonization and regrowth is extremely slow—sometimes taking hundreds of years or more. In some areas where soils have taken thousands of years to form in balance with the coexisting plant life and climatic conditions, soil layers lost by erosion cannot redevelop.

The destruction of wildlife refuge and wilderness qualities by oil and gas activities would last far longer than the short-term energy supply that, as will be shown below, might be extracted from these regions. Furthermore, the importance of wilderness and wildlife refuges and the demand for their use are expected to increase with time for a number of reasons. First of all, technological growth and expanding populations in this country will undoubtedly result in the continued exploitation of less-developed areas outside the remaining islands of protected federal lands. Such growth will decrease the area offering services similar to those of wilderness and wildlife refuges. As the availability of land suitable for wildlife habitat diminishes, many animals will die out since the carrying capacity of protected areas cannot increase to accommodate large influxes of animal populations

from surrounding lands. In addition, increasing human populations and urbanization will result in greater numbers seeking solitude and primitive experience through recreational use of wilderness lands. Finally, growing human populations will also bring increased demand for soil and water conservation. All these considerations heighten the value of remaining undeveloped, unpolluted land.

The importance of setting aside some federal lands as a safety valve against development was recognized by the Congressional leaders who passed the acts establishing the Wilderness and Wildlife Refuge Systems. However, the conflict between exploitation and preservation of wilderness and wildlife refuges continues. This conflict has been upheld by a polarity of values and by notions that the United States must choose between energy and environment. A close look at recent studies by the US Geological Survey (USGS) and others, giving energy resource estimates for onshore and offshore holdings, however, dispels the idea that such a choice must be made.

OIL AND GAS RESOURCES ON WILDERNESS LANDS

Consider the case of oil and gas resources on wilderness lands (both designated and potential). Table 2 shows an estimate of the amount of known and projected oil and gas located in the lower 48 states. This table and other resource estimates in this paper are based primarily on figures traceable to 1980 data gathered by the USGS during its last complete assessment of US resources (28). These 1980 figures have been updated to account for production losses subsequent to 1980. In the case of offshore resources, additional revisions have been made to account for recent (reduced) estimates of undiscovered oil and gas on the outer continental shelf made by the Minerals Management Service (29). All adjustments are described in Appendix B of (2).

The breakdown of the total onshore oil and gas estimates according to wilderness and other federal land categories was derived primarily from a study prepared for The Wilderness Society by Economic Associates Inc. (30).[3] The results of The Wilderness Society's study of onshore resources are consistent with a draft study prepared by the Scientists' Institute for Public Information (32).

To account for changes in wilderness acreage by the 98th Congress since

[3]The separate figures presented by The Wilderness Society for the western states in the lower 48 can be compared in an approximate way with a recent specialized USGS report on the oil and gas potential of wilderness lands in eleven western states (31). Agreement between the two sets of figures appears to be good, with the USGS report projecting lower resource estimates for both designated and potential wilderness lands. Although a direct comparison between the two studies cannot be made because different numbers of states were included

Table 2 Quads of US oil and gas resources estimated to lie on or off the shores of the lower 48 states[a]

	Petroleum	Natural gas
Onshore areas		
Federal land		
Designated wilderness[b] (32 million acres)	6 (1.2%)	5 (0.7%)
Potential wilderness[b] (49 million acres)	8 (1.7%)	8 (1.1%)
Other onshore federal land[b,c] (381 million acres)	77 (16.0%)	69 (9.5%)
Nonfederal land[b,c]	320 (66.7%)	511 (70.1%)
Offshore areas[c,d]	69 (14.4%)	136 (18.6%)
Total	480 (100%)	729 (100%)

[a] Includes economically recoverable reserves and potential (undiscovered) resources. Mean estimates. Acreages are taken from Table 1. Oil and gas figures were converted to quads using the following conversion factors: 5.6 quads per billion barrels of oil, 1.03 quads per trillion cubic feet of natural gas.

[b] Source: Economic Associates, Inc. (30), modified and updated to account for lower 48 states wilderness acreage changes during the 98th Congress. Adjustments to The Wilderness Society's oil and gas estimates for wilderness are discussed in Appendix B of (2).

[c] Estimates for total onshore and offshore energy resources are based primarily on reference (28). These estimates have been decremented to account for production since 1980. Additional adjustments to the offshore estimates were made using recent estimates for undiscovered recoverable federal offshore oil and gas resources (29). Both adjustments are described in Appendix B of (2).

[d] Includes offshore resources in both federal and state waters.

The Wilderness Society's study was published, adjustments have been made to the federal resource estimates given by them [see Appendix B of (2)].

As can be concluded from Table 2, designated and potential wilderness areas together hold only 2.9% of the oil and 1.8% of the natural gas resources in the lower 48 states. This comes as no surprise since wilderness areas cover only 4.1% of the land area in those states (see Table 1). The map in Figure 1, which shows designated and potential wilderness areas

in the definition of "West," the differences in projections are probably due to different methodologies [see Appendix C of (2)]. Had the USGS wilderness study been more complete, or had the area it covered matched geographically the areas examined in the study by The Wilderness Society, its figures could have been used directly in Table 2. Nevertheless, the approximate agreement found for the West in the two studies suggests that the methodology used by The Wilderness Society can reasonably be expected to give valid results for wilderness areas outside the states analyzed by USGS.

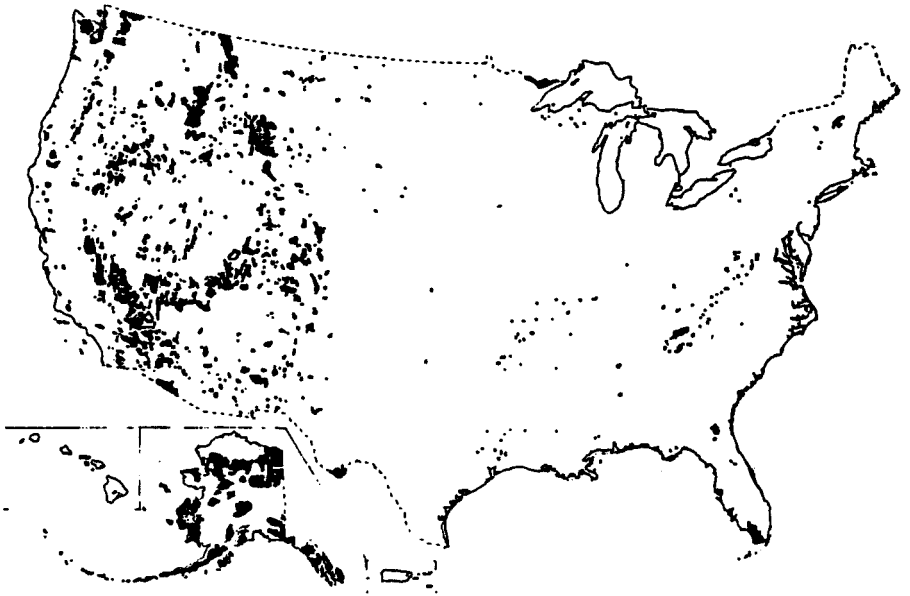

Figure 1 Remaining US wilderness. The darkened areas on the map represent lands that are in the National Wilderness Preservation System and other roadless areas under study for inclusion in the wilderness system. Copyright 1985 National Audubon Society.

in black, makes plain the confinement of wilderness to a small fraction of the lower 48 states land area [see Appendix C of (2) for a discussion of the methodology used to create the map].

The most recent energy/wilderness controversy in the lower 48 states concerns a relatively small amount of energy in the "Overthrust Belt" that cuts through Idaho, Montana, Wyoming, and Utah. Despite implications to the contrary by some energy companies, the total likely amount of energy resources in designated and potential wilderness parts of this region is almost certainly trivial from a national security perspective. It amounts to less than 3 "quads"[4] of oil and 5 quads of natural gas, according to another study commissioned by The Wilderness Society (33).[5] Three quads of oil represents about a five-week supply at current US oil consumption rates (34). The amount of oil and gas estimated to lie under designated wilderness land in the overthrust belt is, of course, even smaller.

Table 3 gives estimates of both known and projected energy resources in Alaska. Even there, only 5.6 and 8.6% of oil and gas resources, respectively, are estimated to lie in designated or potential wilderness lands, including the Arctic National Wildlife Refuge. Although the percentage of Alaska's land remaining as wilderness is large, the small percentage of oil and gas in these areas suggests that most Alaska wilderness lies outside of known or potential oil- and gas-producing areas.

Table 4 combines the figures for the lower 48 and Alaska and gives the oil and gas estimates for the entire United States. It can be seen from this table that the amount of oil estimated to be recoverable on all land designated as wilderness is 9 quads out of a total of 624 quads—that is 1.4% of the total. Nine quads of oil is less than a four-month supply for the United States. The situation for natural gas is similar; 1.1% of the total US supply is estimated to be located on lands designated as wilderness, an amount that equals a six-month supply at current consumption rates (34).

On a per-million-acre basis, the amount of oil and gas located on land designated as wilderness is projected to be only 41% of that of an average area in the United States.[6] This is not coincidental, since there are strong pressures, in choosing federal wilderness areas, to exclude land that appears highly promising from an energy standpoint.

[4] A quad is a unit of energy equal to 1 quadrillion Btu's (British thermal units), equivalent to about 5.6 billion barrels of oil, or 1.03 trillion cubic feet of natural gas.

[5] This study is somewhat out of date but the combined estimates for resources in designated and potential wilderness acreage should still be approximately correct.

[6] There are 2,352 million acres of onshore land in the United States (16). Table 4 indicates that 1175 quads of oil and gas are located on this land, i.e. 0.5 quads per million acres. In contrast, only 0.2 quads of oil and gas per million acres are projected to lie on designated wilderness land.

Table 3 Quads of US oil and gas resources estimated to lie on or off the shores of Alaska[a]

	Petroleum	Natural gas
Onshore areas		
Federal land		
Designated wilderness[b] (56.5 million acres)	3 (2.1%)	4 (3.4%)
Potential wilderness[b] (80 million acres)	5 (3.5%)	6 (5.2%)
Other onshore federal land[b,c] (191 million acres)	29 (20.1%)	22 (19.0%)
Nonfederal land[b,c]	61 (42.4%)	41 (35.3%)
Offshore areas[c,d]	46 (31.9%)	43 (37.1%)
Total	144 (100%)	116 (100%)

[a] Includes economically recoverable reserves and potential (undiscovered) resources. Mean estimates. Acreages are taken from Table 1. Oil and gas figures were converted to quads using the following conversion factors: 5.6 quads per billion barrels of oil, 1.03 quads per trillion cubic feet of natural gas.

[b] Source: Economic Associates, Inc. (30). Since no wilderness acreage changes have occurred in Alaska since 1980, no adjustments to The Wilderness Society's oil and gas estimates for Alaskan wilderness were necessary.

[c] Estimates for total onshore and offshore energy resources are based primarily on reference (28). These estimates have been decremented to account for production since 1980. Additional adjustments to the offshore estimates were made using recent estimates for undiscovered recoverable federal offshore oil and gas resources (29). Both adjustments are described in Appendix B of (2).

[d] Includes offshore resources in both federal and state waters.

Table 4 Total quads of US estimated oil and gas resources[a]

	Petroleum	Natural gas
Onshore areas		
Federal land		
Designated wilderness (88.5 million acres)	9 (1.4%)	9 (1.1%)
Potential wilderness (128 million acres)	13 (2.1%)	14 (1.6%)
Other onshore federal land (573 million acres)	106 (17.0%)	91 (10.8%)
Nonfederal land	381 (61.1%)	552 (65.3%)
Offshore areas	115 (18.4%)	179 (21.2%)
Total	624 (100%)	845 (100%)

[a] Includes economically recoverable reserves and potential (undiscovered) resources. Mean estimates. Includes Alaska. Oil and gas estimates are the sum of numbers from Tables 2 and 3. Acreages are taken from Table 1.

Should all the land under study as potential wilderness be designated formally as protected wilderness, the total energy resources lost to the nation would be trivial from a national perspective. The amount of oil and gas on wilderness land per million acres would still be only 42% of the average amount located on other US land. The total amount of oil and gas "locked up" would amount to 3% of projected US resources, not even enough for a 10-month supply of oil or a 16-month supply of gas at current consumption rates. Clearly, the nation would lose a small fraction of its energy if it were to complete the Wilderness Preservation System and permanently prohibit oil and gas leasing on potential wilderness.

From an economic perspective, oil companies would be foregoing about $500 per acre in oil and gas wealth to keep designated and potential wilderness wild for all time (assuming energy prices equivalent to $50 per barrel of oil).[7]

As has been shown in Tables 2 through 4, relatively little oil and gas is estimated to lie under wilderness lands. Because the strength of the conservationist argument hinges on the low oil and gas figures, the obvious counterargument is that the estimates could be low and that exploration should be allowed in order to check the USGS estimates. It is our contention that any exploration of these areas should be made by nonintrusive methods, without heavy equipment. Requirements for resource assessment are considerably less demanding than those for actually locating specific oil and gas reserves. Examples include satellite survey, aerial photography, geological sampling, geochemical surveys, and certain forms of geophysical surveys (e.g. gravity meters). Nonintrusive methods are currently inadequate for confirming existing USGS estimates, but that situation will no doubt change in the future. Fifty years from now, technologies for identifying natural resources will have surpassed the crude methods available to energy companies today.[8] With such a small percentage of US land remaining as wilderness, it would seem wise for the nation to be patient in confirming the USGS estimates.

If the USGS reports show such a small percentage of energy resources estimated to be on wilderness lands, how has the wilderness "lockup" misconception gained credence? One reason is that wilderness, non-wilderness, and offshore locations are not always distinguished when figures are cited on the large oil and gas resources estimated to lie on all federal lands.

[7] The discounted, net present value would be less than $500 per acre. In making this calculation, we define the economic value of the oil and gas to equal its market value minus the cost of production. We assume that it will cost, on average, 70% of the market price to locate and extract oil and gas in wilderness regions. The market price of natural gas is assumed to be 70% of the price of oil on a purely thermal basis.

[8] For instance, Nobel Prize-winning physicist Sheldon Glashow has proposed that neutrinos, which can penetrate deep into the earth, might be used to locate resources (35).

It can be seen from Table 4 that the amount of resources on federal lands is large, totaling over one-third of all projected US oil and gas resources. If the comparison is restricted to potential (undiscovered) resources, the projected percentage on federal lands turns out to be even higher. But to infer that wilderness restrictions will prevent these resources from being tapped is unreasonable. As can be calculated from Table 4, wilderness restrictions to energy exploration, leasing and development will prevent extraction of less than 10% of the oil and gas resources controlled by the federal government. Arguments that the United States must, for energy security, trade away the quality of its last wilderness lands have no basis.

Thus, barring the highly unlikely event that the total USGS estimates prove significantly inaccurate,[9] the evidence presented clearly supports the position that the 9 quads of oil and 9 quads of natural gas estimated to lie under land already legally designated as wilderness can remain underground forever without significant loss of US energy supply. The same reasoning holds true for the 13 quads of oil and 14 quads of natural gas estimated to lie under wilderness land that has yet to be formally designated as wilderness. The tens to hundreds of years required for surface restoration of developed land overwhelmingly dwarf the very brief time scale over which the United States could be supplied by energy extracted from wilderness lands.

When this country was first settled by Europeans, almost all of the land area corresponding to the 48 states was wilderness and teemed with wildlife. The unrestrained pressure of civilization has steadily eroded wilderness areas to a small percentage of the total—4.1% in the lower 48 states. Although development has consumed forever almost all of the lower 48, our wilderness resources can still be preserved in Alaska (where nearly 37% of the land area remains as wilderness). To those who value wilderness, it is critical that the nation's last remaining fragments are safeguarded from development. Unless the nation maintains the sanctity of all wilderness areas by completing the wilderness system and giving potential wilderness the same protection now enjoyed by designated wilderness, much of that small percentage will disappear.

[9] It is true that the estimates for any one wilderness area are uncertain. (The 95% confidence upper limit for a given area may be a factor of two to three higher than the average estimate.) But it is highly unlikely that all the individual estimates would be uniformly low. Thus, the percentage error in the total wilderness figures will be smaller than the percentage error in estimates for individual wilderness areas.

OIL AND GAS RESOURCES ON SPECIAL NONWILDERNESS LANDS

There are 8.2 million acres of special nonwilderness lands, administered by the National Wildlife Refuge System, the Forest Service, and the Park Service, that are closed to oil and gas activities by statute. On another 13.2 million acres, including 8.7 million acres of BLM land, leasing is allowed whenever the Secretary of the Interior or Agriculture determines that the oil and gas activities are compatible with the purposes of the area [see Appendix A of (2)]. In practice, a large percentage of these 13.2 million acres could be ruled out for energy activity indefinitely, by administrative policy or future legislation or court decisions.

Consequently, it is of interest to estimate the amount of energy resources involved in all 21.4 million acres of these special nonwilderness lands. Although separate estimates of oil and gas for this acreage are not available, it is reasonable to expect that land excluded by Congress, or restricted by the Department of the Interior or the Department of Agriculture will contain less oil and gas per million acres than does average US land. If this is the case, then less than 5 quads of oil (two months' supply) and less than 6 quads of natural gas (approximately four months' supply) will be at stake.

OIL AND GAS RESOURCES IN OTHER FEDERAL LAND (ONSHORE)

Most of the federally controlled onshore oil and gas resources are estimated to lie within the category "other onshore federal land" in the tables. The bulk of this land is open to energy development, although some of the area may be subject to environmental requirements that increase the cost of exploring and drilling for oil and gas resources. This increase in cost due to environmental regulations may delay extraction until such times as the overall economics become more profitable. Eventually, lowered costs due to improvements in exploration technologies and production processes, coupled with increases in energy prices, will offset the cost of environmental regulations and allow development to continue. We expect that virtually all 101 quads of oil and 85 quads of gas remaining in this nonspecial land category will eventually be available to energy companies.

OIL AND GAS RESOURCES IN OFFSHORE AREAS

More total oil and gas resources are estimated to lie in offshore holdings than in all the other federal land categories combined. At present, the only

offshore areas that are permanently off limits to energy development by statute are 1.9 million acres within two National Marine Sanctuaries off the coast of California (36). We anticipate that, subject to lease stipulations to protect biological and other nonenergy resources, the vast majority of offshore areas will eventually be explored and developed for energy purposes.

At present, there is no offshore biological resources inventory and critical areas review process analogous to the wilderness review process for determining areas that should be placed permanently off limits to oil and gas development. The National Marine Sanctuaries Act (37) does not prohibit leasing in marine sanctuaries or require periodic review of offshore areas for inclusion in the sanctuary system. [See Appendix A of (2).] Until such a review process is established, it would be prudent to proceed with offshore leasing slowly enough for site-specific environmental impact assessments to determine what valuable nonenergy resources might be jeopardized by oil and gas development, and where leasing should be delayed or prohibited. Delaying offshore leasing would not be costly to the government in the long run. In fact, since off-shore leases are expected to become much more valuable over the next few decades, such delays should result in significantly more money for the government when these areas are eventually leased.

There are compelling environmental reasons for delaying offshore development in areas with extreme climates, such as "pack-ice" regions of Alaska. Here, drifting ice creates such a hostile setting for workers and equipment that current oil extraction, transportation, and spill control technologies are unable to ensure reasonable protection of the environment from oil spills. The authors of one major study state, "We doubt that there will ever be a completely satisfactory response to cleaning up an arctic offshore oil spill other than preventing it from occurring" (38).

The effects of both large oil spills and chronic low-level discharges from normal drilling and production operations on the sensitive and economically valuable biota inhabiting arctic and subarctic regions are largely unknown. The same is true of other so-called frontier areas. One option is to proceed only after sufficient research has been performed to allow an informed assessment of the risks and benefits of oil exploration and development. For the moment, exploration in frontier areas could be restricted to places close to deposits that have already been located, and where demonstrated oil spill containment and cleanup capability exists.

Despite the argument for gradual, site-specific leasing of offshore areas (with stipulations to ensure adequate environmental protection), the federal government has been attempting to lease virtually the entire US Outer Continental Shelf—almost a billion acres—by 1992. In response to the

Reagan administration's policy of large-scale, area-wide leasing, Congress has passed temporary moratoria on oil and gas leasing off much of the California coast, around Georges Bank off the coast of Massachusetts, and along a buffer strip off Florida's Gulf coast.

Nevertheless, temporary moratoria will not be extended forever and should give way to permanent prohibitions on oil and gas leasing in sites identified by a critical offshore areas review process. Even without a comprehensive review process, sufficient evidence already available indicates that certain offshore regions should never be leased because of their importance as fisheries or because of their proximity to vulnerable coastal ecosystems—coastal marshes, coral communities, and pristine beaches. For instance, Bristol Bay in Alaska and Georges Bank supply a significant portion of the world's fish protein and are prime candidates for being put off limits to oil and gas leasing by statute.

As a result of excluding 1. Bristol Bay and Georges Bank, 2. certain regions off the California coast, and 3. miscellaneous other sites that might be identified by an offshore areas review process, we estimate that perhaps 13 quads of oil and 10 quads of natural gas will be permanently unavailable for development (or about 11% of offshore oil and 6% of offshore gas resources, or 1.6% of total US oil and gas resources). Thus, if permanent restrictions come out of an offshore review process they are likely to be modest.

CONCLUSION

Based on the analysis presented in this paper, we expect that more than 94% of US oil and gas resources will eventually be available to energy companies (see Table 5).[10] This does not, however, mean that energy exploitation can be given free rein in areas that are open for development. The ease with which ecosystems can be damaged by development necessitates careful vigilance over the environmental impacts of energy activities in all areas. Laudable progress has been made in the past decade by some of the larger oil companies that have accepted the need to seriously pursue mitigation methods. Nevertheless, oil and gas companies would be wise to expand their efforts to develop environmentally sound methods of exploration and extraction that are suitable for the great percentage of land, both public and private, on which such activities need not, or will not, be prohibited completely.

[10] Although not shown directly in Table 5, percentage resource availabilities can be calculated for land categories other than total US resources using figures given in earlier tables. The results indicate that (*a*) 92% of all offshore resources, (*b*) 76% of onshore federal lands, and (*c*) 85% of all federal resources should eventually be available to energy companies.

There will always be proposals to use environmentally valuable land such as wilderness and wildlife refuges for energy and mineral development. The pressure of proposals for development in these areas cannot be relieved by granting one-time access. Each time the price of energy or minerals jumps, or whenever a new technology allowing recovery of formerly inaccessible resources is developed, engineers have an incentive to return to an area for a closer look. Plans for development in environmentally sensitive areas, shelved due to economic or technological constraints, may be revived decades later. Only statutory protection, such as that granted by inclusion in the wilderness system, can provide long-term protection.

A nation, like ours, with a 200-year history should look at the wilderness and wildlife preservation issue in a time frame that spans hundreds of years, not mere decades. Only with such a perspective can we pass on to succeeding generations these living laboratories of natural history that are still intact. Wilderness Society chairman Gaylord Nelson has said, "The ultimate test of man's conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard" (39).

Table 5 Summary of long-term availability of US oil and gas resources (if permanent restrictions to development were placed on designated and potential wilderness, special nonwilderness onshore lands, and critical offshore areas)

	Oil (quads)		Gas (quads)	
Areas that are or may be restricted				
Designated and potential wilderness[a]	22		23	
Special nonwilderness[a,b]	6		7	
Critical offshore areas[c]	13		10	
Total	41	(6.6%)	40	(4.7%)
All other areas[a,c]	583	(93.4%)	805	(95.3%)
Total estimated US resources	624	(100%)	845	(100%)

[a] Source: Economic Associates, Inc. (30), modified and updated as described in Appendix B in (2).

[b] Special nonwilderness areas include 21.4 million acres, most of which (62%) have no statutory restrictions on oil and gas development (5). Energy resources for this acreage were (over-) estimated using a ratio, derived from reference (30), for oil and gas resources per million acres of total US land.

[c] These figures are based on our estimate of offshore areas that need to be placed permanently off limits to development, using the most recent estimates available for undiscovered federal offshore oil and gas resources (29). 23 quads represents 7.8% of all estimated offshore oil and gas resources.

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National Audubon Society

TESTIMONY ON BEHALF OF THE
NATIONAL AUDUBON SOCIETY

AT A PUBLIC HEARING ON THE

DRAFT ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

BY

PETER A.A. BERLE
PRESIDENT

WASHINGTON, D.C.
JANUARY 9, 1987

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AMERICANS COMMITTED TO CONSERVATION

My name is Peter A.A. Berle, and I am the President of the National Audubon Society. I am testifying on behalf of the Society, including its 550,000 members nationwide, 2,600 of whom are in Alaska.

After carefully examining the "Resource Assessment Report" for the coastal plain of the Arctic National Wildlife Refuge, we are convinced it is not in the long-term conservation, economic or national security interests of the United States to open the coastal plain to leasing at this time. We urge, therefore, that no leasing or land exchanges be permitted by Congress, and that the U.S. Fish and Wildlife Service be directed to protect and manage the entire Arctic National Wildlife Refuge consitent with the conservation purposes, including wilderness protection, for which it was originally established by Congress.

We wish to commend the many dedicated resource professionals in the U.S. Fish and Wildlife Service, U.S. Geological Survey and Bureau of Land Management who gathered information for the assessment report, often at great personal risk and sacrifice. Because of their many contributions, the outstanding wildlife and wilderness values of the coastal plain have been reconfirmed and understood better than ever before.

As one of the oldest and largest conservation organizations in the United States, the National Audubon Society has a long history of involvement in the Arctic National Wildlife Refuge. We recognize it as a very special national

treasure. Dedicated friends in conservation, including Olaus and Margaret Murie, worked long and hard for its establishment in 1960 to preserve a portion of the eastern Brooks Range of arctic Alaska for its outstanding wilderness values. Thus, unlike many other refuges in the system, the Arctic Refuge was established not out of a singular need to conserve wildlife, but to preserve for all time the spectacular wilderness ecosystem of northeastern Alaska as a whole. Audubon strongly supported this far-sighted action, and so too enlargement of the refuge in the Alaska National Interest Lands Act of 1980 (ANILCA). Over the years we have worked with other conservationists to protect the refuge from a series of threats from development interests; for example, we opposed construction of an oil pipeline across the coastal plain in 1968-73, and opposed construction of a gas pipeline in the same place in the years 1974-77.

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In this debate over the future of the Arctic Refuge and its coastal plain, it is vitally important to realize that major compromises have already been made on Alaska's North Slope between development and conservation interests. These compromises have resulted in current land jurisdictions that essentially make almost 90 percent of the slope potentially available for oil and gas leasing. This is not to mention the additional 24 million acres of nearshore (state) and offshore (federal OCS) lands available in the adjacent Beaufort Sea. A mere 2 million acres of the entire North Slope has been committed to conservation purposes in the Arctic Refuge. Now most of that is under siege

by development interests. The questions must be asked: Where will the compromising stop? Aren't there any public wilderness lands along the arctic coast of Alaska that should be considered sacrosanct?

It is also important to note that this 18 million-acre refuge is the second largest unit in the National Wildlife Refuge System, and the largest and most spectacular arctic wilderness sanctuary for wildlife in the world. Wildlife species of particular national and international concern include the 180-thousand-member Porcupine caribou herd (whose calving ground is on the refuge coastal plain), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds, and arctic char and grayling.

When considered in conjunction with the North Yukon National Park that adjoins it on the east, the Arctic Refuge constitutes an international commitment to the protection of wild nature. Major industrial developments on either of these units is clearly incompatible with their purposes.

We agree with the Department of the Interior (on page 45 of the draft assessment report) that:

> "The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America."

and (on page 46) that:

"The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge. Caribou migrating to and from the 1002 area and the post-calving caribou aggregation offer an unparalleled spectacle."

Despite these outstanding natural values, and the fact that the chance for discovery of an economically recoverable oil field is only 19 percent, the Department of the Interior is recommending that the entire coastal plain be made available for leasing to the oil industry. The department has left us no reasonable alternative but to oppose its recommendations because of the following serious shortcomings in its resource assessment process for the coastal plain:

1. Failure to point out that the compromise to establish the Arctic Refuge in 1960 to preserve its unique wildlife, wilderness and recreation values resulted in the remainder of Alaska's vast North Slope and adjacent offshore waters being made available for oil exploration.

2. Failure to release for public review and comment geologic information critical to the 1002 assessment process. This gives those who could profit from exploiting refuge resources adavantage over those who actually own those resources -- the American people.

3. Failure to reveal its proposed land trades with various Alaska Native corporations and the State of Alaska, and to demonstrate how such trades will serve in the public interest.

4. Failure to justify full leasing when prospects for discovery of even one major economically recoverable oil field on the coastal plain is only 19 percent (pages 49 and 68), and with the market value of leases depressed because of the world oversupply of oil.

5. Failure to conduct a comprehensive economic analysis to show how the benefits to the Alaska and national economies can be optimized from leasing, both in the short and long term.

6. Failure to provide evidence that the Department will ensure that air and water quality wil be protected from toxic chemicals and other pollutants such as those creating problems in the Prudhoe Bay oilfield.

7. Failure to explain how adequate water and gravel supplies will be obtained after finding that " specific locations and sources of water and gravel for exploration and development activities have not been identified; it is understood that these resources, especially water, are not readily available on the 1002 area," (page 75).

8. Failure to explain why it wouldn't be in the strategic interests of the United states to purchase more foreign oil at current low prices for addition to our nation's "Strategic Petroleum Reserve" rather than lose income to the federal treasury by further flooding a depressed lease market through opening the Arctic Refuge.

9. Failure to evaluate cumulative impacts on the Arctic Refuge from oil and gas lease sales on more than a million acres of adjacent state lands (Camden Bay, Demarcation Point and Prudhoe Bay uplands) and 21.2 million acres of OCS leases (Sale 97) in the Beaufort Sea scheduled for July 1987. The latter sale, just off the refuge coast, is the largest oil and gas lease sale ever held in the Artic Ocean.

10. Failure to thoroughly discuss alternative energy policies that if implemented could make the nation energy secure without exploiting the Arctic Refuge.

11. Failure to assure that scarce refuge staff and funds will not be diverted from refuge conservation programs to monitor and regulate industrial activities on the coastal plain. (Since the coastal plain resource assessment was initiated in 1982, more than 90 percent of the refuge budget has been devoted to the 1002 assessment process, resulting in the almost total neglect of the overall refuge conservation program.)

12. Failure to recognize that a North Yukon National Park adjoins the Arctic Refuge and that the United States has responsibilities to cooperate with Canada in protecting shared wildlife resources.

13. Failure to address the need for cooperative management of the Porcupine caribou herd with Canada through the international management agreement that has been negotiated over the past several years.

14. Failure to hold public hearings in all Alaskan communities that will be directly affected by the proposed action, and to make an adequate number of copies of the assessment report available in a timely manner.

Unfortunately, a series of citizens' lawsuits proved necessary during the assessment process to assure that the law was followed, and citizen monitoring of government activities was required as well to learn of industry activities taking place on the Arctic Refuge. And, despite the magnitude of resources at stake and the seriousness of the consequences of the decision on people both in Alaska and throughout the nation, the Department of the Interior chose not to make this report available for public review and comment. A citizen lawsuit was necessary to make the report available. Then, after being forced to release the report for public review, the Department abbreviated the comment period to 60 days over the Christmas holiday period. This is not the way a democracy like ours should work.

In fact, it is clear to us that the Department of Interior has already shown such a bias on this sensitive matter that it is hard to believe that these hearings are anything more than pro forma proceedings. One example of this strong and obvious prejudgement of the issue is an article written by Assistant Secretary Horn for the December issue of Alaska Constuction and Oil magazine. This article, obviously prepared well before the public release of the report in late November, explains to the oil industry and others how to influence the Congress to vote to open up the Refuge.

Further evidence of bias is not necessary -- but unfortunately it exists -- in the form of an extraordinary and unprecedented "press release" of the "Alaska Support Industry Alliance." This document appeared on the same table as the Department of Interior press release on the report, just outside the briefing room inside the Interior Building, where Mr. Horn was allegedly presenting the report to the public for the first time. Such a release prepared by a presumably non-governmental body, wholeheartedly indorsing an allegedly secret report that no one had yet seen, is clear evidence to us that the oil industry and its supporters had been carefully consulted and coordinated with long before the report was shown to the rest of the American people.

In addition to Audubon's long history of involvement in wildlife conservation, another major priority goal of the Society is to "promote national strategies for energy development and use, stressing conservation and renewable energy resources." In an effort to achieve this goal, we have developed an energy plan with input from energy experts in industry, government and the academic community. This was done in the realization that energy is a major factor in determining the quality of human life. It furthers the production of goods and services, but its production and use can seriously impact the quality of the environment.

The Audubon Energy Plan is a practical, step-by-step alternative to the Administration's energy policy of exploiting the last remaining wilderness

lands in the United States. It shows that proper planning and policy development at the federal level will enable the United States to produce more goods and services while actually improving the environment. The environmental pay-off will be cleaner air, purer water, and less pressure to exploit wilderness lands and wildlife habitat such as that in the Artic Refuge.

True, the Audubon Plan requires the introduction of regulatory measures that correct imperfections in the marketplace, such as efficiency standards for home appliances and fuel economy standards for automobiles. Such reliance in our Plan on modest measures to promote cost-effective conservation stands in contrast to the approach taken by the Administration, which holds that conservation should be left solely to the marketplace, no matter how far economists tell us individual markets are operating from the cost minimum, no matter how much energy is being wasted as a result. When this blindspot toward energy conservation is combined with the Administration's skepticism towards environmental protection, it is perhaps not surprising that the Administration makes drilling in wilderness areas one of the pillars of its energy policy. Fortunately, the recent bipartisan show of support in Congress for appliance efficiency standards indicates that the Adminstration is out of touch with the country when it comes to tolerance of modest conservation regulations. We are confident that a Presidential veto of the appliance bill in the upcoming session will be overridden by Congress. We are also confident that, when the choice is clearly put, Congress will decide to enact additional conservation legislation in order to preserve our national treasures such as the Arctic Refuge (as well as to save consumers money).

In the meantime, and as long as this Administration refuses to take reasonable administrative and legislative action to promote cost-effective energy conservation, we will have no choice but to oppose attempts to open the Arctic Refuge to oil and gas development. Audubon has worked hard, particularly at the state level, to get appliance efficiency standards enacted. In New York, we initiated the process that led Governor Cuomo to introduce a tough efficiency standards bill last year. Massachusetts Audubon played a similar role in getting a bill introduced (and passed) in Massachusetts. Audubon members are well aware that preservation of wildlife and protection of the human environment requires wise husbanding of our energy resources.

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Audubon has been actively involved in efforts to develop a long-range comprehensive management plan for the Arctic Refuge. However, we have not been party to any actions that would preempt a thorough review of the mandated assessment report, waiting to judge it on its merits, waiting to see if there might be any places where exploratory drilling could be allowed without risking serious interference with wildlife and the wilderness quality of the land. However, instead of a complete and objective report with viable management options, we found the 1002 report biased, contradictory, and lacking essential information. The only possible excuse for this report is that Interior must not really be serious, but is floating a totally unreasonable position in the hopes of maximizing its bargaining power in

Congress. If so, the tactic is likely to backfire by completely alienating those organizations willing to not prejudge the matter in advance. Certainly, this has been the effect on the National Audubon Society.

The major undiscovered deposits of oil and gas on federal land holdings are thought to lie off the coast of the lower 48 states and Alaska. Thus, in the next two decades, as known onshore reserves are depleted, offshore development will become more important. Relatively little offshore land is permanently off-limits to energy development.

The fact that all federal lands have not yet been leased does not mean that development is proceeding too slowly. These leases will be much more valuable ten to twenty years from now. If the government were to lease all these lands at once, flooding the market, it would get an unfairly low economic return for the taxpayers.

Judged in this context, the Reagan Administration is making a serious mistake in rushing to lease virtually the entire U.S. Outer Continental Shelf (OCS) -- almost a billion acres -- and onshore prospects as well. The practice of offering tens of millions of acres of public lands each year at a time when oil prices are depressed raises very serious questions about whether the entire federal leasing program is amounting to a giveaway to the oil industry.

By flooding the market with lease offerings, it is clear that the administration is helping to drive the price of leases down, thereby providing

the oil industry with an opportunity to lease large acreages at bargain-basement prices. Evidence of this downward pressure on lease prices is overwhelming:

* The average bid per acre under the Reagan Administration's 5-year program has been less than half that under the Carter program ($1,092 per acre versus $2,381 per acre), (Washington Post, November 8, 1983.) Before Interior went to area-wide leasing in 1982, the average price per acre for OCS lease bids in Alaska was $2,794. After area-wide leasing was initiated, OCS lease sales in Alaska netted an average of only $1,229 per acre, (OCS Report, MMS 86-0067, September 1986.)

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Aside from the economic arguments against leasing so much so fast when oil prices are depressed, there is a compelling conservation argument. Huge lease offerings involving tens of millions of acres make it impossible to do

meaningful environmental impact analyses. Additionally, they make it extremely difficult for states like Alaska to conduct rational development planning.

In Alaska, less than 6 percent of oil resources are estimated to lie beneath designated or potential wilderness lands, including those in the Arctic National Wildlife Refuge. Clearly, Congress and the federal government have already made sure that lands with the vast majority of highest potential for oil and gas have been excluded from consideration as potential wilderness.

Relatively little oil and gas is estimated to lie under wilderness lands. When this country was first settled by Europeans, 100 percent of the land area corresponding to the 48 states was wilderness and teeming with wildlife. The unrestrained pressure of civilization has steadily eroded wilderness areas to a small percentage of the total -- 4 percent in the lower 48 states. To those who assign value to wilderness, it is incomprehensible that anyone would object to protecting the nation's last remaining fragments. Unless the nation maintains the sanctity of designated and potential wilderness areas, even that small percentage will disappear.

There will always be proposals to use wilderness and critical habitats for other purposes, particularly energy and mineral development. But little wilderness will be left if the engineers are allowed to scour the land for the next thirty years and beyond -- building new roads and drill sites, returning

for a closer look each time the price of energy or minerals jumps, and returning whenever a new technology allowing recovery of formerly inaccessible resources is developed.

The National Audubon Society believes that a nation like ours with a 200-year history should look at the wilderness preservation issue in a time frame that spans hundreds of years rather than decades. Only with such perspective can the nation pass on to succeeding generations the wilderness resources that are still intact. Indeed, on numerous occasions in our national life, our leaders have consciously decided to forgo the sacrifice of wilderness and wildlife resources for the sake of others. The creation of Olympic National Park with its large amount of commercial forest, or the recent refusal to permit oil and gas exploration in the Bob Marshall Wilderness come immediately to mind.

The fact is that wilderness such as that on the Arctic Refuge coastal plain serves a variety of valuable, noncommercial uses: wildlife habitat, watershed protection, scientific study, fishing, hunting, camping, hiking, and most other forms of dispersed, low density outdoor recreation. Such wilderness lands offer also the spiritual lift of peaceful, truly natural settings.

Although not every oil industry organization takes the limited view on wilderness protection espoused by such organizations as the American Petroleum

Institute, there is obviously a clash in values between advocates of exploitation and those who favor preservation -- a dispute that must continuously be settled through the political process. The Audubon Energy Plan has been developed with this dispute in mind. The Plan demonstrates that there are practical alternatives to exploiting the last of our wilderness areas. The United States can leave wilderness alone and still solve its need for a safe and assured supply of oil. The total amount of oil and gas that may be found in wilderness is simply too small to justify the abandonment of the nation's remaining wilderness heritage.

Under the Audubon Energy Plan, the mean risked estimate of 1.6 billion barrels of oil and the 1.6 billion barrel equivalent of natural gas estimated to lie under land already legally designated as wilderness would remain underground forever. The same would be true for the 2.3 billion barrels of oil and the 2.5 billion barrel equivalent of natural gas estimated to lie under wilderness land that has yet to be formally designated as wilderness, (A. Stege and J. Beyea, "Oil and Gas Resources on Special Federal Lands: Wilderness and Wildlife Refuge," Annual Review of Energy, Vol. 11, 1986, pp. 143-161.) Because wilderness land would never be exploited under the Audubon Plan, there would be no need for exploration.

The estimates for oil in wilderness lands given above assume a mean risked estimate of 600 million recoverable barrels of oil for the Arctic Refuge. In contrast, the Draft Coastal Plain Resource Assessment mentions a figure of 3.2

billion barrels, without clearly specifying whether or not the estimate is "risked." (We suspect it is not.) Clarification on this point is needed from Interior. If the 3.2 billion figues is risked, that is, already incorporates the risk of finding no oil (81%), Interior would be claiming that there are 2.5 billion more barrels of oil likely to be found in wilderness lands than in the estimates we have been using. Nevertheless, even an additional 2.5 billion barrels would not change the fact that a very small percentage of U.S. oil is in potential and designated wilderness lands. The percentage of U.S. oil resources on these lands would rise from 3.5 percent to 5.8 percent.

The only type of exploration that we could ever consider, especially given the fragile nature of the arctic wilderness, would be that conducted by nonintrusive methods, such as satellite survey. Nonintrusive methods are currently inadequate for confirming existing Interior estimates, but the situation will no doubt change in the future. Fifty years from now, technologies for identifying natural resources will have surpassed the crude methods available to energy companies today. With such a small percentage of U.S. land remaining as wilderness, it would seem wise for the nation to be patient in confirming Interior's etimates. Surely, Mr. Chairman, the wilderness of the High Arctic -- our Serengeti -- is one place where we can afford to wait.

As has been indicated, the National Audubon Society is not opposed to any resource extraction on federal lands. We expect that more than 95 percent of

oil and gas resources on federal lands will eventually be tapped. The Society stands ready to work with oil and gas companies to help them develop environmentally sound methods of exploration and extraction that are suitable for the great percentage of land, both public and private, on which such activities need not be prohibited completely. Audubon will continue to insist, however, that exploitation of resources on public lands be carried out carefully in a manner that protects the environment and wildlife. Audubon will continue to oppose oil and gas exploration in any situation where government agencies or energy companies move hastily, without fully assessing the environmental and economic effects of activities or providing adequate safeguards for their implementation. This appears to be one of those cases.

It is argued by industry that the coastal plain of the Arctic Refuge must be leased now becasue it will take at least 15 years to develop any oil fields discovered there. We strongly doubt that. It must be remembered that following discovery of oil at Prudhoe Bay in 1968, oil was flowing through the 800-mile-long Trans Alaska Pipeline (TAPS) by June of 1977, a period of only 9 years. All that would be needed, should oil production be permitted on the Arctic Refuge, would be a 100 to 150-mile-long pipeline spur (at maximum) to tie into TAPS. Our guess is that industry could bring an oilfield on line in the refuge within five years, should it someday prove in the national interest to do so.

It is an illusion to believe that leasing on the coastal plain of the Arctic Refuge will solve the economic problems of the North. After all, its

whole purpose is to deliver northern oil to homes and industries in the South -- or perhaps the Orient. Indeed, rather than solving the North's economic problems, it may accentuate them. For evidence of this, we need look no further than the situation in Alaska today. With the Trans Alaska Pipeline carrying oil at near full capacity, the state is going through one of the most serious economic recessions in its history. The result in many cases is lost dreams and destroyed careers.

The situation on the Arctic Refuge obviously calls for bold and courageous political leadership at both the state and national levels. For politicians to be holding out the promise that yet another great oil bonanza lies beneath the arctic tundra just waiting to be exploited only postpones the day when all Americans must begin to live within their means by implementing cost-effective conservation measures.

On page 6 of its assessmewnt report, Interior states:

> "Oil and gas development will result in widespread, long-term changes in wildlife habitats, wilderness environment, and Native community activities. Changes could include displacement and reduction in the Porcupine caribou heard."

We agree, and this only reinforces our belief that it is not in the best strategic, economic or conservation interests of the United States to recommend making such sacrifices on the finest arctic wildlife and wilderness

sanctuary in the world, at a time of a world oversupply of oil and with hundreds of millions of acres of other federal and state lands available for exploration.

It has been said by many that we are now at our Last Frontier in Alaska. This has different meaning to different people. To some it offers opportunity for resource development and the jobs and material benefits delivered. To others, it is wildlife and wilderness spectacles, which constitute a heritage to be preserved for generations of Americans. The decisions we make on the Arctic Refuge, therefore, are not simply about oil fields and caribou herds. They are decisions that touch our very deepest values as a nation, and as a people.

The National Audubon Society feels the Department of the Interior is making a serious mistake in recommending that the coastal plain of the Arctic Refuge be sacrificed to industrial development. The facts convince us that America can achieve energy security without exploiting the last great arctic coastal wilderness in the United States.

We believe that U.S. Senators Howard Metzenbaum and Paul Tsongas were right when in the 1979 debate on the Alaska Lands Act they stated:

> "It appears as if the 'forbidden fruit' syndrome is operating with regard to the Arctic National Wildlife Range. Regardless of how bitter that fruit may be, there are some oil and gas companies which

will want to invade this last stretch of north slope arctic land unimpacted by man. What the Congress does with regard to this fragile area will be an indication of how wisely we are going to conserve the nation's natural resources in the future. We can afford to make this Range the 'last place to go' in the search for energy and we should. We urge the Senate to study the arguments on both sides of this issue, for we believe strongly that aside from high emotions which have surrounded the debate on this issue, the facts support protection for the Range at this time . . . " (Report of the Committee on Energy and Natural Resources, United States Senate, No. 96-413, November 14, 1979, page 421.)

The National Audubon Society, therefore, strongly opposes leasing of the coastal plain for oil and gas development at this time, and recommends that the U.S. Fish and Wildlife Service be directed to manage the entire Arctic Refuge consistent with the conservation purposes, including protection of its unique wilderness, for which it was established.

Your consideration of our comments and recommendations is greatly appreciated.

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National Audubon Society
ALASKA REGIONAL OFFICE
308 G STREET, SUITE 219, ANCHORAGE, AK 99501 (907) 276-7034
February 6, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th and C Streets NW
Washington, D.C. 20240

Dear Sirs:

These are the final written comments of the National Audubon Society on the Department of the Interior's Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment released for public review November 23, 1986.

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After carefully examining the "Resource Assessment Report" for the coastal plain of the Arctic National Wildlife Refuge, we are convinced it is not in the long-term conservation, economic or national security interests of the United States to open the coastal plain to leasing at this time. We urge, therefore, that no leasing or land exchanges be permitted by Congress, and that the U.S. Fish and Wildlife Service be directed to protect and manage the entire Arctic National Wildlife Refuge consistent with the conservation purposes for which it was originally established by Congress.

The National Audubon Society believes that wilderness designation is the best way to permanently protect the entire Arctic National Wildlife Refuge, including the coastal plain. We therefore support Alternative E, the wilderness alternative. The Society believes that Congress should proceed with wilderness designation unless assessment by the National Academy of Sciences confirms the importance of the Arctic National Wildlife Refuge to the nation's immediate and long-term energy needs, and demonstrates that petroleum extraction can be made compatible with protection of the refuge's fragile ecosystem, including its internationally significant wildlife values. In the interim, the National Audubon Society believes that the entire Arctic Refuge should be managed as wilderness in close cooperation with adjoining North Yukon National Park.

We wish to commend the many dedicated resource professionals in the U.S. Fish and Wildlife Service, U.S. Geological Survey and Bureau of Land Management who gathered information for the assessment report, often at great personal risk and sacrifice. Because of their many contributions, the outstanding resource values of the coastal plain have been reconfirmed and understood better than ever before.

As one of the oldest and largest conservation organizations in the United States, the National Audubon Society has a long history of involvement in the Arctic National Wildlife Refuge. We recognize it as a very special national treasure. Dedicated friends in conservation, including Olaus and Margaret Murie, worked long and hard for its establishment in 1960 to preserve a portion of the eastern Brooks Range of arctic Alaska for its outstanding wilderness values. Thus, unlike many other refuges in the system, the Arctic Refuge was established not out of a singular need to conserve wildlife, but to preserve for all time the spectacular wilderness ecosystem of northeastern Alaska as a whole. Audubon strongly supported this far-sighted action, and so too enlargement of the refuge in the Alaska National Interest Lands Act of 1980 (ANILCA). Over the years we have worked with other conservationists to protect the refuge from a series of threats from development interests.

Conservationists in Alaska and throughout the nation are becoming increasingly concerned about the ulterior motives of these development interests (including the Reagan Administration) who claim that the oil resources of the Arctic Refuge are critical to fulfilling growing national energy needs, particularly since President Reagan recently vetoed the National Appliance Energy Act of 1986. Passed overwhelmingly by both houses of Congress, this act would have saved the nation millions of barrels of oil and billions of dollars on utility bills by the year 2000, thus making exploitation of the Arctic Refuge totally unnecessary. In addition, the Reagan Administration has opposed establishment of fuel efficiency standards for automobiles and continuance of the 55 mile/hour speed limit.

In this debate over the future of the Arctic Refuge and its coastal plain, it is vitally important to realize that major compromises have already been made on Alaska's North Slope between development and conservation interests. These compromises have resulted in current land jurisdictions that essentially make almost 90 percent of the slope potentially available for oil and gas leasing. This is not to mention the additional 24 million acres of nearshore (state) and offshore (federal OCS) lands available in the adjacent Beaufort Sea. A mere 2 million acres of of the entire North Slope has been

committed to conservation purposes in the Arctic Refuge. Now most of that is under siege by development interests. The questions must be asked: Where will the compromising stop? Aren't there any public wilderness lands along the Arctic coast of Alaska that should be considered sacrosanct?

It is also important to note that this 18 million-acre refuge is the second largest unit in the National Wildlife Refuge System, and the largest and most spectacular arctic wilderness sanctuary for wildlife in the world. Wildlife species of particular national and international concern include the 180-thousand-member Porcupine caribou herd (whose calving ground is on the refuge coastal plain), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds, and Arctic char and grayling.

When considered in conjunction with the North Yukon National Park that adjoins it on the east, the Arctic Refuge constitutes an international commitment to the protection of nature.

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We agree with the Department of the Interior (on page 45 of the draft assessment report) that:

> "The Arctic Refuge is the only conservation system unit the protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America."

and (on page 46) that:

> "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge. Caribou migrating to and from the 1002 area and the post-calving caribou aggregation offer an unparalleled spectacle."

Despite these outstanding natural values, and the fact that the chance for discovery of an economically recoverable oil field is only 19 percent, the Department of the Interior is recommending that the entire coastal plain be made available for leasing to the oil industry. Meanwhile, officials of the Department are conducting negotiations in secret to trade away refuge lands on the coastal plain to private interests. This subverts the entire assessment report process preempts congressional options, and could lead to privatization of the refuge. Many of the individuals involved in these land trades are the same ones who attempted to trade away wilderness lands on St. Matthew Island to oil interests in 1984. In that

case, a federal judge ruled that Interior officials made serious errors in judgement, and that the land trade was not in the public interest. Now they are designing another refuge land trade scheme on an even larger scale. Apparently, little was learned by Interior from their St. Matthew experience.

The Department has left us no reasonable alternative but to oppose its recommendations because of the following serious shortcomings in its resource assessment process for the coastal plain of the Arctic National Wildlife Refuge:

1) Failure to point out that the establishment of the Arctic Refuge in 1960 to preserve its unique wildlife, wilderness and recreation values resulted in the remainder of Alaska's vast North Slope and adjacent offshore waters being made available for oil exploration;

2) Failure to release for public review and comment geologic information critical to the 1002 assessment process. This gives those who could profit from exploiting refuge resources advantage over those who actually own those resources--the American people;

3) Failure to reveal its proposed land trades with various Alaska Native corporations and the State of Alaska, and to demonstrate how such trades will serve the public interest;

4) Failure to justify full leasing when prospects for discovery of even one major economically recoverable oil field on the coastal plain is only 19 percent (pages 49 and 68), and with the market value of leases depressed because of the world oversupply of oil;

5) Failure to conduct a comprehensive economic analysis to show how the benefits to the Alaska and national economies can be optimized from leasing, both in the short and long term;

6) Failure to provide evidence that the Department will ensure that air and water quality will be protected from toxic chemicals and other pollutants such as those creating problems in the Prudhoe Bay oilfield;

7) Failure to explain how adequate water and gravel supplies will be obtained after finding that "...specific locations and sources of water and gravel for exploration and development activities have not been identified; it is understood that these resources, especially water, are not readily available on the 1002 area," (page 75);

8) Failure to explain why it wouldn't be in the national security interests of the United States to purchase more foreign oil at current low prices for addition to our nation's "Strategic Petroleum Reserve" rather than lose income to the federal treasury by further flooding a depressed lease market through opening the Arctic Refuge;

9) Failure to evaluate cumulative impacts on the Arctic Refuge from oil and gas lease sales on more than a million acres of adjacent state lands (Camden Bay, Demarcation Point and Prudhoe Bay uplands) and 21.2 million acres of OCS leases (Sale 97) in the Beaufort Sea scheduled for July 1987. The latter sale, just off the refuge coast, is the largest oil and gas lease sale ever held in the Arctic Ocean;

10) Failure to thoroughly discuss alternative energy policies that if implemented could make the nation energy secure without exploiting the Arctic Refuge;

11) Failure to assure that scarce refuge staff and funds will not be diverted from refuge conservation programs to monitor and regulate industrial activities on the coastal plain. (Since the coastal plain resource assessment was initiated in 1982, more than 90 percent of the refuge budget has been devoted to the 1002 assessment process, resulting in the almost total neglect of the overall refuge conservation program);

12) Failure to recognize that a North Yukon National Park adjoins the Arctic Refuge and that the United States has responsibilities to cooperate with Canada in protecting shared wildlife resources;

13) Failure to address the need for cooperative management of the Porcupine caribou herd with Canada through the international management agreement that has been negotiated over the past several years;

14) Failure to consult with the appropriate agencies of the Government of Canada as directed in Section 1005 of ANILCA; and

15) Failure to hold public hearings in all Alaskan communities that will be directly affected by the proposed action, and to make an adequate number of copies of the assessment report available in a timely manner.

Unfortunately, a series of citizens' lawsuits proved necessary during the assessment process to assure that the law

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was followed. Furthermore, citizen monitoring of government activities was required as well to learn of industry activities taking place on the Arctic Refuge. And, despite the magnitude of resources at stake and the seriousness of the consequences of the decision on people both in Alaska and throughout the nation, the Department of the Interior chose not to make this report available to the public. Then, after being placed under court order to do so, the Department abbreviated the comment period to 60 days over the Christmas holiday period. This is not the way a democracy like ours works best.

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Administration is out of touch with the country when it comes to tolerance of modest conservation regulations. We are confident that a Presidential veto of the appliance bill in the upcoming session will be overridden by Congress. We are also confident that, when the choice is clearly put, Congress will decide to enact additional conservation legislation in order to preserve our national treasures such as the Arctic Refuge (as well as to save consumers money.)

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Audubon continues to be actively involved in efforts to develop a long-range "Comprehensive Conservation Plan" for the Arctic Refuge. However, we have not been party to any actions that would preempt a thorough review of the mandated resource assessment report for the refuge's coastal plain, waiting to judge the report on its merits, waiting to see if there were a few key areas in which exploration could be allowed without risking serious interference with wildlife and wilderness resources. Instead of a complete and objective report with viable management options, we find the assessment report biased, contradictory, and lacking essential information. The only possible excuse for this is that Interior must not really be serious, but is floating a totally unreasonable position in the hopes of maximizing its bargaining power in Congress. If so, the tactic is likely to backfire by completely alienating those organizations willing to keep an open mind regarding multiple resource values on the coastal plain. Certainly, this has been the effect on the National Audubon Society.

The major undiscovered deposits of oil and gas on federal land holdings are thought to lie off the coast of the lower 48 states and Alaska. Thus, in the next two decades, as known onshore reserves are depleted, offshore development will become more important. Relatively little offshore land is currently off-limits to energy development. Most of these deposits will eventually be tapped.

The fact that all federal lands have not yet been leased does not mean that development is proceeding too slowly. These leases will be much more valuable ten to twenty years from now. If the government were to lease all these lands at once, it would derive an unfair economic return for the taxpayers.

Judged in this context, the Reagan Administration is making a serious mistake in rushing to lease virtually the entire U.S. Outer Continental Shelf (OCS)--almost a billion acres--and onshore prospects as well. The practice of offering tens of millions of acres of public lands each year at a time when oil prices are depressed raises very serious questions about whether the entire federal leasing program is amounting to a giveaway to the oil industry.

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conservation argument. Huge lease offerings involving tens of millions of acres make it impossible to do meaningful environmental impact analyses. Additionally, they make it extremely difficult for states like Alaska to conduct rational development planning.

In Alaska, less than 6 percent of oil resources are estimated to lie beneath designated or potential wilderness lands, including those in the Arctic National Wildlife Refuge. Clearly, Congress and the federal government have made sure that lands with the vast majority of highest potential for oil and gas have been excluded from consideration as potential wilderness.

Nationwide, relatively little oil and gas is estimated to lie under wilderness lands. When this country was first settled by Europeans, 100 percent of the land area corresponding to the contiguous 48 states was wilderness and teeming with wildlife. The unrestrained pressure of civilization has steadily eroded wilderness areas to a small percentage of the total--4 percent in the lower 48 states. To those who assign value to wilderness, it is incomprehensible that anyone would object to protecting the nation's last remaining fragments. Unless the nation maintains the sanctity of designated and potential wilderness areas, even that small percentage will disappear.

There will always be proposals to use wilderness and critical habitats for other purposes, particularly energy and mineral development. But little wilderness will be left if the engineers are allowed to scour the land for the next thirty years and beyond--building new roads and drill sites, returning for a closer look each time the price of energy or minerals jumps, and returning whenever a new technology allowing recovery of formerly inaccessible resources is developed.

The National Audubon Society believes that a nation like ours with a 200-year history should look at the wilderness preservation issue in a time frame that spans hundreds of years rather than decades. Only with such perspective can the nation pass on to succeeding generations the wilderness resources that are still intact.

The fact is that wilderness such as that on the Arctic Refuge coastal plain serves a variety of valuable, noncommercial uses: fish and wildlife habitat, watershed protection, scientific study, fishing, hunting, camping, hiking, and most other forms of dispersed, low density outdoor recreation. Such wilderness lands offer also the spiritual lift of peaceful, truly natural settings.

Although not every oil industry organization takes the limited view on wilderness protection espoused by such organizations as the American Petroleum Institute, there is obviously a clash in values between advocates of exploitation and those whose favor preservation--a dispute that must continuously be settled through the political process. The Audubon Energy Plan has been developed with this dispute in mind. The Plan demonstrates that there are practical alternatives to exploiting the last of our wilderness areas. The United States can leave wilderness alone and still solve its oil import problem. The total amount of oil and gas under wilderness lands is too small to justify the abandonment of the nation's remaining wilderness heritage.

Under the Audubon Energy Plan, the mean risked estimate of 1.6 billion barrels of oil and the 1.6 billion barrel equivalent of natural gas estimated to lie under land already legally designated as wilderness would remain underground forever. The same would be true for the 2.3 billion barrels of oil and the 2.5 billion barrel equivalent of natural gas estimated to lie under wilderness land that has yet to be formally designated as wilderness, (A. Stege and J. Beyea, "Oil and Gas Resources on Special Federal Lands: Wilderness and Wildlife Refuges," Annual Review of Energy, Vol. 11, 1986, pp. 143-161.) Because wilderness land would never be exploited under the Audubon Plan, there would be no need for exploration.

The estimates for oil in wilderness lands given above assume a mean risked estimate of 600 million recoverable barrels of oil for the Arctic Refuge. In contrast, the Draft Coastal Plain Resource Assessment mentions a figure of 3.2 billion barrels, without clearly specifying whether or not the estimate is "risked." (We suspect it is not.) Clarification on this point is needed from Interior. If the 3.2 billion figure is risked, that is, already incorporates the risk of finding no oil (81%), Interior would be claiming that there are 2.6 billion more barrels of oil likely to be found in wilderness lands than in the estimates we have been using. Nevertheless, even an additional 2.6 billion barrels would not change the fact that a very small percentage of U.S. oil is in potential and designated wilderness lands. The percentage of U.S. oil resources on these lands would rise from 3.5% to 5.8%.

Certainly, any exploration that may eventually be permitted on these areas should be made by nonintrusive methods, such as satellite survey. Nonintrusive methods are currently inadequate for confirming existing Interior estimates, but the situation will no doubt change in the future. Fifty years from now, technologies for identifying natural resources will have surpassed the crude methods available to energy companies

today. With such a small percentage of U.S. land remaining as wilderness, it would seem wise for the nation to be patient in confirming Interior's estimates.

As has been indicated, the National Audubon Society is not blindly opposed to resource extraction on public lands. We expect that more than 95 percent of oil and gas resources on federal lands will eventually be tapped. The Society stands ready to work with oil and gas companies to help them develop environmentally sound methods of exploration and extraction that are suitable for the great percentage of land, both public and private, on which such activities need not be prohibited completely. Audubon will continue to insist, however, that exploitation of resources on public lands be carried out carefully in a manner that protects the environment and wildlife. Audubon will continue to oppose oil and gas exploration in any situation where government agencies or energy companies move hastily, without fully assessing the environmental and economic effects of activities or providing adequate safeguards for their implementation. This appears to be one of those cases.

It is argued by industry that the coastal plain of the Arctic Refuge must be leased now because it will take at least fifteen years to develop any oil fields discovered there. It must be remembered that following discovery of oil at Prudhoe Bay in 1968, oil was flowing through the 800-mile-long Trans Alaska Pipeline (TAPS) by June of 1977, a period of only 9 years. All that would be needed should oil production be permitted on the Arctic Refuge would be a 100 to 150-mile-long pipeline spur (at maximum) to tie into TAPS. Our guess is that industry could bring an oilfield on line in the refuge within 5 years should it someday prove in the national interest to do so.

It is an illusion to believe that leasing on the coastal plain of the Arctic Refuge will solve the economic problems of the North. After all, its whole purpose is to deliver northern oil to homes and industries in the South--or perhaps the Orient. Indeed, rather than solving the North's economic problems, it may accentuate them. For evidence of this, we need look no further than the situation in Alaska today. With the Trans Alaska Pipeline carrying oil at near full capacity, the state is going through one of the most serious economic recessions in its history.

The situation on the Arctic Refuge obviously calls for bold and courageous political leadership at both the state and national levels. For politicians to be holding out the promise that yet another great oil bonanza lies beneath the Arctic tundra just waiting to be exploited only postpones the day when

all Americans must begin to live within their means by implementing cost-effective conservation measures.

On page 6 of its assessment report, Interior states:

> "Oil and gas development will result in widespread, long-term changes in wildlife habitats, wilderness environment, and Native community activities. Changes could include displacement and reduction in the Porcupine caribou herd."

We agree, and therefore do not believe the long-term conservation, economic, or national security interests of the United States will be served by recommending that such sacrifices be made on the finest Arctic wildlife and wilderness sanctuary in the world at a time of a world oversupply of oil, and with hundreds of millions of acres of other federal and state lands available for exploration.

It has been said by many that we are now at our Last Frontier in Alaska. This has different meaning to different people. To some it offers opportunity for resource development and the jobs and material benefits delivered. To others, it is wildlife and wildland spectacles which constitute a heritage to be preserved for generations of Americans. The decisions we make on the Arctic Refuge therefore are not simply about oil fields and caribou herds. They are decisions that strike to our very deepest concerns as a nation.

The National Audubon Society feels the Department of the Interior is making a serious mistake in recommending that the coastal plain of the Arctic Refuge be opened to full leasing. The facts convince us that America can achieve energy security without exploiting the last great arctic coastal wilderness in the United States.

We believe that U.S. Senators Howard Metzenbaum and Paul Tsongas were right when in the 1979 debate on the Alaska Lands Act they stated:

> "It appears as if the "forbidden fruit" syndrome is operating with regard to the Arctic National Wildlife Range. Regardless of how bitter that fruit may be, there are some oil and gas companies which will want to invade this last stretch of north slope arctic land unimpacted by man. What the Congress does with regard to this fragile area will be an indication of how wisely we are going to conserve the nation's natural resources in the future. We can afford to make this Range the "last place to go" in the search for energy and we should. We urge the Senate

to study the arguments on both sides of this issue, for we believe strongly that aside from high emotions which have surrounded the debate on this issue, the facts support protection for the Range at this time..." (Report of the Committee on Energy and Natural Resources, United States Senate, No. 96-413, November 14, 1979, page 421.)

To reiterate our position on this issue, the National Audubon Society believes that wilderness designation is the best way to permanently protect the entire Arctic National Wildlife Refuge, including the coastal plain. We therefore support Alternative E, the wilderness alternative. The Society believes that Congress should proceed with wilderness designation unless assessment by the National Academy of Sciences confirms the importance of the Arctic National Wildlife Refuge to the nation's immediate and long-term energy needs, and demonstrates that petroleum extraction can be made compatible with protection of the refuge's fragile ecosystem, including its internationally significant wildlife values. In the interim, the National Audubon Society believes that the entire Arctic Refuge should be managed as wilderness in close cooperation with adjoining North Yukon National Park.

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Your consideration of our comments and recommendations is greatly appreciated.

Sincerely,

David R. Cline

David R. Cline
Regional Vice President

February 3,1987

U.S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior Building
18 and C Streets NW
Washington, D. C. 20240

RE: Draft 1002 Report for the Arctic Coastal Plain

Dear Sirs/Madams:

Here are the comments of the National Park and Conservation Association on the Draft 1002 Report for the Coastal Plain of the Arctic National Wildlife Refuge.

The National Park and Conservation Association, founded in 1919, is the only non-profit, private organization devoted to protecting and improving all of our Nation's National Parks. At present the Association has over 50,000 members (300 in Alaska). While the Association is primarly concerned with management of National Parks it has concerns for the health and welfare of the environment nation-wide.

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It has been long recognized (first by Robert Marshall and then by Olaus Murie) that there is a need to preserve a portion of the Brooks Range and Artic Alaska for its great wilderness values. This was the origional purpose to establish the Arctic Range. It was a concern for the unique wilderness ecosystem that formed the purpose of the the Arctic National Wildlife Refuge when Congress established the area. The Refuge is a national wilderness treasure entrusted to the U.S. Fish and Wildlife Service by the people to protect those unique wilderness values. Also, many of the components of this ecosystem extend into Canada, and ultimately decisions that we make for the Arctic Refuge will effect Canada.

With this as a background, we commend the Service for its statement on page 45 of the draft report that states: "The Arctic Refuge is the only conservation system unit that protects, in an undesturbed condition, a complete spectrum of the various arctic ecosystems in North America." We also agree with page 46 that: "The 1002 area is the most biologically productve part of the Arctic Refuge for wildlife and is the center of wildlife activit. on the refuge." Given these statements, we find no justification for the Department's preferred alternitive to make the entire costal plain available for leasing to industry.

National Parks and Conservation Association
1015 Thirty-First Street, N.W., Washington, D.C. 20007
Telephone (202) 944-8530

The report has several shortcommings in its resource assessment of the coastal plain.

1) There were no hydrologists, ecologists, soils scientists, or recreation planners on the planning team.

2) The report cites outdated data to make various points. For example, the statement that the North Slope air is generally of good quality (Burro, 1973).

3) The report states that water resources in the 1002 area are very limited, but does not describe practical, economic ways that industry must deal with this problem and still protect resource values.

4) Large and obvious animals were selected for "evaluation species" which may not reflect resource development impacts of consequence to all of the relevant ecosystems. For example the arctic fox, small mammals, Lapland longspurs, and pectoral sandpipers could be used as indicators of environmental quality.

5) The cultural importance of bowhead whales to the people of kaktovik has been inadequately addressed. The 1979-1985 bowhead whale studies (Ljung-blad et al. 1986, Richardson 1986 and Miles et al. 1986) are important to consideration of the Pokok port site and annual sealift activities.

6) Baseline data reports show a tendency to duplicate efforts or to establish habitat classification systems independently of other investigators. A concerted effort should be made to standardize a habitat classification applicable to most studies to expedite comparisons between habitats, areas, and populations over time and regions.

7) Very little use was made of the substantial data on terrestrial bird populations of the Refuge that have been collected over 4 years. As of 1985, 127 10-hectare plots in 7 habitat types in 10 study areas of the 1002 area have been established and surveyed in various years. A more consistant study design should be conducted that addresses the need to obtain information on biotic resources of the Refuge prior to further exploration, development, and production of oil and gas resources. Results to date do not support the statements of importance of rock and willow ptarmigan compared to other terrestrial species.

8) No mention is made of the documents: Gravel Removal Studies in Arctic and Subarctic Floodplains in AK (FWS/OBS-80/08) and Gravel Removal Guidelines Manual for Arctic and Subarctic Floodplains (FWS/OBS-80/09).

9) While culvert design is addressed tending them is not. Evaluations along the Trans Alaska Pipeline and the Dalton Highway show that metal culverts remain frozen after spring breakup begins causing significant ponding of surface water, to such an extent that vegetation is drastically altered, animal populations changed, and washout of roads and workpads occurs. Substantial areas of the North Slope have been altered by non-functional culverts in runoff conditions.

10) Based on studies alonf the Trans Alaska Pipeline in 1980 and other years, snow drifting may be 5 to 6 times that indicated in the report (100 ft.). This coupled with impounding of runoff from roads and workpads will account for several hundred more acres of nesting habitat effected than is indicated in the report.

11) Based on studies during 1976-81 along the Dalton Highway, dust shadows can result in a 55% reduction of nesting bird densities and extend about 800-1000 feet down wind. The report states only 250 ft. for a total of 7,000 acres will be effected by development. The actual effect of development may be more than 4 times what the report suggests.

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12) Increased snow drifting, accelerated snow melt due to dust, and impounding of sheet flow by roads and workpads can combine to produce significant environmental impacts over a larger area than the report states.

13) Ongoing studies od the Lisburne Terrestrial Monitoring Program-1985 & 1986 have provided current data of direct import to this area. Considerable insight as to consequences of development activities can be added to the assessment by including these data with the referenced material.

14) Ptarmigan were one of the minor residents on the area's study plots. Tundra-nesting birds (other than ptarmigan) and small mammals will probably incur greater losses than ptarmigan, and they are important foods for larger predators.

15) Regulations that deal with oil spill prevention, containment, and cleanup should be noted in the report.

16) Caribou herds are an enigmatic group of individuals, often unpredictable in response to natural and unnatural phenomena, and are a unique resource. The report does not contain sufficient data to assess the potential inpact of development on this species.

17) The scenarios presented for the various alternatives for the petroleum potential are pure conjecture until the resources are defined.

18) The report looks at the 1002 area in isolation, rather than examining in detail the cumulative effects of oil and gas development on adjacent state and federal leases and offshore on the outer continental shelf.

19) The disposal of hazardous wastes associated with oil development presents a serious long term problem that is not adequately addressed and are not fully understood in the Arctic.

20) The report does not consider energy conservation and creating viable alternative energy sources that can better provide for future needs than can the Arctic Refuge.

21) The report does not deal with the value to the people of establishing the 1002 area as part of the National Wilderness Preservation System. In fact the report, page 93, states that; "No further study or public review is necessary for the Congress to designate the 1002 area as wilderness." It also states that a wilderness review was conducted in the early 1970's pursuant to the provisiona of the Wilderness Act, but the draft report was never made final nor was puplic coment obtained. The Wilderness Act of 1964 directed federal agencies to study areas to determine their suitability as Wilderness. As part of this process, Agencies were directed to hold public hearings. Hearings were never held and the report was never finalized for this area, although Congress directed the Secretary to do so.

22)The Department seems anxious to pursue development. It has disregarded the purpose for designating the area for future generations of Americans. It wants to make all the decisions here and now and not leave any options for the future. The Department has taken every measure to prevent the public from commenting on this report. It took a court case to direct the Department to allow comment on this report.

In view of these findings and others that we have not cited we can not agree with the Departments recommendation of "full leasing of the Coastal plain." We feel that the unique wilderness resource of this area is important to the nation as well as Canada. Therefore, we urge that no further development or land trade in the 1002 study area take place and that the area be added to the National Wilderness Preservation system.

Thank you for complying with the court for the opportunity to comment.

Sincerely,

William J. Holman
Alaska Regional Representative
4300 Rendezvous Circle
Anchorage, AK 99504
(907) 337-9454

Working for the Nature of Tomorrow

NATIONAL WILDLIFE FEDERATION, 1412 Sixteenth Street, N.W., Washington, D.C. 20036-2266 (202) 797-6800
Office of the Executive Vice President

February 4, 1987

The Honorable Donald Paul Hodel
Secretary
U.S. Department of the Interior
18th and C Streets, N.W.
Washington, D.C. 20240

Dear Mr. Secretary:

The National Wildlife Federation (NWF) has always viewed the Coastal Plain of the Arctic National Wildlife Refuge as a magnificent natural resource. It provides critical habitat for an incomparable array of arctic wildlife, including caribou, polar bears, grizzly bears, musk oxen, and snow geese. It is truly a world-class wildlife area and a national treasure. However, the Federation has long recognized that if significant deposits of oil and gas are present in this area, the question of their development and production will have to be addressed.

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The National Wildlife Federation has reviewed the Draft Coastal Plain Resource Assessment, the so-called 1002 Report, which examines several questions surrounding the potential oil and gas resources of the Arctic Coastal Plain. Federation staff, knowledgeable leaders from our state affiliate in Alaska (The Wildlife Federation of Alaska), and our consulting geologist have examined the report and have provided me with detailed comments. Also, along with two other senior staff members, I traveled to Alaska in mid-January to meet personally with representatives of the major state and federal agencies, oil and gas companies, and environmental interests concerned about the future of these lands.

Since the outset, I have had reservations about the process the Department of the Interior used in producing this report. Public interest groups had to resort to litigation to obtain access to the assessment process and the opportunity to comment on this draft. Then, Assistant Secretary Horn publicly unveiled a strategy for industry to

lobby Congress to open the Arctic Refuge to oil and gas development (December 1986 issue of Alaska Construction and Oil). And, of course, concurrent with all of this are the secret negotiations the Department of the Interior has underway with Native corporations to trade away the public's interest in the subsurface rights to oil and gas resources of the 1002 area.

The course of action recommended by Assistant Secretary Horn and the direction that seems to be coming from the Interior Department give us concern about your commitment to be guided by the oath of public trust to which you have pledged yourself.

The Federation, however, attempted to review the report objectively. Our review has been extensive, and involved a critical analysis of all major aspects of the available information.

Our first problem with the report is that it does not comply with the mandate of Congress in several important respects. One of the most glaring oversights is that, despite the specific requirements of the law for a baseline study of fish and wildlife resources, there are significant shortcomings in the biological data upon which the report is premised. For example, one of the most important questions to resolve before any recommendations can be made about future development in the 1002 area is to define the critical calving habitat for the Porcupine Caribou Herd. Yet, leading caribou biologists agree that the biological data is insufficient to define the ecological attributes of critical calving areas.

Another oversight is the Department's failure to consult in a timely manner with the Government of Canada. Despite the explicit mandate of the law, no consultation occurred before the report was released. This is a significant omission, given that the Porcupine Caribou Herd is an international resource and the Government of Canada has recently established the North Yukon National Park immediately adjacent to the Arctic Refuge. At the minimum, this is an arrogant disregard for one of the United States' most important allies.

Beyond such omissions, the analysis presented in the report is seriously flawed. For example:

- there is little support for the apparent conclusion of the Executive Summary that impacts upon fish and wildlife resources can be mitigated effectively; in fact, this assertion appears to be contradicted later by the report when it states, for example, that mitigating the loss of caribou core calving habitat "is not possible";

- the cumulative environmental impacts of developing millions of acres of adjacent on-shore and off-shore lands -- which are planned for leasing -- are ignored; and,

- the report concludes that providing the fresh water necessary to drill even <u>one</u> exploratory well is a significant and <u>unresolved</u> problem and then simply fails to address the question of providing the water necessary for any level of future development.

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These are only a few examples of the problems which are evident with the assessment of the potential impacts of development of the 1002 area. In general, the shortcomings of the fish and wildlife impact analysis are matched only by the zeal with which the Department wraps its "lease-everything" recommendation in the flag of national security.

Together, the conduct and content of the report, make it clear that the Department has already decided what it will recommend to Congress regarding the future of the Arctic National Wildlife Refuge. As a result, the critical questions posed by Congress in enacting ANILCA remain unanswered. It is regrettable that instead of responding to the mandate of Congress the Department has embarked upon a course of action which can only add to the polarization of this controversy and cloud the very issues which it was asked to resolve.

Therefore, the National Wildlife Federation does not believe that its submission of detailed comments on the Draft Coastal Plain Resource Assessment to the Department of the Interior would be constructive. The comments submitted by our state affiliate, the Wildlife Federation of Alaska, adequately represent our views.

Instead, in an effort to make a more positive and constructive contribution to the resolution of this controversy, the National Wildlife Federation will submit a comprehensive report regarding the future of the Coastal Plain of the Arctic National Wildlife Refuge to the Congress shortly.

We will be pleased to make copies of that report available to you, Assistant Secretary Horn, Director Dunkle, and representatives of other interests when it is released to Congress and the public.

Thank you.

Sincerely,

Jay D. Hair

JAY D. HAIR

JDH:kg

cc: Assistant Secretary Horn
Director Frank Dunkle

National Wildlife Refuge Association

16096 Creekwood Road
Prior Lake, Minnesota 55372
(612) 447-5586

January 15, 1987

O-261

Mr. William P. Horn
Assistant Secretary for Fish and
Wildlife and Parks
U. S. Department of the Interior
Fish and Wildlife Service
18th & C Streets, N.W.
Washington, D.C. 20240

Attn: Division of Refuge Management

Dear Mr. Horn:

This expresses the concerns and views of the National Wildlife Refuge Association (NWRA) on the draft Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment report released for public review November 24, 1986. As a nationwide citizens' organization dedicated to the preservation and perpetuation of the National Wildlife Refuge System, we appreciate this opportunity to review and comment on the draft 1002 report document. Many of our members have had extensive experience in managing National Wildlife Refuges and in administering oil and gas operations, including related developments on Alaskan refuges.

Unlike some conservation groups, NWRA has deferred taking a position on this controversial issue until we could review the Interior Department 1002 report. Despite the inevitable environmental damage of oil and gas extraction to dedicated conservation lands, we believe that such development could be sanctioned if a national emergency or crucial need positively existed and if other energy development alternatives were impractical to pursue. We recognize that properly-directed oil and gas developments can be condoned as an acceptable use of federal lands, including wildlife refuge units where habitat manipulation is a standard management practice. We also recognize and appreciate instances where direct or indirect contributions of the oil industry have benefited some refuges. Oil and gas leasing on the coastal plain of the Arctic National Wildlife Refuge is, however, a horse with a different color.

The Arctic Refuge was not the creation of a government bureaucracy. A review of the extensive and detailed files of the establishment of the original wildlife range reveals that this magnificent reserve exists because of the exhaustive efforts of citizens throughout the Nation. For a 10-year period, major conservation organizations, sportsmen's groups, civic organizations and renowned naturalists, including Olaus and Margaret Murie, studied the area and supported its establishment. The arctic reserve concept was brought forward for executive confirmation by individual citizens and conservation

leaders in Alaska and throughout the Nation. It exists today because people cared enough to have it established. Its status will be vigorously defended because people care even more about its protection now in a world rapidly running out of virgin wildlands and their associated wildlife. The Arctic Refuge is unquestionably one of the last outstanding natural treasures in the entire world.

Since the inception of our organization in 1975, we have strongly supported the maintenance of the wildland character of the arctic and the expansion of the Arctic Refuge under the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). We have worked with conservation groups over the years to protect refuge values from various detrimental threats, and our efforts to preserve this internationally important arctic reserve will prevail until it can be unequivocally demonstrated to be in the national interest to do otherwise. With respect to the recommendation for full leasing of the coastal plain, our position is that an action of this magnitude at this time is not in the long-term economic, national security, or conservation interest of our Nation.

We find many inadequacies in the 1002 assessment report. We find the report to be seriously incomplete in vital information areas and woefully inadequate in analyzing and discussing alternatives, as well as the biological, social and economic impact of full scale leasing. A bias toward development is noted and we suspect that this is intended to influence public sentiment under the guise that the 1002 area is "clearly the most outstanding oil and gas frontier remaining in the United States", and full leasing would "contribute substantially to national economic and security interests." Unfortunately, these statements, in the absence of supportive information, may be viewed as contentions rather than facts. An action of this magnitude and its potential environmental and social consequence must be based on fact, not mere contentions.

If it is in the national interest to develop oil and gas resources, industry should look first to developing the numerous leases already in its possession throughout the United States, including onshore and offshore lease areas situated along the breadth of the arctic coastal plain, and keep this part of the refuge's coastal plain intact, at least during the immediate future. Development of the 1002 area should be a last resort, predicated on a clearly demonstrated national need. We hasten to note that major compromises have already been made on Alaska's North Slope by both development and conservation interests. These resulted in making 90 percent of the arctic coastal plain available to industry in addition to some 24 million acres of state-controlled nearshore and federal offshore areas along the Beaufort Sea.

The problem of report completeness poses a major concern to our organization. Aside from the need to provide supportive information on full leasing, we believe that the report is remiss in not

describing the process and rationale leading to the establishment of the original arctic wildlife range. The draft report (page 45) states that "the Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America." This statement would be more meaningful if reviewers had a better insight to the exhaustive efforts, and the reasons for these efforts, that culminated in a mandate to preserve the natural integrity of this special ecosystem. Development now or in the future is clearly in conflict with the original purpose of establishment. The 1002 report does not adequately address the wildland values of the coastal plain and how these values will be changed by large scale oil and gas developments.

The report is conspicuously void of any discussion of commitments of the United States to the international community. It should recognize, among others, the following treaties and legislative mandates:

1. The Migratory Bird Treaty with Canada, Mexico and Japan as concerns the possible impact on the continental snow goose populations, produced in Canada and tranditionally using the 1002 area for feeding and staging prior to migration.

2. The agreement for the Conservation of Polar Bear (1973) with Canada, Denmark, Norway, and the U.S.S.R., which states that each contracting party shall take appropriate action to protect the ecosystems with special attention to protecting denning and feeding sites and migration patterns. Development in the 1002 area would adversely affect known polar bear denning areas.

3. Agreement calling for cooperation in the field of environmental protection between the U.S.A. and the U.S.S.R. (1972)

4. The 1976 convention between the U.S.A. and U.S.S.R. concerning the Conservation of Migratory Birds and their Environment (impact on birds migrating along the northern part of the continent).

5. Impact on the ANILCA directive requiring consultation with the Canadian government involving oil development along the refuge coastal plain adjacent to Canada's Northern Yukon National Park. Canadian officials had not been consulted before the 1002 report was released November 24.

6. Impact on on-going discussions with Canada concerning the establishment of an international Porcupine caribou treaty. Development would adversely affect this herd and subsistence activities associated with Arctic Village, Kaktovik, and the Canadian village of Old Crow.

These issues should have been presented and discussed in a separate, clearly-defined section of the 1002 report.

We find the alternatives to be both narrow in scope and superficially discussed. This may be by design to facilitate support of the preferred alternative of opening the entire 1002 area to full leasing. Due emphasis should be placed on greater objectivity in selecting alternatives and discussing their implications in the final document. We note that the 1002 report makes reference to structuring a leasing program to protect the southeast part (242,000 acres) used as a caribou calving area so this would be the last part to be developed. This type of rationale should be the key to all development alternatives. The manner in which alternatives have been drafted induces our organization to oppose full scale leasing and to support the no action alternative.

Because of the inadequacies which we perceive in this document, the NWRA strongly opposes oil and gas leasing along the coastal plain area of the Arctic Refuge. We urge the Interior Department to manage this unique area--the refuge in its entirety--consistent with the purposes for which it was founded, lest this unique arctic reserve be sacrificed on the altar of economic dogma.

In conclusion, you should know that we strongly object to the secretive efforts of the Interior Department to negotiate land exchanges with Native organizations. These negotiations are obviously aimed toward influencing congressional decision making. While we agree with land exchanges in principle, we strongly oppose the manner in which current negotiations behind closed doors are being conducted. This approach may lead to costly litigation on essentially the same grounds that the St. Matthew Island land exchange was contested and ruled an illegal action by the Federal Court. The Arctic National Wildlife Refuge was established by the American people for the American people and they should have an opportunity to voice their opinions whenever dedicated public lands are transferred to private ownership.

We will appreciate your careful consideration of the concerns which we have expressed.

Sincerely,

Forrest A. Carpenter
President
National Wildlife Refuge Association

U. S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior
18th & C Sts. N.W. Wash DC 20240

Comments
Draft
Arctic National Wildlife Refuge, Alaska,
Coastal Plain Resource Assessment

By
The National Wildlife Refuge Association
Washington Representative - Marcus C. Nelson
4216 Downing St. Annandale, Va. 22003

The Interior Department's recommendation to the Congress, in its "Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment" pits the protection of a pristine National Wildlife Refuge enviornment of unparalleled ecological value against the exploration and development of those lands for the unproven production of oil.

The Arctic National Wildlife Refuge (ANWR) was set aside to protect, in an undisturbed condition, a complete spectrum of various arctic ecosystems, which together with Canada's adjoining Yukon National Park, constitute the most spectacular arctic sanctuary found anywhere in the world. The-18-million acre arctic NWR provides internationally important calving and rearing grounds for the 180 thousand head porcupine caribou herd as well as natural habitats for polar bears, grizzly bears, musk ox, dall sheep, wolves, wolverine, peregrine falcons, snow geese and other important migratory birds.

Because the coastal plain area reputedly contained major oil and gas resources, Congress, in Section 1002 of ANILKA, identified 1.5 million acres of the 2.0 million acre coastal plain for study and required a comprehensive assessment of resource values, including petroleum resources through a Government-guided oil exploration program by means other than actual drilling.

This past November, the U. S. Fish and Wildlife Service (USFWS) released the required draft resource assessment for a 60-day public review period. The "so called" 1002 report recognized that the study area is the most biologically productive part of the Arctic NWR. Despite this and the knowledge that the development of economically recoverable oil is going to depend upon full exploration, gambling on production and constructing all necessary facilities, the Interior Department recommends that all indicated oil bearing areas within the 1002 portion of 1.5 million acres of the Arctic NWR coast be leased for development.

According to the 1002 report, the outstanding wilderness, wildlife habitat and fish and water qualities will be severely impacted by oil and gas leasing. The presence of oil development facilities would eliminate the wilderness character in development areas and cause intrusions into designated wilderness adjacent to the 1002 area. Development would cause widespread, long-term changes in wildlife habitats and interfere with native subsistence activities.

The National Wildlife Refuge Association (NWRA) has strongly supported the expansion of the Arctic refuge unit and the maintenance of its wilderness qualities early in the deliberations of the Alaska National Lands issue. The NWRA and conservation organizations worked during succeeding years to protect the Arctic NWR from potential encroachments on the premise that the naturalness of the unique ecosystems of arctic Alaska should prevail when virtually the rest of the north slope and millions of acres of other Alaska lands and waters would be accessible to commercial interests.

In a separate action, the Department and Native Corporations have negotiated towards the exchange of privately owned lands for sub-surface rights on the coastal plain area of the Arctic NWR surrounding Kaktovik. This unofficially estimated 95,000 acres of presumed oil bearing lands, at least equal to the potential of other refuge lands, invites a major private development over which the Government would have little control.

The NWRAs position on the Arctic NWR development concerns serious inadequacies of the 1002 report. The report is flawed by an insufficient

analysis and discussion of alternatives other than opening the entire 1002 area to oil leasing. Another critical shortcoming concerns the distorted importance of the areas petroleum resources without providing a perspective of the cumulative benefits and impact from oil and gas lease sales already let and to be scheduled in other parts of arctic Alaska, including off shore areas. The NWRA believes that the 1002 report should be re-drafted to be more thorough and objective in content; otherwise, the review and decision making process will be woefully impaired.

Based on the known widespread, long-term changes in wildlife habitat and natural systems that will occur, weighed against the gamble of full exploration to develope what oil may be present under the locations that showed signs of promise will spread activity over most of the 1.5 million acres studied. This appears to be "over kill" and not in the best strategic, economic or conservation interests of the United States to recommend such sacrifices on the finest Arctic Wildlife Sanctuary in the world at a time of world oversupply of oil, and with millions of acres of other federal and state lands available.

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The National Wildlife Refuge Association appreciates this opportunity to comment on this most important proposal under consideration for the Arctic NWR.

dated 1-9-87

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Comments

Of The

NATURAL RESOURCES DEFENSE COUNCIL

On The

DRAFT

ARCTIC NATIONAL WILDLIFE REFUGE

COASTAL PLAIN RESOURCE ASSESSMENT

Report And Recommendation

To The

Congress Of The United States

And Legislative Environmental Impact Statement

O-265

February 6, 1987

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The Natural Resources Defense Council (NRDC) is a national environmental organization dedicated to the protection and enhancement of the nation's natural resources. NRDC's membership totals approximately 60,000 members and supporters in the U.S. and Canada. NRDC has had a long standing interest and involvement in the federal government's oil and gas leasing programs; we therefore welcome the opportunity to comment on the Interior Department's draft Report to Congress and Legislative Environmental Impact Statement (LEIS) on oil development in the coastal plain of the Arctic National Wildlife Refuge. Our major comments can be summarized as follows:

1. The draft Report/LEIS fails to meet the requirements of NEPA and its implementing regulations because it does not adequately assess:

   a. cumulative impacts of oil and gas development in the Alaskan and Canadian arctic;

   b. reasonable alternatives to the proposed action;

   c. impacts of gas development;

   d. impacts of full leasing on water quantity and quality;

   e. impacts of full leasing on air quality;

   f. conflicts between the proposed action and the Alaska Coastal Management Program; and

   g. impacts on endangered and threatened species.

2. The draft Report/LEIS fails to comply with Section 810 of the Alaska National Interest Lands Conservation Act.

3. The Department's estimates of the amount of oil and associated economic benefits that would accrue to the nation from full leasing of the coastal plain of the Refuge are overstated as a result of the use of overly optimistic assumptions and methodologies that inflate the amount and value of projected oil reserves.

4. The Department's conclusions that the oil industry can operate in the arctic without significant environmental

consequences is unjustified and is contrary to evidence presented in the body of the draft Report.

I. Introduction

The 18 million acre Arctic National Wildlife Refuge is the second largest refuge in the National Wildlife Refuge System and the largest arctic wilderness sanctuary for wildlife in the world. The Refuge, which stretches from the southern foothills of the Brooks range to the Beaufort Sea in northeastern Alaska, supports one of the few remaining large caribou herds in North America, as well as polar bears, grizzly bears, moose, muskox, Dall Sheep, wolverines, snow geese, peregrine falcons and other species of arctic fish and wildlife. The coastal plain portion of the Arctic Refuge lies on the north slope of the Brooks Range and consists largely of pristine, extremely fragile tundra and wetlands. The coastal plain lies 60 miles to the east of the giant oil fields near Prudhoe Bay, and according to the Department's draft Report to Congress, there is a 19% chance that economically recoverable oil exists somewhere in this region of the Arctic Refuge.

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) placed roughly half of the Arctic Refuge under wilderness protection but deferred a decision to protect 1.5 million acres of the coastal plain as wilderness pending a comprehensive assessment of resident fish and wildlife, oil and gas potential and the impacts that oil development may have on the environment of the Refuge. ANILCA instructed the Secretary of the Interior to report his findings on these three topics to the Congress along with his

recommendations regarding whether oil and gas development in the coastal plain would be in the national interest.

On November 24, 1986, the Department issued a draft Report to Congress and Legislative Environmental Impact Statement (LEIS) recommending full leasing of the coastal plain to the oil industry. The decision to recommend full leasing was based on three considerations: the analysis of impacts presented in the draft Report, the national need for domestic sources of oil and gas, and "the ability of the industry to minimize damage to the North Slope environment as learned from oil and gas activities elsewhere in the Alaskan Arctic." Draft Report (hereafter, "D.R.") at iii.

As discussed in detail below, the Department's substantive analysis of these three considerations is seriously flawed. In addition, there are many legal deficiencies in the draft Report/LEIS. Taken together, these defects in the Department's analysis render the document fatally flawed and therefore not a suitable or adequate basis on which to make recommendations to Congress on leasing in the Arctic Refuge.

II. The Analysis of Environmental Impacts in the Draft Report to Congress/LEIS

A. The Conclusions Drawn in the Executive Summary are not supported by the Body of the Draft Report.

According to the draft Report, full leasing of the coastal plain could result in a 20-40% decline in the Porcupine caribou herd (D.R. at 112), a 20-50% reduction in the muskoxen population (which in 1985 numbered only 476) (id. at 114), a loss of half of the wolverine population (id. at 116), almost 50% of the snow

geese that stage in the coastal plain (id. at 122), and a loss of subsistence hunting opportunities throughout approximately one half of the coastal plain (id. at 132). In light of these and other impacts projected by the draft Report, it is difficult to understand how the Department can conclude in the Executive Summary that oil development on the coastal plain can be expected to generate "minimal effects" (id. at 2).

The Executive Summary is the document most often read by decision-makers and others. It must accurately reflect the conclusions of the body of the Report so that a complete understanding of the implications of developing the Arctic Refuge may be had by all readers. The Executive Summary should be revised to explicitly state the losses of wildlife and habitat projected to result from full leasing.

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B. Deficiencies in the NEPA Analysis

The purpose of an environmental impact statement is to provide a full and fair discussion of the significant environmental impacts of a proposal and to inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse effects on the environment. 40 C.F.R. §1500.2. The Council on Environmental Quality's regulations implementing NEPA specify that in order to achieve these goals, certain information must be presented in an EIS. Unfortunately, the draft Report to Congress/LEIS does not fulfill the informational requirements mandated by NEPA or its implementing regulations.

Omissions from the draft report/LEIS, discussed below, render the document so inadequate as to preclude meaningful analysis. The Department must therefore prepare and circulate a revised document, as provided for by 40 C.F.R. §1502.9(a).

1. Cumulative Impacts

Cumulative effects are those that result from the incremental impact of a proposed action when added to other past, present and reasonably foreseeable future actions (40 C.F.R. 1708.7). Nowhere in the draft Report/LEIS does the Department analyze in detail the cumulative impacts of oil and gas development projects throughout the Alaskan and nearby Canadian arctic, despite the fact that a large number of oil and gas development projects have been undertaken in or are planned for the region (e.g., Prudhoe Bay, the Lisburne Field, the Kuparak Field, the Endicott Project, Milne Point, Seal Island, the Naval Petroleum Reserve-Alaska and State, federal and Canadian waters of the Beaufort Sea).

There are a large number of wildlife species that stand to be significantly affected by the incremental impacts of all of the different oil and gas development projects in northern Alaska and Canada. For example, denning polar bears are extremely sensitive to human activities. D.R. at 117. The draft Report notes that oil development could produce a major reduction in the availability of denning habitat in the 1002 area. Id. at 118. Similar reductions in denning habitat can be expected to result from current and future oil development elsewhere in the arctic. It is

therefore critical that the Interior Department analyze the cumulative impacts of all those developments. Only by doing so will the Department be able to assess the extent to which development of the Refuge, in combination with similar developments elsewhere, will affect the overall health and survival of the regional polar bear population.

Another species sensitive to human disturbance is the snow goose. This species is highly sensitive to aircraft disturbance. Id. at 121. Studies have reported that snow geese flush in response to aircraft and helicopters passing by at distances of up to 9 miles. Id. The draft Report concludes that oil and gas activities in the Refuge could result in the displacement of these geese from up to 50% of their preferred staging habitat. Id. at 122. If this has occurred or is occurring in other areas of the Alaskan arctic subject to oil development, major impacts to the regional snow geese population could result. It is therefore extremely important that the Department evaluate the effect on snow geese of leasing in the Refuge in the context of larger impacts resulting from development activities across the region.

The Department has recognized the need to perform cumulative impact analyses for oil and gas development on federal land and routinely does so for federal OCS lease sales. For example, the draft environmental impact statement for Lease Sale 97 in the Beaufort Sea evaluates the cumulative effects of oil and gas operations throughout the Alaskan Arctic. (FEIS Sale 97 at 4-A-28). We note however, that the Sale 97 cumulative impact analysis assumes no development in the Arctic National Wildlife Refuge and

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fails to evaluate the effect of oil and gas activities in the Canadian Beaufort Sea. The Sale 97 cumulative impact analysis therefore could not be used in the final Report/LEIS on the Arctic Refuge.

We recommend that the Department prepare and circulate for public comment a draft cumulative impacts assessment prior to issuing the final report to Congress in accordance with 40 C.F.R. §1502.9.

2. Failure to Consider Reasonable Alternatives to the Proposed Action

One of the most important functions of the NEPA process to assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects on environmental quality. Indeed, the CEQ regulations call the analysis of alternatives "the heart of the environmental impact statement". 40 C.F.R. §1502.14.

According to the draft Report, energy independence and economic benefits appear to be the primary goals the Department hopes to achieve by opening the Refuge to oil development (e.g., D.R. at pages iii-8, 161-166, 169). Yet nowhere in the draft Report could we find any analysis of alternative methods of achieving these same goals.

Rather than evaluating alternatives for enhancing energy security and associated economic benefits, which together constitute the purpose for action, the Department improperly frames the alternatives in terms of forgoing such benefits in order to partially or completely protect the Refuge from oil and gas development. For example, the draft Report's discussion of the

wilderness alternative indicates that by designating the Refuge as wilderness, the nation must completely forgo the energy and economic benefits that will allegedly result from developing oil and gas in the Refuge.[1] This is not necessarily the case, as there are many other options for reducing the nation's dependence on foreign oil achieving related economic benefits.

The Report to Congress and accompanying Legislative EIS provide the opportunity to stand back and evaluate broad policy alternatives to promote national goals of energy independence and economic benefits. We believe that alternative energy sources should be discussed in the context of the "wilderness" and "no-action" alternatives so that ways of avoiding oil and gas development in the Arctic National Wildlife Refuge can be explored. For example, if President Reagan had signed the National Appliance Energy Conservation Act of 1986, the nation could have saved about 1.3 billion barrels of oil equivalent.[2] This represents more than twice the risked mean oil resources that the Department estimates underlies the Arctic Refuge.[3] The "wilderness" and "no action" alternatives should be structured so that comparisons of this sort can be readily made. This will permit the public to comment on

1. "A decision to designate the 1002 area as wilderness will maintain long term fish, wildlife, subsistence and wilderness values at a cost of a potential but unconfirmed 3.2 billion barrels of oil." Draft report at 144.

2. Howard Geller, American Council on an Energy Efficient Economy, 1986. Energy and Economic Savings Potential from Natural Appliance Efficiency Standards.

3. Mean estimate of conditional, economically recoverable oil (3.23 billion barrels) times marginal probability (19%) = 614 million barrels of oil.

the desirability of pursing one energy scenario over others. The following energy alternatives should be examined.

a. Improved automobile gas mileage standards

The Administration has rolled back fuel economy standards from 27.5 miles per gallon (mpg) mandated by Congress to 26 mpg for 1986, 1987 and 1988 model year automobiles. The decision not to enforce original fuel economy standards means that an extra 300 million barrels of oil will be used by 1987, 1987 and 1988 model year cars.

To put this number in perspective, the Department's draft Report to Congress estimates that the coastal plain portion of the Refuge contains an estimated risked mean of 614 million barrels of oil. Thus, by the single action of rolling back automobile efficiency standards for three years, the Administration will cause the equivalent of half of the oil projected to underlie the Arctic National Wildlife Refuge to be needlessly burned by less fuel efficient cars.

b. Appliance efficiency standards

The economic attractiveness of appliance efficiency standards was demonstrated in 1986 when the appliance industry and the conservation community jointly sponsored federal legislation to enact uniform appliance efficiency standards. As noted above, these standards would have saved an estimated 1.3 billion barrels of oil equivalent from gas savings in furnaces, water heaters, and ranges. Despite the swift passage of the legislation by overwhelming margins in the Congress, the President chose to forego these significant energy savings and vetoed the bill in November.

It is difficult to understand why the Administration feels so pressing a need to open the Refuge in light of its rejection of a far more effective method of assuring energy security.

c. Government funded conservation research

According to DOE,[4] federal investments in 18 major industrial/commercial energy saving technologies will be providing 521 million barrels per year in equivalent energy savings by the year 2010. These technologies have been introduced into the market in the 1978-1983 period and savings are based on expected market penetration by 2010. Despite the success of these technologies, the Administration is advocating a 50% cut in federal conservation technology research and development as part of its FY 1988 budget -- on top of a 50% cut from FY 1980 through FY 1987. These budget cuts will mean that potential further major savings in energy conservation will not be realized.

d. Incentive Programs for Building Retrofit

Some 3.5 million barrels of oil equivalent per day are used in the form of oil or gas for heating homes. Incentive-based retrofit insulation programs have the potential to save more than 1.5 million barrels per day at a cost of less than that of oil.[5] Pilot programs sponsored by utilities have shown that almost 90% of the potential savings can be achieved with a three year

4. FY 87 Energy Conservation Multi-Year Plan, July 1985, Office of Conservation, U.S. DOE.

5. SERI/Solar Conservation Study, A New Prosperity, Birck House Publishing, Andover, Massachusetts at 13.

implementation period,[6] yet the federal government has proposed no programs to help this process along. The only direct government involvement has been in solar and conservation tax credits. This program was terminated at the request of the Administration.

e. Mass Transit Expansion

Mass transit is more fuel efficient than automobiles and also allows a reduction in automobile travel miles in areas well served by mass transit. A 50% change in transit ridership up from current levels could save over 3 billion barrels of oil over the next twenty years.[7] Mass transit is generally a much lower cost option to the nation than automobile-based transportation systems, even excluding the benefits of their lower energy costs. Yet the Administration has consistently supported large cutbacks in federal mass transit funding and has withheld money that Congress directed to be invested in mass transit construction, despite the consequences on oil imports.

To comply with CEQ's regulations implementing NEPA, the Department must perform a comprehensive evaluation of these and other alternative mechanisms of meeting national energy needs and the effects of such alternatives on oil imports and the environ-

6. Eric Hirst and R. Goeltz, "Potential Versus Practice Installation of Retrofit Measures in the Hood River Conservation Project," Oak Ridge National Laboratory, ORNL/CON-189 1985, at 26-27.

7. David Goldstein, Senior Scientist, Natural Resources Defense Council, 1985. Testimony for House Appropriations Committee, Subcommittee on Transportation, on Appropriations for the Urban Mass Transit Administration, 2 May 1985.

ment. Included in such a discussion should be a "least-cost" analysis of different energy sources.

Least-cost analyses are essential to economically rational or defensible decisions concerning the development of energy resources. Congress recognized the value of least cost planning as early as 1980, when the Pacific Northwest Electric Power Planning and Conservation Act authorized the creation of a new agency to plan for electricity use in the Northwest and charged it with acquiring electricity in a least cost fashion. The California Energy Commission has operated under at least cost principles for a decade under leadership from both political parties and now claims that those principles have saved that state's ratepayers billions of dollars. Before oil development in the Arctic National Wildlife Refuge can be justified on an economic basis, the Department must develop a least cost energy plan and see where development of the Refuge fits in. If it falls behind other options not being pursued, then the development of the Arctic National Wildlife Refuge should be postponed until other more attractive resources are exploited.

This analyses should be prepared and circulated for public comment prior to the issuance of the final Report in accordance with §1502.9(a) of the CEQ regulations.

3. Failure to Evaluate the Impacts of Gas Development

The CEQ regulations require that an Agency evaluate impacts of a proposed action. While the Department is proposing full

leasing of the coastal plain, the draft report fails to analyze the impacts of developing the gas resources of the coastal plain. The Department assumes that crude oil is the only potentially economic hydrocarbon which would attract leasing interest if the 1002 area were opened to leasing. D.R. at 75. Later in the draft Report, however, the Department notes that "it is expected that gas production from this area would also be economic within two to three decades." Id. at 143. The Department's failure to evaluate the impacts of gas recovery in the Refuge not only violates the CEQ regulations, but also section 1002(h)(3) of ANILCA, which requires the Department to evaluate the adverse effects of exploration, development and production of oil and gas within the coastal plain.

This is important because the impacts of gas development would not be limited simply to the construction of a gas pipeline for transportation of gas, as the draft Report implies. Rather, the development of gas will inevitably result in the increased demand for scarce supplies of water and gravel, new construction which will result in habitat loss, and other impacts associated with further development of the Refuge. In order to comply with both §1002(h)(3) of ANILCA and §1502.9(a) of the CEQ regulations, the Department must prepare and circulate a draft assessment of the impacts of both oil and gas development in the Arctic National Wildlife Refuge prior to issuing its final report to Congress.

4. Failure to Adequately Evaluate Impacts on Water.

a. Water Quantity Issues

The list of preparers of the draft Report/LEIS does not include anyone with expertise in water. Yet the report describes very significant potential impacts on water. The result is a woefully inadequate analysis of water issues.

For example, the Report the Department acknowledges that "as much as 15 million gallons of water may be needed to drill one exploratory well. Taking this amount of water from the water-deficient 1002 area could have a major adverse effect." D.R. at 99. However, there is no discussion of what this effect may be in the chapter on environmental consequences. This is a major omission that must be corrected. In addition, in order to evaluate the overall demand for water, the Department should estimate the number of exploration and development wells that will be drilled in the Refuge. Since the Department routinely does this for OCS sales (see, e.g., Sale 97 DEIS at Table II-A-1), this should not be difficult.

b. Water Quality Issues

With respect to water quality, the Department fails to analyze the impacts of oil and contaminant spills, reserve pit fluid discharges and leaking reserve pits on the overall water quality of the region, even though the Department acknowledges that reserve pit fluid discharges into tundra ponds is resulting in a deterioration in water quality, and that the quality and quantity of organisms used as food by North Slope bird species may be decreasing as a result. D.R. at 100. This information needs

to be incorporated more thoroughly into the analysis of impacts. For example, what percentage of food sources will be affected by contamination from reserve pits? What percentage of the habitat area will be contaminated with pit fluid discharges?

In order to perform such an analysis, the Department must estimate how many tons of muds, cuttings and other wastes will be generated by oil and gas operations in the Refuge and disposed of in reserve pits. Calculations must them be made on the percentage of pits that leak and the amount of water that will be discharged into the tundra by pit de-watering operations. This will allow the Department to estimate the amount of habitat that will be contaminated by metals, hydrocarbons and other pollutants associated with pit fluid discharges. Since the Department routinely estimates the quantity of muds and cuttings generated as a result of OCS lease sales (see, e.g., Sale 97 DEIS at Table II-A-1). This should not be excessively difficult.

The Department must prepare and circulate a revised and expanded analysis of the impacts of the proposal (and alternatives) on water quality and quantity on the North Slope prior to issuing the final report to Congress in accordance with 40 C.F.R. §1502.9.

5. Failure to Evaluate Air Quality Impacts

The list of preparers of the draft Report includes no air quality specialists, and the draft Report itself contains no adequate discussion of the impacts of oil and gas development on the air quality of the North Slope. This is of considerable

concern due to the fact that large amounts of air pollutants are emitted by oil and gas operations elsewhere in the North Slope. For example, the approximately 20 state permits issued and pending for operations on the North Slope allow a total of between 80,000 and 100,000 tons of oxides of nitrogen (NO_x) to be emitted into the air annually. To put this number in perspective, the New York State Department of Environmental Protection reports that NO_x emissions in 1980 (the last year for which complete data is available) for the five boroughs of New York totaled 196,775 tons. SO_2, total suspended particulates, carbon monoxide and volatile organic compounds are other air pollutants of concern that are emitted in substantial amounts by oil and gas operations. (Sale 97 DEIS Table IV-B-5). DOI has concluded that a major potential consequence of increased air emissions is acidification of the local tundra. Id. at IV-B-126. Concerns have been raised with respect to the effects of SO_2 emissions on caribou forage.

The Department must prepare and circulate a draft assessment of the impacts of leasing the coastal plain on the air quality of the Alaskan and Canadian arctic, prior to issuing the final report to Congress in accordance with §1502.9 of the CEQ regulations.

6. Failure to Consider Conflicts Between the Proposed Action and the Alaska Coastal Management Program

Section 1502.16(c) of the CEQ regulations requires the Agency to discuss "possible conflicts between the proposed action and the objectives of federal, regional, state and local....land use plans, policies and controls for the area concerned." In

addition, Section 1506.2(d) requires that EISs discuss any inconsistency of a proposed action with any approved state or local plan and laws whether or not federally sanctioned. Where an inconsistency exists, the EIS must describe the extent to which the Agency, in this case the Department, would reconcile its proposed action with the plan or law.

Despite this requirement, we could find no comprehensive discussion of possible conflicts between leasing of the coastal plain and the policies and standards of the Alaskan Coastal Management Program (ACMP) (6 AAC 80). This is a serious omission given that leasing and subsequent exploration and development will have significant direct impacts on the state's coastal zone.

Federal activities which result in an impact on a state's coastal zone must be consistent with that state's federally approved coastal zone management program. While federal land is excluded from the coastal zone, the coastal plain of the Refuge directly abuts non-federal land that is subject to the goals and policies of the Alaska Coastal Management Program as approved by the U.S. Department of Commerce. Oil and go activities conducted on the coastal plain will affect these lands, and such activities must therefore be consistent with the standards of the ACMP. ACMP standards that must be considered in the EIS include the following.

a. Coastal Development (6 AAC.040). This standard governs the location of development, placement of structures, discharge of dredged material, and other activities affecting the coastal

zone. The Department must discuss means of conformance with this standard.

b. Geophysical Hazard Areas (6 AAC 80.050). Onshore development will cover extensive areas of permafrost. Portions of the main pipeline and haul road from the Refuge to the TAP would cross onshore areas and streams included within the coastal boundary. Development along the entire route could be subject to problems with permafrost. These hazards will constrain the pipeline route. The Department needs to identify means of conformance with this standard.

c. Energy Facilities (6 AAC 80.070). This standard includes 16 policies for siting energy related facilities, some of which would apply to development of the Arctic National Wildlife Refuge. For example, ACMP policies require that facilities be sited to 1) minimize adverse environmental and social effects while satisfying industrial requirements, and 2) be compatible with existing and subsequent uses (6 AAC 80.070[1],[2]). Other ACMP policies require that facilities be consolidated and sited in areas of least biological productivity, diversity and vulnerability. (6 AAC §80.070[3],[13]) Facilities must be designed to permit free passage and movement of fish and wildlife with due consideration for historic migratory patterns. (6 AAC §80.070[12]). This is particularly critical given the concerns raised in the draft Report concerning the reluctance of caribou to cross barriers such as roads and pipelines. D.R. at 108-109.

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d. Transportation and Utilities (6 AAC §80.080) This standard requires that routes for transportation and utilities be sited inland from shorelines, among other things. Conformance measures must be spelled out.

e. Mining and Mineral Processing (6 AAC §80.110) ACMP standards require that mining and mineral processing be compatible with other standards, adjacent uses and activities, state and national needs and District Programs. 6 AAC §80.110[a]. Extraction of sand and gravel is a major concern on the North Slope. The Department estimates that several million cubic yards are required to develop an oil field. D.R. at 100. The sources of this gravel, the impacts of mining it, and means of conforming with the ACMP policies governing mining must be discussed.

f. Subsistence (6 AAC §80.120) State standards guarantee opportunity for subsistence use of coastal areas and resources. The draft Report notes that subsistence hunting will be precluded on up to half of the coastal plain. D.R. at 132. Given this impact, the Report must analyze means of conforming with ACMP standards on subsistence.

g. Habitats (6 AAC §80.130) The ACMP standard for all habitats in the coastal zone require that habitats "be managed so as to maintain or enhance the biological, physical and chemical characteristics of the habitat which contribute to its capacity to support living resources." 6 AAC §80.130[b]. Habitats of particular relevance include rivers, lakes, streams and wetlands. Most of the coastal plain is considered wetlands; onshore development would therefore need to be designed and constructed to avoid

adverse effects on natural drainage patterns, the destruction of important habitat, and the discharge of toxic substances. 6 AAC §80.130[c][3]. In addition, rivers, lakes and streams are managed to protect natural vegetation, water quality, important fish and wildlife habitat and natural water flow under the ACMP. 6 AAC §80.130[c][7]. Means of conforming to the ACMP habitat policies for all of these habitats must be examined.

h. Air, Land and Water Quality (6 AAC §80.140) The air, land and water quality standards of the ACMP incorporate by reference all the statutes pertaining to and regulations and procedures of the Alaska Department of Environmental Conservation. Conformance measures for each of these statutes and regulations must be discussed in the Report.

The Department must prepare a draft assessment that discusses possible conflicts between the proposed action (and alternatives) on the objectives, policies and controls of the Alaska Coastal Management Program prior to issuing the final report to Congress in accordance with 40 C.F.R. §1502.9. This is particularly important in light of the fact that the Department considers the Report the leasing EIS. D.R. at 13.

7. Failure to Adequately Evaluate Impacts on Endangered and Threatened Species

The evaluation of impacts on endangered and threatened species contained in the Report is totally inadequate. For example, the draft Report acknowledges that activity, noise, altered habitats and changes in availability of food sources from dredging and other operations may adversely effect seals and

whales, (D.R. at 136), but there is no discussion of specific impacts on endangered bowhead and grey whales, which inhabit the Beaufort Sea adjacent to the coastal plain. D.R. at 38. In addition, no consideration has been given to two species of plants currently designated as candidates for listing as threatened or endangered that occur within the coastal plain. Salix ovalifolia variety glacialis, a low growing willow, is found in sandy soils around the region. The other species, Thlaspi arcticum, is a mustard that occurs in northeastern Alaska on well drained sites such as dry ridges and low river terraces. Both plants could be affected by activities such as coastal vehicular traffic, onshore development or sand and gravel mining operations. The U.S. Fish and Wildlife Service has stated in connection with development of the Beaufort Sea that "agencies wherever possible will be interested in protecting such [threatened] species, thereby reducing the probability that they will require listing. We encourage you to consider them in your environmental planning." Sale 97 DEIS at J-1.

The Department must prepare and circulate a draft assessment of the impacts of the proposal and alternatives or endangered species that includes the omissions cited above prior to issuing the final report to Congress.

8. Failure to Adequately Analyze Archeological Impacts

Early man occupied the Beaufort Sea area during the past 18,000 years. Known archeological sites exist on the North Slope and others probably occur within the boundaries of ANWR. In preparation for Sales 97 and 87 in the Beaufort Seas, the

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Department of Interior did an extensive assessment of the potential for archeological resources. Sale 97 DEIS at H-1-9. In contrast, the archeological analysis contained in the draft Report is totally inadequate, consisting of two sentences. A revised draft evaluation of archeological impacts should be prepared and circulated prior to issuing the final report to Congress.

C. Failure to Comply With the Alaska National Interest Lands Conservation Act (ANILCA)

1. Section 810

Section 810 of ANILCA requires that:

> (a) In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provisions of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency --
>
> > (1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 3115 of this title;
> >
> > (2) gives notice of, and holds, a hearing in the vicinity of the area involved; and
> >
> > (3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsis-

> > tence uses and resources resulting from such actions.
>
> (b) If the Secretary is required to prepare an environmental impact statement pursuant to section 4332(2)(C) of Title 42, he shall provide the notice and hearing and include the findings required by subsection (a) of this section as part of such environmental impact statement.

While acknowledging that development of the 1002 area "will result in a major adverse effect on subsistence uses within the 1002 area" (D.R. at 129), the Department claims that it need not perform an 810 analysis until the actual lease sale:

> Overall a major effect (considered a significant restriction of subsistence uses under section 810 of ANILCA) could occur if alternative A was implemented. If the Congress enacts the legislation to authorize the Department of the Interior to lease the 1002 area, the Secretary of the Interior must, prior to the actual lease sale, determine the effects on subsistence of such disposition in compliance with section 810 of ANILCA unless the Congress were to exempt the Secretary from that requirement. Id.

This directly contravenes the explicit language of section 810(b), which states that if the Secretary is required to prepare an environmental impact statement, he shall include the findings regarding subsistence use required by subsection (a) in the environmental statement. If the draft Report to Congress/LEIS is to serve as a leasing EIS (D.R. at 13), (something which we believe is not appropriate), the Secretary must include the Section 810 analysis in the LEIS .

The findings required by §810 must therefore be made in a supplemental environmental impact statement that is prepared and circulated for public comment prior to the issuance of a final Report/LEIS. The discussion of alternatives to leasing the Refuge

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required by §810(a) should include an evaluation of energy alternatives described earlier in these comments.

2. Section 1005

ANILCA instructed the Department to "consult with the appropriate agencies of the government of Canada in evaluating ...impacts particularly with respect to the Porcupine caribou herd." This consultation is extremely important given that many of the species that stand to be affected by oil development in the Refuge migrate freely between the Refuge and the bordering Canadian National Park. According to testimony given by the Yukon Government on January 9, 1987,[8] the Department has so far failed to fulfill its obligations to consult with the Canadian government. NRDC shares the concern of the Yukon government and we strongly recommend that the Department begin consultations immediately.

III. The National Need for Oil and Gas is Inadequately Analyzed

The Department claims that full leasing of the coastal plain could help achieve national security and economic benefits. It claims that development of 3.2 billion barrels of oil could yield Net National Economic Benefits of $79.4 billion, based on an oil price of $33 per barrel. D.R. at 1. In addition, the draft Report asserts that leasing the coastal plain would reduce the

8. W.J. Klassen, Deputy Minister, Department of Renewable Resources, Government of the Yukon Territory. Statement in Response to the Draft Arctic Natural Wildlife Refuge Coastal Plain Resource Assessment at 6.

nation's dependence on foreign oil and enhance national security. D.R. at 162-165. However, each of these claims is based on flawed, misleading or insufficient evidence. In addition, nowhere in the Report is it acknowledged that there are other, far less environmentally damaging ways of securing far more energy than is thought to underlie the Arctic Refuge, such as these discussed in Section II.B.2. above.

A. The Department's Estimates of the Amount of Oil and Gas in the Arctic Refuge are Overstated

The Department's estimate of 3.2 billion barrels of oil in the Arctic Refuge is a "conditional" mean estimate. D.R. at 72. A conditional mean estimate is "the average amount you would expect to find if at least one of the prospects in an area contained economically recoverable accumulations of hydrocarbons and if all the prospects modelled were drilled."[9] Conditional resource estimates assume that hydrocarbons will be present in some of the prospects. They do not take into account the possibility that the area may not be hydrocarbon prone; this consideration is taken into account in determining the risked economically recoverable resources in a planning area.[10] A risked estimate is one where the conditional mean is multiplied by the marginal probability of finding hydrocarbons. In establishing the size, timing and location of leasing for the federal Outer Continental Shelf Oil

9. U.S. Department of the Interior, February 1986 5-Year Outer Continental Shelf Oil and Gas Leasing Program for January 1987-December 1991, Detailed Decision Documents at 29.

10. Id.

and Gas Leasing Program, the Department uses risked estimates.[11] In contrast, the oil estimates for the Refuge are conditional estimates. Inexplicably, the Department failed to risk the oil estimates in the way that it customarily does for OCS program. Since the marginal probability of finding hydrocarbons in the Arctic is only 19%, the total amount of risked mean economically recoverable oil underlying the Refuge is 614 million barrels, or one-fifth the amount of oil the Department claims is in the Refuge in the draft report, and there is 81% chance that no oil at all will be found. The failure to make this clear in the Executive Summary and in the body of the report is unjustfiable and must be corrected.

Furthermore, the estimates of both conditional and risked economically recoverable resources do not take into account costs incurred in searching for oil and gas, primarily exploration expenses. In order to factor in such expenses, which are important to a company's decision on whether or not to explore and develop a lease, the Department has developed estimates of "leasable resources" in the proposed 5-Year OCS Leasing Program. In determining the amount of leasable resources in an area, an assessment is conducted of each prospect to determine its risked economic value at the time of sale to both the lessee and the nation as a whole. If the private value (after-tax net present value), is found to be greater than zero, then the economically recoverable resources associated with the prospect are considered leasable. If the private value of the prospect is zero or less,

11. Id., Decision and Summary, at Table 2.

then the entire amount of the prospect's economically recoverable resources are deemed to be unleasable at the time of sale for given economic assumptions. Thus, the estimate of leasable resources in a planning area is the sum of economically recoverable resources associated with prospects calculated by the Department to be worth acquiring, i.e., they have positive private values.

It appears that the Department not only failed to risk its estimates of oil underlying the Refuge, but it also did not estimate the leasable resources as it typically does for the OCS program. Why are oil and gas estimates of the coastal plain for the Arctic National Wildlife Refuge assessed differently than oil and gas estimates of the federal Outer Continental Shelf?

B. The Department's Estimates of the Economic Benefits of Oil Development are Overstated

It is extremely difficult to tell how the Department came up with its net economic value estimates, in that no information is given on how the Department calculated the alleged revenues that will accrue from full leasing of the coastal plain. In the final Report, the Department's methodology must be completely explained.

It appears from what little information is presented that the Department's methodology for assessing new economic benefits is inconsistent with that used in the federal Outer Continental Shelf Oil and Gas Leasing Program. For example, estimates of net economic value in this OCS program are made for prospects containing leasable resources, which are risked estimates of oil that will bring positive net benefits to the lessees after deducting royalties, rentals and taxes. Had the Department based its net

economic benefit calculations on risked oil estimates, the economic value of full leasing would be 19% of that cited in the Draft report ($15.1 billion vs $79.4 billion). If the net economic benefit calculations were based on leasable resources, the economic benefits would be even lower. In addition, the Department bases its estimate of conditional economically recoverable oil resources on an oil price of $33 a barrel in 1984 dollars in the year 2000. In order for this value to be reached in the year 2000, the oil price would have to grow at an average rate of about 4% per year starting from the current oil price of about $18 a barrel. In contrast, MMS uses a real oil price increase of 1% per year in calculating the net economic value of leasing OCS areas.[12] Thus, the 4% growth rate used in the draft Report is more than four times the growth rate assumed by MMS. As a result, the draft Report projects a much higher net economic benefit than would have been the case if the MMS oil price increase rates were used. We recommend that the Department make its projections on oil prices consistent with those used by the Minerals Management Service.

NRDC has reviewed the economic analysis in the draft 5-Year Program and has provided the Department with major comments on it. Many of these comments are relevant to the economic analysis in the Arctic National Wildlife Refuge draft Report. For your convenience these comments are attached as Attachment 1.

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12. 5-Year OCS Leasing Program January 1987-December 1991 Secretarial Issue Document, October 1985 at Table 2, Table 5, Table 6.

IV. Impacts of Oil Development Elsewhere in the Alaskan Arctic

The draft Report notes very significant environmental problems that have resulted from oil and gas development elsewhere in the Alaskan Arctic. These problems indicate that, contrary to the Department's assertions, the oil industry in fact cannot operate in the arctic without severe environmental consequences.

For example, the Fish and Wildlife Service (FWS) has undertaken investigations into the effects of reserve pit fluid discharges on water quality and the freshwater macroinvertebrate community of tundra ponds. The aquatic invertebrates studied are known to be sensitive indicator organisms for a wide variety of environmental pollutants and an important food source to the approximately 150 species of water fowl, sea birds, shorebirds, raptors, and passerines using the North Slope for nesting, rearing, molting and feeding. D.R. at 100. Preliminary results of those studies show increases in heavy metals, including aluminum, barium, chromium, zinc and arsenic, hydrocarbons, pH, salinity, alkalinity, turbidity and sediment loads for ponds adjacent to reserve pits on the North Slope. Moreover there were concomitant decreases in oxygen levels, total taxa, taxa diversity and invertebrate abundance in tundra ponds associated with reserve pits. The results of these studies indicate that the disposal of drilling muds, cuttings and other wastes in reserve pits on the North Slope is resulting in substantial deterioration and water quality as a result of leaching, breaching or overtopping of the pits. Along with deteriorations in water quality, the quality and

quantity of organisms used as food by North Slope bird species may be decreasing. Id.

Another impact of existing oil operations on the North Slope is air pollution. Oxides of nitrogen (NO_x), sulfur dioxide (SO_2), total suspended and particulate matter, and carbon monoxide (CO) are the principle air pollutants generated by oil and gas activities in Prudhoe Bay. State permits issued or pending for gas fired turbines on the North Slope allow close to 100,000 tons of NO_x to be emitted annually. In contrast, the 5 boroughs of New York City emit approximately 197,000 tons of NO_x per year.

Permit limitations on carbon monoxide emissions on the North Slope have apparently been exceeded by older gas fired turbines. In addition, EPA is presently investigating whether or not permit exceedences for NO_x have occurred as a result of "downwash" in the vicinity of stacks. Questions have been raised about the impacts of air pollutants, particularly SO_x, on lichen and plant species which serve as caribou forage.

Other major air pollution problems include gas flaring, which generates smoke trails that have been tracked for 100 miles, incineration of oily and hazardous waste, and visibility impairment caused by smog. The draft Report deals with none of these issues.

Oil spills are another problem. Since 1972, some 23,000 spills of crude oil, gasoline and diesel have been reported to the Alaska Department of Environmental Conservation as a result of operations on the North Slope. 521 spills were reported in 1985 totalling 82,216 gallons. D.R. at 104. The impacts of oil spills

in the arctic environment are quite severe. Direct contact with oil or diesel often results in immediate mortality to the above-ground vegetation. Injury to the root system may not be immediately obvious and can cause a slow deterioration of plants and a high degree of winter kill in future years. Id. at 103. The draft Report cites a study that found that the site of a diesel spill in Northern Alaska showed little recovery after 30 years. Id. The ability of the industry to avoid these spills appears to be minimal: "[a]ccidental spills of crude oil and refined petroleum products an inevitable consequence of oil field development." Id. at 103.

To our knowledge, no one outside the oil industry has ever done a comprehensive evaluation of the environmental impacts that oil and gas development has had on the North Slope of Alaska. In addition, there has been very little monitoring of environmental parameters on the North Slope, particularly in the area of contamination from reserve pits. Given that knowledge about the environmental impacts of oil and gas development on the North Slope is so limited, the conclusion that the oil industry is capable of operating in North Alaska without causing extensive and long term damage is speculative and is insupportable. The limited evidence collected by state and federal officials indicates that air pollution, water pollution and habitat degradation are widespread. It is therefore irresponsible for the Department to base its decision to recommend full leasing of the coastal plain on the ability of the industry to limit environmental damage.

V. Conclusion

The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America. D.R. at 45. The Administration has a large number of options to reduce oil imports and enhance national energy security other than leasing the Arctic Refuge to the oil industry. Very few of these options have been pursued by the Administration. In fact, as noted above, the Administration policies frequently have undermined national energy security. If the Administration feels comfortable with pursuing such strategies, surely it should feel comfortable forgoing oil development in the Arctic National Wildlife Refuge.

Given the nationally significant natural values of the Refuge, the limited amount of economically reoverable oil and gas the Department projects to underlie the Refuge, the fact that alternative sources of energy are available, and that industrial development is clearly incompatible with the purposes of the Refuge, we believe the Refuge should be designated as wilderness in its entirety.

Thank you for considering these comments.

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NRDC

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Attachment 1

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COMMENTS
of the
NATURAL RESOURCES DEFENSE COUNCIL,
SIERRA CLUB,
ENVIRONMENTAL POLICY INSTITUTE,
GREENPEACE, U.S.A.,
TRUSTEES FOR ALASKA,
and
OREGON NATURAL RESOURCES COUNCIL
on the
PROPOSED 5-YEAR
OUTER CONTINENTAL SHELF
OIL AND GAS LEASING PROGRAM
for January 1987 - December 1991
and
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Prepared by:

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May 8, 1986

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ATTACHMENT II
COMMENTS ON DOI 5-YEAR LEASING PLAN[1]

MAY 8, 1986

I. INTRODUCTION

The economic analysis provided in the Department of Interior's [DOI's] 5-Year Outer Continental Shelf Oil and Gas Leasing Program for January 1987 - December 1991, dated February 1986, generally uses the same conceptual framework as the 1985 Draft 5-Year plan in justifying a rapid disposal of federal OCS properties. One noteworthy improvement in the new analysis is the extensive discussion of the appropriate discount rate for comparing present and future economic benefits from OCS development. The most glaring deficiency of the 5-Year plan is the use of oil price scenarios that are not appropriate in light of recent changes in world oil prices.

We have commented extensively on the previous DOI Draft 5-Year Plan.[2] These comments will address new issues raised in the

[1] James P. Love. I would like to acknowledge the contributions of Professor Joseph Stiglitz on an earlier draft of these comments.

[2] Joseph Stiglitz, "Economic Issues in Draft Five Year OCS Leasing Plan," included as Attachment 1 in "Comments of the Natural Resources Defense Council, Sierra Club, Environmental Policy Institute, Conservation Law Foundation of New England, and Friends of the Earth, on DOI's Draft Proposed OCS Oil and Gas Leasing Program," May 20, 1986. James Love and Joseph Stiglitz, "Comments on DOI's Draft 5-Year Leasing Plan: Revised July 1985 Appendix P," September 12, 1985. James Love, "Shortcomings of the U.S. Department of Interior Draft 5-Year OCS Leasing Plan," reprinted as "Prepared Statement of James P. Love," U.S. House of Representatives, Committee on Merchant Marine and Fisheries, Subcommittee on OCS and Panama Canal, Hearings on the Five-Year

current 5-Year plan and restate our previous objections to DOI's OCS leasing program. In particular, we believe the current DOI plan suffers from the following shortcomings:

1. DOI is using the wrong discount rate to evaluate the costs to the federal treasury of premature leasing.

2. The recent plunge in world oil prices has rendered DOI's quantitative cost benefit analysis obsolete.

3. The changed outlook on oil prices requires, according to DOI's own analytical framework, a radical modification of the OCS Leasing schedule.

4. DOI should change the 5-Year Plan to offer fewer tracts for sale. Leasing of high cost acreage should be deferred.

II THE RELEVANT DISCOUNT RATES

One of the central problems for DOI concerns the comparison of social and private benefits and costs over time. The method used to make that comparison in the 5-Year Plan is discounting for time. Public and private groups are held to have certain rates at which they "discount" future benefits and costs. These rates are used to determine the "present value" of different leasing options.

There are <u>three</u> important discount rates that DOI must consider in the 5-Year Plan. These include the private discount rate used by firms that bid on OCS resources, the discount rate which reflects the federal government's cost of borrowing money,

Draft Proposed Program for Oil and Gas Leasing on OCS, and the State Federal Consultation Process, SN 99-20, August 5, 1986, p. 280.

and the "social discount rate" that DOI uses to determine how society as a group compares benefits and costs over time.

The private discount rate is used to determine how much money private firms will pay today for the right to develop OCS resources over the term of a lease. The private discount rate is also used to determine the incentives that private firms will have to time the development of OCS resources, since prices for OCS resources, and the costs of developing those resources, are expected to change over time.

The federal government's cost of borrowing money should be used to compare the present value of lease payments [including bonus payments] that are expected to be collected, according to different leasing schedules. The lease schedule affects the present value of lease payments in two ways. First, bonus payments are made at the time of the auction, which is entirely a function of the lease schedule. Bonus payments are in turn a function of the discounted profits that the firm expects to earn. Second, the timing of the lease auction affects the timing of the development of OCS resources, and hence the timing and size of royalty and other lease payments.

The social rate of discount is used to determine how society as a whole values the future economic benefits and costs. The social discount rate is not so much an interest rate that is observed in the market, but rather a theoretical construct that reflects the opportunity costs faced by consumers and firms, and profound philosophical and ethical judgments. The social rate of

discount should be used to determine the present value of OCS development to society as a whole, given different leasing schedules. DOI proposes to use a social rate of discount to determine when OCS resources should be leased.

In the 5-Year plan DOI discusses some of the different methods of estimating the social discount rate, but does not identify the specific methodology that is appropriate for OCS development. Instead, DOI simply states that it will use a range of social discount rates between 6 and 8 percent, adjusted for inflation. In fact, DOI uses the 8 percent discount rate as its baseline assumption, with only limited sensitivity analysis of the 6 percent discount rate. The 8 percent real discount rate means that DOI places very little value on future OCS benefits. Economic benefits valued at one 1986 dollar [adjusted for inflation] that are received 25 years in the future are valued at less than 15 cents by DOI today. The same unit of benefits received 50 years in the future have a present value of 2.1 cents according to DOI.

DOI asserts that the private after-tax rate of discount falls within the 6 to 8 percent range used for the social discount rate. DOI also asserts that the real rate of interest on federal government bonds falls within this range. This would be a fortuitous coincidence for DOI, if it were true, because it would narrow much of the debate over the appropriate discount rate.

In fact, the real rate of interest on federal government

bonds is considerably lower than 6 to 8 percent. Our own interviews with oil industry personal suggest that the real after-tax private rate of discount is considerably higher than the 6 to 8 percent range. We believe that economic theory and empirical evidence support the notion that the three discount rates are different. In particular, the private rate of discount is considerably higher than interest rate on federal government bonds.

III THE RELEVANCE OF DIFFERENT DISCOUNT RATES

In designing a leasing program DOI must consider the impact of the plan on the timing of OCS development and the present value of expected federal government receipts from the sale of the resource.

DOI argues that the social discount rate should be used to determine the most efficient timing for development. By this, DOI means that development should occur on OCS properties as soon as the net social value [firm profits, plus taxes and royalties] is growing [the change in net value due to expected increases in price or decreases in development costs] at a rate that is less than the social rate of discount. This principle is referred to as the Hotelling Rule.

Maximizing the present value of government receipts from the sale of the resource is a related but conceptually distinct issue. An important component of federal lease receipts are the bonus payments that are paid at the time of the auction. The

bonus payments have an economic effect that is similar to that which would occur if the federal government, as the landowner, borrows money from the oil industry against future expected profits from development. When the interest rate on government bonds is significantly lower than the discount rate used by the private firms that bid on OCS resources, the taxpayers suffer a loss when OCS resources are sold prematurely. In effect, the federal government pays the oil industry discount rate to borrow money against future profits.

The present value of federal government receipts are affected by timing of development and the timing of lease receipts. The lease schedule influences the timing of development, and the timing of development influences the timing of lease receipts. But lease terms are flexible enough that different development timing scenarios can be accommodated under different lease schedules. This is particularly true for high cost frontier areas where primary lease terms are 10 years, and are subject to extension upon filing development plans. It is also true of areas where unitization allows several leases tracts to be grouped together to meet common diligence requirements, although actual development on some tracts may be delayed for years past the primary lease term. For example, on Alaska's North Slope several leases that were issued in 1969, some 17 years ago, are just now beginning production. A difference in the industry discount rate and the government bond rate of 5 percent, and a 10 year delay in development, would result in a

loss in present value of bonus payments of nearly 40 percent. A fifteen year delay and an 8 percent difference in discount rates would result in a loss or nearly 70 percent in the present value of bonus payments.

In the example given above, the federal government should delay leasing of the property until it is ready to be developed. The best timing for development may be based on DOI's estimate of a social discount rate, while the timing of the lease sale would be based on the government's borrowing rate. There are, however, important distributive reasons for DOI to consider using the federal government bond rate to determine both the timing of development and the timing of the lease auction.

The use of the social discount rate to time development makes sense if DOI is concerned only with maximizing the net gains to society as a whole, regardless of the distribution of benefits. If, on the other hand, the benefits of OCS development accrue largely to the private firms that develop the resources and the federal government through collection of lease receipts and taxes, and DOI places a smaller weight on the welfare of the private firms than on the U.S. citizens who own the resources in their role as taxpayers and beneficiaries of public services, it should use the federal government's bond rate to determine both when OCS resources should be developed and when lease auctions should be held. In the latter case, DOI should only consider the benefits from lease payments and taxes, and development should occur when these benefits are growing at a slower rate than the

government bond rate.

There are several reasons why DOI might place a smaller weight on the welfare of the private firms that develop OCS resources. First, it may believe that the shareholders of the firms are better off than the citizens of the U.S. as a whole, and that a redistribution of income is desirable. Second, DOI might decide to place a smaller weight on the welfare of the private firms because their shareholders are not all U.S. citizens. Indeed, most oil producing countries rely heavily upon firms that are owned by foreign shareholders, and design leasing programs with one objective in mind -- to capture economic rent for the government. While the United States has historically dominated the oil industry world wide, the ownership of the large oil companies is increasingly becoming international, and several large foreign firms control significant amounts of U.S. oil production. For example, half of the giant Prudhoe Bay oil reservoir is owned by Sohio, which in turn is controlled by British Petroleum. Many other large U.S. firms are owned in part by foreign shareholders, including members of the OPEC cartel.

IV MEASUREMENT OF DISCOUNT RATES

We do not believe DOI has accurately estimated various discount rates under discussion.

In the 1985 Draft 5-Year Plan DOI asserted that the real interest rate on long term government bonds was 8 percent. In

the new plan, DOI asserts that recent yields on government bonds are 6 to 8 percent in real terms. DOI arrived at the 8 percent number by taking a single year, 1983, and subtracting the current rate of inflation from the long term nominal interest on long term treasury bonds. By comparing the long term bond rate to the short term inflation rate DOI ignored the effects of anticipated inflation. The interest rate and inflation from that single period were not typical of other periods.[3] In previous comments we calculated real ex post yields on treasury bonds from 1950 to 1984 and anticipated yields on future bond offerings using CBO projections and estimated real interest rates of 2 to 4 percent.[4] The February 1986 CBO budget projections estimate nominal rates on short term treasury bonds falling to 5.4 percent by 1991, with real rates declining from the 1985 level of 3.4 percent to 1.1 percent by 1991.[5]

Recent movements in interest rates provide further evidence that an 8 percent real rate is too high. The yield for three month Treasury Bills was 6.04 percent on May 7, 1986. The same

[3] Using the DOI method, the real rate of interest on 10 year constant maturity Treasury Bills were 6.9 percent for 1982, 3.51 percent for 1981, minus 2.04 percent in 1980, minus 1.86 percent in 1979 and .71 percent in 1978.

[4] Love and Stiglitz, "Comments on the Department of Interior's Draft 5-Year Leasing Plan: Revised July 1985 Appendix P."

[5] The Economic and Budget Outlook: Fiscal Years 1987-1991, CBO, February 1986. p. xiv.

day yield for 30 year Treasury Bills was 7.51 percent. If the long term inflation rate is expected to be 3.5 to 5 percent the federal government's real borrowing cost would be in the neighborhood of 2.5 to 4 percent.

On an after tax basis, government interest rates are considerably lower. A 30 percent income tax rate would mean that an 6 percent nominal yield, accompanied by 4 percent inflation, would have a real pre-tax interest rate of 2 percent, but an after-tax interest rate of only .2 percent. Likewise, a nominal bond yield of 7.5 percent and an inflation rate of 5 percent would result in a pre-tax real yield of 2.5 percent, but an after-tax real interest rate of only .25 percent.

DOI has cited two studies that estimate a real after-tax industry discount rate of 7 percent. One of the studies is a survey of large oil and gas producers.[6] The second study estimated rates of return for Gulf of Mexico OCS leases from 1954 to 1975.[7] Thus, according to DOI, private firms bidding on OCS resources use a "hurtle rate" on new investment that is the same as the return that DOI says investors could obtain by purchasing treasury bonds. While we are not prepared to critique in detail either study, it is worth noting that the Mead study covered a

[6] H. Boyle and G. Schenk, 1983, "Investment Analysis: U.S. Oil and Gas producers Score High in University Study," Journal of Petroleum Technology, Vol. 37, No. 4.

[7] W. Mead et. al., 1980. Studies of Competition and Performance in OCS Oil and Gas Sales, 1954-1975, Final Report, USGS Contract No. 14-08-0001-15078.

period when real yields on government bonds were close to zero and sometimes negative. Moreover, when we interview oil industry sources they claim to use a private after-tax real discount rate of 10 to 14 percent.

The pre-tax industry discount rate is higher than the after-tax rate. It is more difficult to make the adjustment for oil development projects than for bonds, due to provisions in the federal income tax laws that provide for deductions of interest expense, rapid depreciation, investment tax credits, expensing of intangible drilling expenses and dry hole drilling costs, depletion allowances, and other items. Industry income tax rates are not trivial, however, and average effective rates have climbed following the recent curtailment of the percentage depletion allowance.

When comparing the industry discount rate to the government bond rate, the appropriate comparison would be the pre-tax industry rate against the pre-tax bond rate, or the after-tax [net of corporate and personal income taxes] industry rate to the after-tax bond rate [net of personal income taxes].

We believe the industry discount rate is higher than the 7 percent figure estimated by DOI. Our interviews with industry sources suggest that the industry rate is relatively greater for the higher risk projects that have greater uncertainty regarding geology and oil prices.

Both types of uncertainty are more significant in frontier areas where there has been little exploration and where projects

require longer lead times. DOI itself considers the oil industry to be averse to bearing such risks. DOI's recent analysis of minimum bid policy assumes that this risk aversion results in private firm's under assessing the value of frontier acreage.* Thus the difference between the government bond rate and the industry discount rate will be greater in those sales that are in frontier regions.

The social discount rate presents a unique set of measurement problems. DOI has provided a review of many of the important theoretical and ethical questions to be addressed in choosing a social discount rate.*

In traditional cost benefit analysis, economists have debated the relative merits of using the after-tax return to savers, the pre-tax return on private investment, or some weighted average of the two. In recent years there has been a growing recognition that the theoretical basis for one rate or another is very sensitive to the particular problem the discount rate is used to address, and to the constraints that are implicitly or explicitly assumed to limit the options of

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* Hartgen, Carol, and Marshall Rose, "Analysis of Minimum Bid Policies," Branch of Economic Studies, Offshore Resource Evaluation Division, DOI. June 7, 1985.

* Our previous comments on the proposed changes in minimum bid policy unfairly criticized the current 5-Year Plan's analysis of the discount rate for failing to recognize the ethical questions at stake. Love, "Comments on Proposed Minimum Bid Requirement." While that was true of the previous 5-Year Plan, the current 5-Year Plan provides a much richer discussion of such issues.

consumers, firms or policy makers.

DOI has discussed some of these issues. For example, DOI asserts that federal policy makers cannot make rational decisions to finance federal government operations from OCS receipts.[10]

The ethical question concerns the value we place on the welfare of future generations. OCS resources are exhaustible, and depletion today will preclude their development later. The new 5-Year Plan discusses arguments for increasing or lowering the discount rate due to perceived market failures that lead to systematic under or over valuation of the welfare of future generations, but offers few suggestions except to say that disputes over such issues are best resolved through the political process.[11]

After navigating its way through the thicket of ethical,

[10] DOI asserts that federal policy makers are not able to distinguish between current income and the depletion of a capital asset such as OCS oil and gas properties, and hence will change spending priorities based solely on when the money is received. If true, this would be an argument to avoid early liquidation of OCS assets, or to use a lower social discount rate.

[11] DOI cites a paper by Joseph Stiglitz to support the view that intertemporal equity is served by providing future generations with fewer natural resource endowments than present generations, because future generations will have a larger capital stock and better technology. J.E. Stiglitz, "A Neoclassical Analysis of the Economics of Natural Resources," in V.K. Smith, ed., Scarcity and Growth Reconsidered, Baltimore, Johns Hopkins Press. 1979. In recent years, however, the trend rate of growth in GNP has significantly decreased. Due largely to current federal government fiscal policies, the U.S. savings rate is also much lower today than the historic norm. Thus, policy makers do not have such assurances of improved welfare of future generations.

theoretical and empirical problems in estimation, DOI finally settles on a range of real social discount rates between 6- to 8- percent. Just how this range was chosen is unclear.

V THE SIGNIFICANCE OF CHANGED OIL PRICES

As noted above, DOI is relying upon the Hotelling rule to justify the pace and scope of the OCS leasing plan. According to this theory, exhaustible resources are expected to appreciate in value as low costs stocks are depleted. Increases in the resource price will lead to greater profits, as long as prices are increasing at a greater rate than costs. The problem for firms and resource planners is decide when the resources should be left in the ground to appreciate, and when stocks should be developed.

Hotelling proved that in a competitive market, firms have the incentive to defer development until the net benefits from production [price minus production costs] are appreciating at a slower rate than the rate of interest. Hotelling further argued that so long as there are no other market distortions, the incentives facing the firm were socially efficient.

As noted in the above discussion of discount rates, and in our previous comments, the markets for petroleum are not necessarily competitive, and substantial differences exist between the firm discount rate, the social discount rate, and the interest rate on government bonds. In particular, the firm's

discount rate is considerably higher than both the federal government bond rate and DOI's estimated social discount rate. Leases that require royalty payments and diligence requirements also change firm incentives in ways that are not reflected in a simple application of the Hotelling rule.

While a simple application of the Hotelling rule is impractical in today's world, an examination of the fundamental concept is important for understanding how the recent plunge in world oil prices has changed the economic analysis in the current 5-Year Plan. According to this rule, which is quoted and relied upon extensively throughout the 5-Year Plan, society should determine the rate of appreciation in the net value of OCS resources, and initiate development as soon as that rate of appreciation falls below the appropriate rate of discount. If the cost of oil is $25, and the price is $28 and appreciating in real terms at 1 percent per year, the net benefit of developing the oil today is $3, and $3.28 percent next year. The increase in net benefits is thus 9.3 percent. For oil with a production cost of $27, the net benefits would be $1 and $1.28 respectively, for a rate of appreciation in net benefits of 28 percent. If the social rate of discount is 6 percent, development should be deferred until the rate of appreciation of the resource stock falls below 6 percent.

Oil that cost $20 to develop would be evaluated in the same way. Produced today at a price of $28 it would yield net benefits

of $8.28, for a rate of appreciation of just 3.5 percent. Because the resource was appreciating at a rate which was less than the rate of discount, the $20 oil should be scheduled for development now.

Holding everything else equal, development should be <u>delayed</u> more, the <u>higher</u> the rate of <u>increase</u> in oil prices, the <u>higher</u> the <u>cost</u> of production, and the <u>lower</u> the beginning <u>price</u> of oil. As DOI has recognized in the 5-Year Plan, changes in expected oil prices require a reassessment of the OCS leasing schedule. In the Appendix F, DOI used three catagories to describe potential oil resources:[18]

> A. Uneconomic deposits: those that are not economical under the prices expected during the upcoming production period. [Costs exceed price on these deposits.]
>
> B. Marginal deposits: those that are economical but whose net benefits are growing at a rate greator than the discount rate.
>
> C. Economic deposits: those that are economical and whose net benefits would increase at a rate less than the discount rate.

The following DOI discussion from the 5-Year plan is quoted extensively, as it describes in detail the modifications to the 5-Year plan that DOI anticipated would be necessarily for certain price contingencies:[19]

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[18] p. F-32.

[19] Ibid.

Because of the abrupt and unanticipated oil price changes of the last decade or so, it is worth examining how a manager using this sequencing rule [the Hotelling rule] would react to such price changes. Assuming the sequence of development prior to a price increase has followed the rule, the manager would have his inventory of non-producing oil and gas deposits divided into groups A, B, and C as described earlier. An abrupt and unanticipated increase in oil prices, assuming that it would raise prices throughout the upcoming production period but leave the rate of price increase during the period unchanged, would cause him to regroup his deposits. Numerous deposits would be shifted from group B to C because they now yield such great net benefits that future price increases would not increase them at a rate greater than the discount rate. . . . In addition, some of the uneconomic deposits in group A, those that were close to being economical before the price increase, would be shifted to group B. A large enough price increase could make some deposits that were uneconomic shift directly from group A to group C.

The effect of an abrupt and unanticipated oil price increase is thus to greatly increase the number of deposits economically ready for development and to substantially increase the net benefits which the economy can realize from the production of those deposits. The manager under these conditions would reasonably be expected to substantially increase the pace of development in order to realize those net benefits.

Other unanticipated changes in oil prices could occur. For example, some external factor could cause an increase in the long run rate of oil price growth. This would cause shifts in the grouping of oil and gas deposits similar to the abrupt price increase scenario, but the increase long-term price growth rate would reduce the extent of shifting from Group B to Group A and some from group B to group C. The deposits moved to group A would be those that were barely economical given the higher prices that were expected later in the production period. Without such continued increases, such deposits become uneconomical.

Recent price trends in the world oil markets show the possibility of a decrease in the rate of future oil price growth. If the OCS manager were confronted with an unanticipated leveling off of oil prices for the coming production period after expecting continued increases, he would find it necessary to regroup his inventory of deposits, moving some from group B to

group A and some from group B to group C. The deposits moved to group A would be those that were barely economical given the higher prices that were expected later in the production period. . .

On the other hand, some deposits that were increasing in value under previously expected price increases would be shifted to group C because there is no longer any increase in the economic benefits to be had by waiting for higher oil prices. Thus, an unanticipated leveling off in the rate of future price growth, like an abrupt, unanticipated increase in prices, could bring the OCS manager to order an increased number of deposits into production in order to achieve the greatest gain for the economy.

The DOI 5-Year plan was written prior to the recent plunge in world oil prices. The fact that the price decrease was unanticipated is evidenced by the fact that DOI used a base price of $24 dollars in 1984, increasing in real terms by 1 percent a year, with alternate price scenarios beginning at $19 and $28 in 1984 dollars. Moreover, the possibility of a dramatic drop in the beginning price of oil was one of the few alternatives not discussed in Appendix F.

World oil prices were falling in real terms since 1980, but at a gradual rate until early 1986. This pattern lead DOI on more than one occasion to suggest that prices will continue to fall slowly for several years prior to beginning an expected rebound by the end of the century. Within the analytical framework of the Hotelling rule, as applied by DOI, calculations were made of the economic benefits of leasing huge areas of OCS resources. The same logic which supported such an aggressive leasing program now requires DOI to radically scale back the leasing schedule.

There can be little doubt about the implications of the drop in world oil prices. First, the starting price of oil is far lower than predicted in the base case, and even lower than the lowest price used in the sensitivity analysis. Second, assuming that long term supply and demand predictions were reasonable, the expected future rate of growth in prices has increased. The combination of a lower starting price and a higher rate of increase in prices means DOI must return to the drawing board to reevaluate its leasing schedule.

In DOI's words, many deposits that were previously classified in group C should be placed in groups B and A. Likewise, many, if not all, deposits in group B should be placed in group A. Moreover, all the cost benefit calculations will have to be redone, to determine if the lower economic value of OCS resources still outweigh the costs of environmental damage and other negative externalities. Finally, the expected loses to the federal treasury from high private discount rates are expected to grow, as development will be deferred by the lower oil prices.

Recent oil prices have been unstable, but over the past two months have generally moved in a range of $10 to $15 per barrel. Crude oil deliveries from Alaska's North Slope are currently reporting a delivered price of $12.50, and a wellhead price of about $4.50. New oil production from the Milne Point field on Alaska's North Slope was recently estimated to have a wellhead value close to $1 per barrel, leading Conoco and other producers

to ask the Alaska State Legislature to lower royalty payments to prevent a shut down of the field.

COMMENTS

of the

NEW ENGLAND FUEL INSTITUTE ASSOCIATION
and the
INDEPENDENT FUEL TERMINAL OPERATORS ASSOCIATION

to the

U.S. DEPARTMENT OF THE INTERIOR

on the

REPORT AND RECOMMENDATION TO THE CONGRESS
CONCERNING ARTIC NATIONAL WILDLIFE REFUGE (ANWR)

Washington, D.C.
January 23, 1987

O-292

I. Introduction:

The New England Fuel Institute ("NEFI")[1/] and the Independent Fuel Terminal Operators Association ("IFTOA") hereby submit comments to the Secretary of the Interior concerning the proposed leasing and development for petroleum production of the Section 1002 area within the Arctic National Wildlife Refuge ("ANWR"). NEFI is the association of home heating oil marketers serving the six New England states; IFTOA is the association of independent terminal operators marketing fuel oil and other petroleum products along the East Coast from Maine to Florida.

The Section 1002 area consists principally of the Coastal Plain at the Northern tip of the ANWR.[2/] Preliminary surveys indicate that this area has the potential for containing one or more giant (more than 100 million barrels) or super giant (more than 500 million barrels) oil fields. ANWR recoverable resources could equal, or exceed, the enormous field developed on Alaska's North Slope ("ANS") at Prudhoe Bay.

The U.S. Fish and Wildlife Service of the Department of the Interior ("DOI") has prepared a draft Resource Assessment and Environmental Impact Statement regarding development of the Section 1002 area. In this report, DOI outlines five possible alternatives:

1/ A description of IFTOA and NEFI is included as Attachment A.

2/ Draft, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. Report and recommendations to the Congress of U.S. and legislative environmental impact statement; U.S. Department of the Interior (November 1986).

A. The full leasing of the Section 1002 area;

B. The partial leasing of the area excepting the core calving area of the porcupine caribou herd (PCH);

C. Further exploration of the area, including exploratory drilling;

D. No action;

E. Designation of the Section 1002 area as wilderness.

For the reasons discussed below, NEFI and IFTOA recommend adoption of Alternative A, and urge DOI to proceed promptly with development.

I. The U.S. Needs to Develop ANWR Reserves

A. Domestic Production Is Declining

Oil is the most important energy resource for the U.S. economy. Oil supplies almost 43 percent of total U.S. energy demand. Because of its relative worldwide abundance, and its ease of transportation and distribution, oil will remain America's most vital energy resource for at least several decades, and probably much longer. Oil is clean, portable and safe, and burns more efficiently than other fossil fuel resources.

Despite the enormous increases in the price of oil in the 1970's, it remained America's fuel of choice, never falling to less than 41 percent of total energy demand. When prices for petroleum were high, incentives for maintaining and increasing U.S. production were adequate. U.S. production remained virtually steady from 1973 to 1985, in large part because of the

enormous contribution to domestic production from ANS reserves, which began production in 1977 and has already produced about 4.6 billion barrels.

However, the 1985 decline in the price of oil has abruptly ended the extraordinary private incentives to maintain domestic production. Production declined in 1986, and barring unforeseen events, will continue to decline. Moreover, ANS production cannot be sustained at current levels beyond 1988, and will decline significantly in the 1990's. The National Petroleum Council ("NPC") predicts that U.S. crude oil production will fall from 8.9 million barrels a day ("MBD") in 1986 to 8.0 MBD in 1990, and to 7.0 MBD in 1995.3/ To a large extent, this decline is inevitable and unavoidable; much of this declining production is totally independent of price, particularly the projected decline in Alaska North Slope production. Now, more than ever, new incentives are needed.

B. Maintenance of Domestic Production is Essential

The maintenance of domestic oil production, or limiting the decline in production, is important to the nation's economic and military security. No price support or artificial, protectionist measures could maintain domestic production as effectively as prompt development of ANWR.

3/ See American Petroleum Institute, Domestic Petroleum Production and National Security (December 30, 1986).

Maintenance of domestic production reduces the likelihood of a supply disruption and lessens the costs of such a disruption to the economy, should one occur. Increased domestic production benefits the national economy most significantly by generating billions of dollars in income and related taxes; conversely, the added domestic production eliminates a comparable level of imports that would further enlarge the U.S. trade imbalance. In the light of these considerations, a major opportunity to increase domestic oil production significantly should be pursued vigorously. Development of ANWR is such an opportunity with virtually no adverse economic costs.

C. ANWR Development Will Moderate the Level of Imports

The second consequence of the decline in the price of oil is rising import levels. The U.S. imported 24 percent more oil in 1986 than in 1985. The NPC predicts increases in imports from 4.3 MBD in 1985 to 6.2 MBD by 1990, possibly reaching 50 percent of consumption, and to 7.9 MBD in 1995.4/

Development of ANWR will significantly reduce the likelihood of reaching these projected levels of imports. Unnecessary reliance on imports weakens the economy by costing jobs, income and taxes that would otherwise be generated through domestic production. It has a serious impact on the U.S. trade deficit. In 1984, crude oil and petroleum product imports were more than $59 billion, almost 50 percent of the trade deficit.

4/ See API, Domestic Petroleum Production and National Security (December 30, 1986).

Because of the 10 year lead time needed for Arctic petroleum development, it is essential to commence development of ANWR now. ANWR is the single most potent weapon currently available to the U.S. in its battle to prevent OPEC from regaining control over world oil prices and supply.

D. Production from ANWR Will Have a Major Impact

The DOI states in its draft report: "The [Section 1002] area is clearly the most outstanding oil and gas frontier remaining in the United States and could contribute substantially to our domestic energy supplies." The mean estimate for economically recoverable oil in the 1002 area is 3.2 billion barrels ("BB"). There is a 5 percent chance that 9.2 BB of economically recoverable oil lies within the area. The mean estimate of 3.2 BB is 11.35 percent of the total current U.S. proved reserves of oil. Further, if U.S. reserves decline as is now projected,5/ ANWR could provide more than 25 percent of total U.S. proved reserves by 2000.

In addition, output from the oil fields at Prudhoe Bay currently constitutes about 20 percent of domestic production. However, this production has peaked at about 1.8 million barrels per day, and is expected to decline by 1988; it is estimated that Alaska North Slope production will decline to only 500,000 barrels per day by 2000. However, if ANWR is leased and developed promptly, oil production from ANWR could offset the decline in

5/ The DOI report estimates that by the year 2000 the U.S. proved reserves could drop to 11.6 BB.

production from Prudhoe Bay. Thus, much of the transportation and distribution facilities developed for ANS crude could be utilized for ANWR production.

III. Benefits of Development of ANWR to U.S. and Alaska Economy

The development of ANWR will significantly benefit the U.S. economy. "The net national economic benefit ("NNEB") is the expected net value of oil production, or the difference between revenues from the sale of oil and the costs of exploration, development, production and transportation." The DOI draft report estimates the NNEB from development of ANWR could range from $79.4 billion to $325 billion, depending upon the price of crude oil. In addition, primarily by creating new jobs, development of ANWR can decrease unemployment in the depressed oil production and services industries, where 878,000 jobs have been lost.6/ Furthermore, the more favorable balance of trade created by development of ANWR will significantly alleviate one of the most troublesome and intractible problems facing America today.

Development of ANWR also will benefit the native landholders of the area. The testimonies of various resident corporations and Inupiat Eskimos at the hearing conducted by DOI in Kaktovic, Alaska, the one major village in the 1002 area, reveal the strong native support for opening ANWR to oil production. In fact, the Inupiat representative said: "The North Slope of Alaska is Inupiat land ... we should not be denied the opportunity to

6/ National Defense Council Foundation, "The Hidden Oil Crisis," 1986.

develop oil and gas underneath the lands which were granted us."7/ The direct financial benefits of development from Inupiat lands will go to these landholders. Furthermore, employment opportunities will be created where few exist; and severance tax payments to the State of Alaska will generate further income to the State.

IV. Mitigation of Environmental Impact Mitigation

Development should not occur if it inflicts significant and permanent damage on the environment. Fortunately, oil development in the Section 1002 area can be achieved successfully with little or no impact to the environment. Alaska is a vast land; oil development and wildlife preservation goals can be achieved side by side. The successful development of Prudhoe Bay provides convincing evidence that mitigation of adverse environmental effects is possible.

One example of the favorable environment consequences of ANS development is the increase in numbers of the Central Arctic Herd ("CAH") of caribou. Many felt this herd would be threatened by development of Prudhoe Bay and the Trans-Alaska Pipeline System; the Trans-Alaska Pipeline System ("TAPS"), Dalton Highway corridor and Prudhoe Bay-Kuparuk oil fields all lie within the CAH's range. Nevertheless, due to careful engineering of facilities and extraordinary precautions, the CAH has continued to co-exist with the development. In fact, the CAH has

7/ Testimony of Oliver Leavitt, Elected Assemblyman from the North Slope Borough.

increased from 3000 in 1972 to more than 13,000 presently living near Prudhoe Bay. In addition, water fowl that were deemed extremely vulnerable, continue to nest and rear their broods within the developed area. This demonstrates that wildlife in Alaska can thrive if oil development is undertaken carefully and with mitigation of environmental effects as a principal goal.

A comparable situation exists in the ANWR, and can be resolved similarly. The core calving area of the Porcupine Caribou Herd (PCH) is centered in the Section 1002 area of ANWR. This zone is particularly important as an identifiable habitat that the PCH has repeatedly used during critical life stages. NEFI and IFTOA recommend that DOI seek authority to lease this area last, in order to apply to this critical region the experience learned through prior development of other Section 1002 land.

The planning and construction of transportation facilities can also be done in a way that minimizes the adverse economic impact. As indicated, if the Section 1002 area is fully leased, oil production from ANWR is expected to grow as production at Prudhoe Bay declines. Thus, existing pipeline capacity will be available to transport ANWR crude oil most of the distance to Valdez.

Not only will this eliminate the need for construction of a major new pipeline, it will also prevent the deterioration and premature abandonment of the existing TAPS facility. If TAPS capacity is inadequate, it would be possible to increase capacity

by looping or improving pipeline hydraulics. Furthermore, any connecting pipeline from ANWR to TAPS can be elevated to protect the permafrost and allow free passage to the caribou. Consequently, the transportation facilities needed to bring ANWR crude to market are largely in place, and supplemental facilities can be built with no adverse environmental effect.

In countless other ways oil can be produced in the Section 1002 area with little or no adverse impact on the environment. Consolidating production facilities to the maximum extent will minimize effects on vegetation; insect relief habitat for the caribou can be protected by limiting surface occupancy in that particular zone; federal performance and design standards can be enforced to meet environmental and safety requirements. In short, environmental protection is not a sound basis for preventing or deferring development of ANWR.

V. Conclusion

The Section 1002 area of ANWR is the outstanding oil and gas frontier in North America. Declining domestic production and the inherent dangers to U.S. economic and national security resulting from such declining production makes development of this vast domestic resource imperative. Mitigation of adverse environmental impacts is clearly possible, as demonstrated by the previous development of Prudhoe Bay Moreover, by leasing the core calving area of the Porcupine Caribou Herd last, further experience in mitigation can be applied to development. In light

of these considerations, NEFI and IFTOA strongly recommend that the entire Section 1002 area be leased promptly for exploration and petroleum production.

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February 4, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, NW
Washington, DC 20240

Dear U.S. Fish and Wildlife Service:

This letter constitutes the comments, views and opinions of the Northern Alaska Environmental Center (NAEC) on the draft Arctic National Wildlife Refuge, Alaska, coastal plain resource assessment, report and recommendation to the Congress of the United States and legislative environmental impact statement, as solicited in the draft report. This report was prepared to fulfill the requirements of Section 1002(h) of the Alaska National Interest Lands Conservation Act (ANILCA) and will hereafter be referred to as the 1002 report or simply the report. To facilitate your review of our comments, we have consolidated them into broad categories according to subject.

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For reasons outlined below, the Northern Alaska Environmental Center recommends the adoption of Alternative E, Wilderness Designation, as being the most prudent and responsible course for management of the Arctic Refuge coastal plain. Due to the many oversights, misstatements, and problems in the draft 1002 report, we also feel that a near total rewrite of this document will be necessary before it can be presented to Congress in a useful form.

ADMINISTRATIVE IRREGULARITIES

Public Comment

The NAEC is composed of over 700 members in Alaska and most of the other states. It is the only environmental conservation advocacy organization that is entirely devoted to maintaining the environmental quality and promoting sustained, intelligent, long-term use of the natural resources of Arctic Alaska. It was, therefore, with particular displeasure that we observed that our organization had been left off of the original distribution list at the back of the report. We had to call the U.S. Fish and Wildlife Service (FWS) regional office in Anchorage to request our copy, and then had to wait many days after the report was released (organizations on the list had already received theirs) to receive it. We would like to think that this was merely an oversight, but leaving a key group like NAEC off the distribution list seems rather a deliberate omission on the part of the FWS or top Department of the Interior (DOI) officials, who we realize are really responsible for the report.

The other blatant omission that was even more puzzling and just as serious was the village of Kaktovik. The very village that would be changed and

affected most significantly by the actions recommended in the report was not on the list to receive a copy. We understand that members of the Arctic National Wildlife Refuge staff had to intercede and have copies sent to the village, though not without some difficulty since such a limited number of the reports were initially printed. The village almost had to wait until the second printing (three weeks later) to receive theirs.

The DOI made it quite clear that it did not want public review of the report through its appeal of a District Court decision mandating public comment. This is bad enough for a public agency in our democracy. However, once the report was released, its limited availability was another serious shortcoming. So few reports were initially printed that the FWS was being extremely selective as to who received the reports during the first few weeks of its availability. Considering the short time period available to review such an important and complex document, not having it available to the public-at-large in a timely manner was a serious and obvious effort to limit the extent of the report's circulation and comments on it. This demonstrates to us that the DOI is still not really interested in public review of the report, but allowed the draft report to be reviewed merely to comply with the letter of the court decision. If review of the report had been delayed until after the Christmas holidays or if a longer comment period had been provided (at least 90 days), we seriously doubt whether Congress would have minded all that much, considering that the report was already almost three months late.

A member of our staff was informed by DOI's Susan Reece in a phone conversation on December 11 that hearings on the draft 1002 report were being held only as a "courtesy" extended to the public by DOI. This seems preposterous in view of the court decision mandating public involvement. It is noteworthy that public comment periods held by FWS in Alaska on refuge draft Comprehensive Conservation Plans (CCP), which are decidedly less controversial and complex documents than the 1002 report, are a standard 90 days in length. The number of public hearings held on these plans is also typically far greater than the number that were afforded for the 1002 report. If FWS can provide double the minimum 45 day comment period (stipulated in Council on Environmental Quality Regulations) for draft CCP's, why could it not do so for the draft 1002 report, as the public requested? The fact that there will be opportunity for lobbying after the matter reaches Congress does not relieve the DOI from its responsibilities as an agency within a democratic governmental system, especially when such an important recommendation is to be made to the legislature. The agency's attempts to prevent and later limit and stifle public involvement in the report are a terrible miscarriage of its responsibilities to the people of the United States.

The fact that only three public hearings were held on the report represents a significant shortcoming relative to DOI's public involvement process. The hearings were held in Kaktovik and Anchorage, Alaska, and in Washington, D.C. The following groups or organizations have requested public hearings in Fairbanks and/or Arctic Village, Alaska: Greater Fairbanks Chamber of Commerce, Fairbanks North Star Borough, Arctic Audubon Society, Citizens' Advisory Commission on Federal Areas, National Audubon Society, the Northern Alaska Environmental Center, and the people of Arctic Village. There can be no doubt that Fairbanks and Arctic Village will be two Alaskan communities greatly affected by decisions relating to the Arctic Refuge coastal plain.

There can also be no doubt that, while written comments are supposed to be equivalent to verbal ones, many people are more comfortable speaking than writing. Public hearings afford the opportunity for FWS to make a verbal presentation concerning the contents of the 1002 report. With its 172-page length, technical jargon, and lack of availability, the 1002 report represents a formidable document to most lay people. Public hearings in Fairbanks and Arctic Village, which were desired and requested by the public, would have helped alleviate these problems.

Baseline Report Availability and Adequacy

The 1002(h) report was released prior to finalization and publication of the 1985 update and final baseline study reports that were required by Section 1002(c) of ANILCA. Since the 1002 report was partially based upon information gathered in these studies, how could it have been written in compliance with ANILCA without the benefit of these reports? Just as importantly, these reports should have been available to reviewers of the draft 1002 report during the entire review period for an adequate evaluation. The final baseline study report was not distributed until late December 1986. At 695 pages in length, it is not a document that can be quickly perused. Under these cirumstaces, it is not surprising that very little information from the baseline reports is included in the 1002 report. The 1985 update report is still not available at the end of the review period.

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A further apparent irregularity is the availability of the final baseline report before completion of the 1985 update report. We understand that some of the 1985 data were still being analyzed and the report was still being written at the time that the 1002 report to Congress was released. It also seems that the 1985 update report should logically have been completed prior to the final, since the final report is supposedly based upon information in the 1985 update. This irregularity raises serious questions concerning the validity of the final baseline study report as well as the 1002 report to Congress.

We further believe that the ANILCA 1002(c) studies were themselves deficient. Subsection 1002(c)(D) requires that the Secretary of the Interior "analyze the potential impacts of oil and gas exploration, development, and production on. . ." the wildlife and habitats of the ANILCA Section 1002 study area. Few of the great number of research projects that constituted the baseline studies included work with the expressed objective of determining the impacts of such activities. These were the study of seismic exploration impacts on muskoxen and limited work on the effects of aircraft disturbance to staging snow geese. All of the studies focused on the 1002 area itself. We believe that certain key studies should have been conducted in the Prudhoe Bay oilfield 80 miles to the west. These studies could have significantly helped in analyzing the potential impacts of oil and gas development on the coastal plain of the Arctic NWR. For the reasons stated above, we believe that the FWS and the DOI did not comply with Congress' intent relative to preparation of the 1002(c) reports.

Information unavailable to public or presented in a biased manner

Yet another shortcoming is the non-availability of the geological data that the projections of oil and gas resources in the 1002 report are based upon.

The resources in question belong to the American people. These data should be publicly available in order for the report to be adequately evaluated. The fact that the data were collected by private entities should not be used as an excuse for keeping the data secret. This is a matter that the FWS should have recognized and dealt with long ago, prior to the data being collected. We think that greater creativity could have been used in satisfying this important concern. It is interesting to note that Alternative C, further exploration, contains no stipulations to avoid such problems in the future.

Although the 1002 report purports to be an objective document, it is in fact biased in many ways so that it favors support of full oil and gas leasing of the coastal plain. One of these subtle biases is reflected in the report's imbalance in its descriptions of the resources of the 1002 area. A total of 24 pages was devoted to describing the area's geologic and oil and gas resources. However, only 11 pages were devoted to describing the area's fish and wildlife resources, which we think are equally, if not more important, especially considering that the area is supposed to be a wildlife refuge. The area's living resources are just as complex as the area's geology, so that can't be used as an excuse. The report makes only minimal attempts to describe the complex ecological processes and relationships in this Arctic area, which we believe are important in understanding what the long-term effects of oil and gas development might be. Other biases in the report will be illustrated elsewhere in our comments.

LACK OF BACKGROUND INFORMATION

The introduction in Chapter 1 (page 9) does not include enough background information on the history and actions leading to the establishment of the Arctic National Wildlife Range, which later became the Arctic National Wildlife Refuge. This information is important in understanding the purposes for which this conservation system unit was established. This is especially important in light of the fact that many people reviewing the report, most importantly members of Congress, may not know that creation of the wildlife range was the culmination of many years of hard work by conservationists in Alaska and other parts of the country.

The original inspiration and idea for establishment of a conservation unit in Arctic Alaska is attributed to Robert Marshall, who journeyed through what is now Gates of the Arctic National Park between 1929 and 1939 (Spencer et al. 1979). Marshall proposed the idea that large portions of Alaska should be protected as wilderness, since most original landscapes and ecosystems were disappearing rapidly in the rest of the United States. He early recognized the importance of keeping significant areas of the earth free of human domination.

The first attempt to act upon Marshall's ideas occurred in 1949 when the National Park Service (NPS) conducted a survey to determine areas in Alaska that deserved formal protection as conservation units. Two NPS workers, George Collins and Lowell Sumner, spent two summers exploring and studying the eastern Brooks Range in this survey. They wrote a report proposing that the northeast corner of Alaska and adjacent portions of Canada be protected as a unique ecosystem (Collins and Sumner 1953).

The report's recommendation soon attracted the attention of the conservation community and concerned citizens nationwide, who began promoting the report's findings and lobbying the DOI to establish a park or wildlife range in the area. Notable leaders in this effort included Olaus and Margaret Murie, who made several trips into the area that later became the refuge. Olaus Murie had worked as a biologist for the Bureau of Biological Survey (FWS predecessor) studying caribou in various parts of Alaska (Murie 1978). Murie was also a co-founder of the Wilderness Society, which played a key role in establishing the wildlife range. These and other conservationists worked extensively during the 1950's to get a conservation system unit established in the area.

As stated in the report, their efforts finally resulted in establishment of the Arctic National Wildlife Range by Public Land Order in 1960. The purposes stated were to preserve "...unique wildlife, wilderness and recreational values." To the extent that these purposes do not conflict with those stated in ANILCA Section 303(2)(B), which re-established the range as the Arctic NWR, these same purposes still apply today. The report should be reviewed in light of this fact.

WILDERNESS REVIEW

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We believe that the DOI has not complied with the provisions of ANILCA Section 1004 which calls for a wilderness study and report on the 1002 study area. This study should be completed before the final report is submitted to Congress. A blatant shortcoming of the 1002 report is the fact that there is only one-half page of text describing the area's wilderness and aesthetic values. We acknowledge that describing the oil and gas resources could rightly be more complicated and thus might require more text than the wilderness resources description. However, we believe that the wilderness values should have been described at least as thoroughly as the oil and gas resources. As the report is written, it barely does justice to this important aspect of the area. The area's wilderness resources are indeed the crux of the current controversy surrounding this issue. We note on page 46, first paragraph, that the report states that the area "could" meet the criteria for wilderness status as described in the Wilderness Act. We believe that the area DOES meet these criteria.

This lack of detail concerning wilderness values is an obvious attempt to downplay the significance of the area's wilderness resources, and is an important omission in terms of report review by persons who are not already familiar with the area. We will therefore provide below augmentation to the report's meager description of the area's wilderness values.

At least two formal wilderness reviews have been conducted for the 1002 area. One of these considered the wilderness qualities of the entire wildlife range (USFWS 1973). Though this study was never finalized, the preliminary draft concluded that the entire wildlife range was suitable for wilderness designation, except for the two abandoned DEW Line sites on the coast, the Barter Island military withdrawal, and the Kaktovik Inupiat Corporation land selections. The reason this study was never finalized and submitted to Congress for action was that the area was being considered as

an alternative route for the Arctic Gas Pipeline and because of the Alaska Native Claims Settlement Act (ANCSA) Section 17(d)(2) debates in Congress which culminated with passage of ANILCA in 1980. The Arctic Gas Pipeline proposal died in 1976. Early House versions of ANILCA, passed overwhelmingly, would have designated the 1002 area as wilderness along with the rest of the original wildlife range, but the question of oil and gas potential prevented that. The final version resulted in the 1002 area being excluded from wilderness designation, with the requirement for the present report incorporated therein.

The second wilderness review was specific to the 1002 area as designated in ANILCA. That study (Thayer 1982) also concluded that the entire area, except for the abandoned DEW Line stations, was suitable for wilderness designation.

The area exceeds the 5000-acre minimum size specified in the Wilderness Act. With few exceptions the area is in near pristine condition. It is currently the most pristine large segment of Arctic tundra remaining in the United States that is protected from human development. The entire balance (over 90%) of the Alaskan North Slope is currently open to oil and gas development. The same is largely true for the Canadian Arctic as well, the exception being the new Northern Yukon National Park, which protects a very small segment of the Canadian North Slope. These factors drastically increase the wilderness significance of the 1002 area.

The 1002 area is primeval land and provides excellent opportunity for solitude. This factor is further enhanced by the wilderness status of the lands immediately to the south and east. There are no roads or designated trails for travel; most travel occurs along the river courses. Visitors to the area can experience true solitude and wilderness equaled in few other places on earth. The area's present relative inaccessibility is a major reason for this. Travel across the area by primitive means is reminiscent of the hardships, challenge, drama and peril faced by early American people, but which is becoming increasingly difficult to experience today. There are few signs of human presence, these mostly being archeological sites and scattered artifacts. Occassionally one may see or hear an aircraft. Many people spend days without seeing a single sign of human existence.

The area provides unexcelled opportunity for primitive and unconfined recreation. The special features of the area that contribute to this are its openness and feeling of unconfinement. The close proximity of the mountains and the Arctic coast in the 1002 area presents a unique wilderness situation in the North American Arctic, offering the wilderness recreationist the opportunity to experience, in a comparatively contracted zone, a variety of habitat and terrain types whether traveling by foot or river. A visitor can, within the span of a few days, go from the alpine zone of ice, snow and rock, to alpine meadows, to arctic tundra valleys, to tussock tundra foothills, to braided river floodplains, to rolling tundra plain, to flat thaw lake plain, to the coastal zone of wetlands, lagoons, barrier islands, and the ocean. This recreational variety is unavailable within such a short distance anywhere else on the Alaskan North Slope.

The shallow valleys of the numerous streams that flow across the area to the Arctic Ocean provide good camping sites. Gravel outcrops on the plain above the rivers provide camp sites with broad views. The streams in the area are

not navigable by conventional power boat, and most are not easily navigable by canoe. Rafts or kayaks provide the best crafts for river running.

In terms of scenic quality, the Arctic NWR coastal plain is splendid and varied. To a person situated midway between the Brooks Range and the ocean, the mountains dominate the southern skyline. Mounts Isto, Chamberlin, and Michelson, the three tallest peaks in the Brooks Range, are always snow-clad and are impressive when viewed from the coastal plain, their grays and whites contrasting with the greens and browns of the tundra. To the east and west, one sees the vast expanse of treeless tundra rolling into the distance creating the illusion of limitless wilderness in both directions. If one is situated in the right place and given the right weather conditions it is also possible to see to the north the coastal lagoons, the ocean and the permanent pack ice beyond. Because vegetation is mostly very low, only a few centimeters tall over most of the area, both visitor and wildlife are conspicuous. Animals are easily visible and, because of the relative lack of human presence, are often unwary or even curious when confronted by humans.

The Arctic coast, with the Arctic Ocean to the north and the broad coastal plain to the south and the general absence of man's work offer extensive primitive and unconfined camping and wilderness enjoyment opportunities.

The Arctic NWR is one of the most primitive and isolated wild regions left on earth protected as a conservation area. The 1002 area is an integral part of the wilderness ecosystems encompassed by the Arctic NWR, as most of the major wildlife species occurring on the refuge (caribou, moose, grizzly bears, wolverines, wolves, muskox, polar bears, numerous species of birds) utilize the coastal plain habitats for all or critical portions of their life cycles (i.e., calving, denning, nesting, breeding, staging).

Seasonal abundance of wildlife on the coastal plain is high. Many species of migratory birds utilize the coastal plain wilderness for nesting and rearing young. These species travel far beyond the boundaries of the refuge. The report correctly states that the coastal plain is the most biologically productive part of the entire Arctic NWR and is the center of wildlife activity on the refuge (USFWS 1978).

The biological diversity and uniqueness of the Arctic NWR has been recognized by many scientists. A symposium was held concerning the wildlife range at the 12th Alaska Science Conference at the University of Alaska in 1961 (Dahlgren 1962). At this symposium, many scientists went on record stating the importance of the wildlife range to science. This importance was attributed to the relatively undisturbed condition of the area and the ecological diversity found within such a contracted zone. It was stated that the area could serve as a control against which we can measure the effects of land-use practices elsewhere in the Alaskan Arctic, an opportunity that has been forgone for most other North American ecosystems. The range's combination of habitat and species variety was compared to that of Africa's Serengeti Park and it was thought that the area could "... provide topics for an untold number of scientific publications."

In originally recommending the area for preservation, Collins and Sumner (1953) wrote:

> The region offers science the best opportunity of any place in Alaska, if not in the whole of North America, for studying the processes by which these and other Arctic animals maintain their numbers through the natural checks and balances of climate, food supply, and predation.
>
> The whole field of cyclic population fluctuations, so characteristic of the smaller animals in the Arctic, can be studied here with no interference by agricultural or other human activities. Such research possibilities are of outstanding importance to various applied sciences such as game, fur and fish management, and human survival techniques.
>
> Ecologists recognize that research in an Arctic wilderness study area has special usefulness beyond the confines of the region because the comparative simplicity of environmental factors in the Arctic makes them easier to isolate and analyze.

If these statements were true in 1953, their truth and relevancy in 1987 cannot be doubted; there are far fewer acres of such wild richness today than there were then.

In 1969 the Tundra Biome Section of the International Biological Program (IBP) passed a resolution urging that all or a major portion of the Arctic NWR be included in the National Wilderness Preservation System, and that scientific research be recognized as a priority use of the range (USFWS 1973). The resolution also called for minimizing man-induced physical and biological change in the area. A major purpose of the IBP was to study natural ecosystems to predict the consequences of natural or man-induced environmental changes or stresses.

The Arctic NWR is the only conservation system in North America and perhaps in the world that protects a complete spectrum of the various arctic ecosystems in an undisturbed condition, and the 1002 area is an integral part of that spectrum. The area presents unique opportunities for scientific study of an undisturbed ecosystem. The area also presents excellent opportunity for wilderness environmental education.

The 1002 area is the only portion of Arctic coastal plain in Alaska that has not been committed to man's development activities, except for a tiny stretch from the Aichilik River to the Canadian border. As such it has extremely high values as a remaining example of the natural coastal Arctic ecosystem. Its ecological, scientific and educational values as such an example are incomparable.

The 1002 area in its present state has outstanding wilderness qualities, and completely meets the definition of wilderness contained in the Wilderness Act. The area has been described as being de facto wilderness (HR Rep. No. 95-1045, Part I, 95th Congr., 2d Sess. 151, 1978; HR Rep. No. 96-97, Part I, 96th Congr., 1st Sess. 483 and 487, 1979). In fact, the Arctic NWR is regarded by many as epitomizing the

values intended to be preserved by formal wilderness designation (S. Rep. No. 96-413, 96th Congr., 1st Sess. 376, 1979).

A number of publications have described the wilderness qualities of the Arctic NWR and the 1002 area. Some of these are Abbey (1984), Brower (1971), Chadwick (1979), Kerasote (1984), Laycock (1976), Milton (1969), Sumner (1956), and Tall (1959).

EXECUTIVE SUMMARY

Impacts of Oil and Gas Production in the Arctic

The Executive Summary portion of the report does not accurately reflect material contained in the body of the report. This section contains major flaws, one of which is self-contradiction. On page 2, we read: "Most adverse effects would be minimized or eliminated through carefully applied mitigation, using the lessons learned and technology acquired from development at Prudhoe Bay and from construction of the Trans-Alaska Pipeline System (TAPS)." Later, on page 6, we read: "Long-term losses in fish and wildife resources, subsistence uses, and wilderness values would be the inevitable consequences of a long-term commitment to oil and gas development, production, and transportation." How can long-term losses occur if most adverse effects are minimized or eliminated? The two statements quoted above are mutually exclusive. In view of the evidence compiled to date (some of which is presented in the 1002 report), the latter statement is eminently believable while the former is not.

On page 2 of the Executive Summary we also read: "The evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources." This statement is totally insupportable. Perhaps the authors of the Executive Summary should have read the final baseline study report prepared pursuant to ANILCA Section 1002(c), before making such statements. "On the north slope oil fields, new facilities are presently being built, and successful rehabilitation techniques have not yet been developed." (USFWS, 1986, p. 563). It is too early to determine many of the long-term impacts that fish and wildlife resources (i.e. populations and habitats) have suffered or will suffer at Prudhoe Bay. In most cases, baseline studies of fish and wildlife resources were not conducted at Prudhoe Bay prior to oil development activities there. This makes it nearly impossible to tell what kinds of changes have occurred to date.

The December 1986 final baseline study report devotes many pages to consideration of some of the adverse environmental impacts of oil development, production, and transportation. Here is a partial list of the causes of some of the impacts: human activity (including aircraft overflights, traffic, and increased legal and illegal harvest

levels), vehicle trails, gravel cover, erosion and sedimentation, impoundments, gravel spray, dust, snow drifts, thermokarst (permafrost degradation), fuel spills, drilling muds and reserve pits, and seawater spills. Some of the adverse impacts due to the above-mentioned causes: permanent changes in species composition and distribution, severe loss of vegetative cover, exposure of peat and mineral soil, thaw settlement, changes in moisture regime and drainage patterns, slumping, early snow melt, and delayed plant phenology.

Although some causes and effects have been documented, there have not been many studies done that quantify impacts to fish and wildlife populations and habitats from oil development activities. For example, "Few studies have been done on the effects of drilling muds and reserve pit fluids on tundra vegetation, and the long-term effects are essentially unknown" (USFWS, 1986, p. 560). From page 34 of the same report: "Little information is available on the distribution of ground ice in the study area and the extent and origin of massive ice beds. The amount of ground ice is an important factor in determining the effects of oil exploration and development on surface stability." As indicated repeatedly in both the 1002 report and the final baseline study report, many types of adverse impacts are inevitable consequences of development, even using current technology and mitigation procedures. The logical conclusions to be drawn from this information are that devlopment in the arctic cannot be conducted with only minimal impacts, and that it is presently unknown whether or not developed areas can be rehabilitated to their original state.

The 1002 area's estimated oil and gas potential

What isn't provided anywhere in the executive summary is the fact that there is only a 19% chance that an economic size field exists in the 1002 area. In the introduction to the executive summary it is stated, "The area is clearly the most outstanding oil and gas frontier remaining in the United States, and could contribute substantially to our domestic energy supplies". In support of this statement, the in-place estimates for oil and gas are given. The amounts of economically recoverable oil and gas, the really significant estimates, are provided obscurely in a single paragraph on the second to last page of the 7-page summary. We see this as a deliberate deception, which must be rectified in the final report.

The high oil and gas potential for the area that is described in the executive summary and in the Secretary of the Interior's recommendation is not supported by the text of the report. Our reasons for this observation are elaborated below.

1. On pages 49, 68, and 72, the report states that there is only a 19% chance of there being at least one economically recoverable oil deposit in the 1002 area. We do not see this 1 in 5 chance as being very encouraging from the standpoint of discovering oil. Where did this figure come from? The derivation of this estimate should be provided, as should estimates for each of the prospects 1-26 that are shown in Figure III-1. Also, what is the chance of finding other prospects not mapped?

2. On page 50, Figure III-2 compares the conditional resources of oil on the refuge with the recoverable reserves of proven fields. These data are not comparable, although the manner in which they are presented makes it seem that they are. It would be more appropriate for the estimated recoverable reserves in the 1002 area to be portrayed here. Conditional resources should be portrayed elsewhere and identified by number (1-26) for the eight largest prospects. Even if these data were comparable, for all possible prospects on the refuge, the most likely (95% probability) resource estimates are well below the estimated reserves of most of the largest known fields. Yet in the paragraph at the top right of this page the report concludes that the area is one of the most outstanding prospects in the United States. This conclusion does not logically follow from the data presented.

3. Table III-1 on page 50 is ambiguous. The caption states that the data do not reflect the risk that economically recoverable oil may not exist in the "planning area". Does this mean that this risk is not reflected only for the 1002 area, or for all of the areas compared? If the former is true, then this table does not represent a valid comparison of data.

4(a). In several places in the report, the proximity of the area to Prudhoe Bay is cited as an encouraging factor in the 1002 area being highly prospective for oil and gas. On page 54 the report states that most of the Prudhoe Bay production is from Ledge Sandstone rocks of the Ellesmerian Sequence. Yet it is also stated that these rocks are likely non-existent in the 1002 area. On page 54 the report also states that if Ledge Sandstone rocks are not present, then the chances of oil being present in the area are much reduced. These rocks are cited as being the major possible source rocks for oil and gas production in the area, but their existence in the area is uncertain. Other possible source rocks are given on page 55 as being the Shublik Formation and the Kingak Shale. However, the existence of these rocks in the area is uncertain. On page 62 the report indicates that these source rocks are probably gas-prone in the 1002 area, and further that "these rocks may not be present in much of the 1002 area." Page 54 contains the vague statement that "drilling one or two wells in critical areas would help resolve this question" of the presence or absence of Ellesmerian rocks. This statement should be supplemented with a map showing where these "one or two wells" would be placed. If it is indeed true that drilling one or two wells would resolve this important queston, please explain why the draft report recommends full oil and gas leasing rather than exploratory drilling. This does not seem logical and prudent considering the predicted environmental consequences of full leasing.

(b) Also, on page 62 the report states that analyses of oil from the Hue Shale in the 1002 area (natural oil seeps) show that this oil is not chemically similar to oil from the same formation in the Prudhoe Bay area.

5. On page 58 the report states that the extremely complex geology of the southeastern half of the 1002 area makes location of structural traps and possible source rock in the Brookian sequence very

problematical. Hue Shale is stated as the only possible source rock in the Brookian Sequence. The report states that no prospects were discovered in Brookian Sequence rock. Please indicate how this information helps support the conclusion stated in the Executive Summary and on page 50 that "the 1002 area is clearly one of the most outstanding prospective oil and gas areas remaining in the United States."

6. On page 66 the report states that the two largest prospects (18 and 19) account for the majority (50%) of the estimated in-place oil. Yet it is also stated that these prospects, which are in the Folded Ellesmerian / Pre-Mississippian Play, are dependent on the presence of Ellesmerian rocks as reservoirs and also on Hue Shale as the most probable source rock. The report also states that the former rocks are likely not present in the area and that the Hue Shale is only possibly present. Again, this information seems to indicate conclusions contrary to those drawn in the Executive Summary and elsewhere in this report.

7. On page 68, Figure III-6 should show the mean estimates of in-place oil and gas by prospect, not by resource block.

8. Page 70: It seems that for the PRESTO model a 1 in 20 risk level would more closely coincide with what was reported, particularly for the very large prospects. The geologic risk section on this page needs to be clarified so that the lay person can understand the assumptions upon which the estimates are based.

9. The report uses the mean estimate as the most reasonable estimate for in-place oil. Yet the probability associated with this estimate is only 40%. It seems that a more meaningful estimate would be that at the 50% level (1 in 2 chance of occurrence). The amount of in-place oil at this probability level is somewhat less, 11.9 billion barrels of oil (BBO), compared with 13.8 BBO, the figure used in the report. However, the most reliable and most probable estimate would be that at the 95% probability level, which we note is only 4.8 BBO.

10. The most likely or expected amount of economically recoverable oil is given in the report as the mean value (3.23 BBO). As with the in-place estimate we question the meaningfulness of this value. It seems that a more reasonable estimate would be that associated with the 50% probability. That estimate would be 2.21 BBO. As with the in-place estimate, the most probable or reliable figure would be that at the 95% probability level -- 0.59 BBO. We note that this is only slightly more than the minimum economic field size for the 1002 area given on page 71 as 0.44 BBO.

11. The evaluations of economically recoverable oil are made with an assumed oil price of $33 per barrel. The current oil price is less than $18 per barrel. The report makes no predictions of the future price of oil. Considering the recent drop in world oil prices, the $33 per barrel figure sounds unrealistically high. The report should have provided an evaluation of future expected oil prices. Otherwise, reviewers have no basis to judge whether the economic assumptions are realistic. It should be noted that lower oil prices would result in

larger minimum economic fields. At current oil prices the predicted most likely amount of recoverable oil in the 1002 area would probably be well below the minimum economic field size.

12. It should not be "expected that this LEIS will suffice for initial leasing" (page 13). This statement shows a blatant disregard for the provisions of the National Environmental Policy Act (NEPA).

EXISTING ENVIRONMENT

1. A section on water quality should be added.

2. The section on air quality is totally inadequate. All references cited predate development at Prudhoe Bay and in no way represent current conditions. Monitoring data collected in the late 1970's should be cited. Ambient air quality monitoring at Prudhoe Bay began in late 1986. Permitted discharge for nitrogen oxides is currently 100,000 tons annually. Until results are available from this research, effects must be considered unknown and warrant further evaluation. Some attention should be given to emissions from start-up and upset flaring. Measures must be established to ensure that appropriate monitoring is conducted. Stipulations and operational procedures should be based on real data rather than supposition, in order to be effective.

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3. It should be mentioned on page 17 that average snowfall on the Arctic NWR is significantly less than in the Prudhoe Bay area.

4. On page 26 the Sadlerochit Spring area was mentioned as having been nominated as a National Natural Landmark. However, the report failed to mention another site that was likewise nominated. This is the Beaufort Lagoon-Demarcation Bay area (Bliss and Gustafson 1981). Another site that was nominated for inclusion in a State system of ecological reserves is the Jago River drainage. This site was described by Stenmark and Schoeder (1974) to contain "a complete array of tundra and floodplain vegetative and animal types typical of the North Slope." The Secretary's recommendation would allow oil development over the entire extent of this proposed ecological reserve. Yet it was not mentioned at all in the report!

5. The goals of the State's Coastal Zone Management Plan are mentioned frequently in the report (pages 27, 42, and 43). We note that most of these goals point toward the maintenance of a natural environment on the North Slope. The Secretary's recommendations should have addressed this.

6. On page 34, specific information is lacking for loons. Plate 3A implies that waterfowl and loons only nest in the shaded areas. This is inaccurate. The map should also depict the important staging/molting areas for oldsquaw and other waterbirds in the coastal lagoons. More detailed habitat use data should be provided for all migratory bird species.

7. An explanation of what the Kaktovik Inupiat Corporation (KIC) lands are, their ownership history and future, should be provided. Some mention is made of these lands on pages 13, 15, and 42, yet no detailed explanation is ever provided. Mention should be made of what effect the "1991" provisions of the Alaska Native Claims Settlement Act (ANCSA) might have in terms of land ownership in the 1002 area, and the significance of ANCSA Section 22(g) relative to these lands. The fact that a land exchange in 1983 allowed private entities to drill an exploratory well inside refuge boundaries is significant. The trunk oil pipeline proposed under Alternative A "will transport oil from Federal leases and from any private lands in the 1002 area to Pump Station 1" (p.89). The report's failure to address the additional impacts that might occur from leasing and production on these private lands is another of its many flaws.

8. On page 37 sport fishing is mentioned as being minimal in the 1002 area. Although we acknowledge that sport fishing is not a primary reason why people visit the area, it is an activity that is engaged in by almost everyone who does visit the coastal plain.

9. On page 41 in the last paragraph in reference to Kaktovik whaling, what is the definition of "historic" period? The next sentence appears to contradict the statement that no whaling took place at Kaktovik during the historic period.

10. On pages 75-76 the lack of water and gravel resources are highlighted as major engineering problems. We see these as major environmental problems as well if oil and gas leasing is authorized. The report's failure to adequately address these problems is one of its major flaws.

11. Beginning on page 84 and becoming more common from there on the word "will" is used in places where the word "would" seems more appropriate. This implies a presumption on the part of the authors that development "will" take place, rather than "might" take place.

12. Assumption 7 on page 89 states that additional geophysical exploration would be allowed prior to lease sales. We believe that additional exploration of any kind should be allowed only following a lease sale.

13. The exclusion of the 1002 area from the operation of the comprehensive conservation planning (CCP) process is a perversion of Congress' intent in setting up that process. The CCP should proceed independently of the 1002 process, for the entire refuge. Congress will have the ultimate decision concerning any lease sale authority or wilderness designation. We see this as another example of the Department's attempt to limit public comment and involvement in decisions concerning the 1002 area.

14. No exact boundaries were presented in the report as to the area or areas that would be excluded from leasing under the limited leasing alternative. The boundary of the core calving area for the Porcupine caribou herd is inexact. What rationale was used in deciding to exclude only the core calving area from leasing under Alternative B?

Why not exclude the entire concentrated calving area? Apparently the basis for the difference between full and limited leasing relates entirely to caribou. Other resource values, of at least equal significance, are not even mentioned. Why?

ENVIRONMENTAL CONSEQUENCES

This chapter focuses primarily on wildlife and habitat issues. We found several problems with this section (Chapter VI). These problems are detailed below.

1. A major omission in the 1002 report is its failure to consider the impacts of possible development associated with gas production. Please provide concrete substantiation for the statement on page 95 that "no appreciable increase in environmental impacts is anticipated" due to gas production. Referring to gas in the 1002 area, the 1002 report states on page 143 that "...it is expected that gas production from this area would also be economic within two to three decades." It seems likely that there would indeed be impacts associated with gas production that would be additional to those associated with oil production. The largest gas production facility in the world recently began operation on Alaska's North Slope, and DOI is currently processing an application to build the Trans-Alaska Gas System (TAGS). For these reasons, we feel that a detailed discussion of additional facilities and impacts associated with gas production would be suitable for inclusion in the final 1002 report.

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2. In paragraph 4, the process for consultation and coordination should be formalized so that each party is aware of their specific responsibilities.

3(a). On page 97 most of the discussion sounds good in theory, but we see this as being wishful thinking on the part of the authors. The demonstrated environmental track record of the oil industry and the success (or lack of it) of the regulatory agencies in enforcing mitigation procedures, does not give us much confidence that proposed mitigation provisions are realistic expectatons. The chapter on environmental consequences should have been written with the assumption of realistic mitigating measures. To do otherwise would be misleading.

(b) The Fish and Wildlife Service is primarily a land management agency, not a regulatory agency. While general suggestions sound fine, it would be more appropriate to propose specific additional regulations to be added to the Code of Federal Regulations. Such regulations could be designed to increase the Fish and Wildlife Service's ability to promulgate effective and enforceable mitigation procedures. In the past, the oil industry has frequently balked at implementing mitigation procedures thought to be too expensive, regardless of their demonstrated effectiveness. An example of this is industry's steadfast opposition to timing restrictions designed to protect goose nesting and brood-rearing.

(c) Another way to ensure the use of effective mitigation measures would be the inclusion of stipulations for such measures in lease sale authorizations. This would likely be much more effective than the use of FWS special use permits or other authorizations.

(d) In light of the above, Assumptions 2 and 3 used in assessing environmental impacts as stated on page 98 are invalid.

4. Page 98 - Assumption 4 - these standards and stipulations cannot be assumed to be adequate for the entire 1002 area nor should standards and stipulations used for exploration be considered acceptable for development. We are concerned that the excessive issuance of variances and special permits could render all of these standards and stipulations irrelevant.

5. We question the statements on page 99 that ice roads on NPR-A had "virtually no effect" on the tundra and that ice airstrips can be used on the tundra in the same place for more than one year without any effects. We would like to see documentation for these statements. Also, are we to infer from this information that the same would be true in the 1002 area? Differences in microsite characteristics between NPR-A and the 1002 area are liable to be significant.

6. The discussion of reserve pits on pages 99-100 is inadequate. There needs to be a review of practices used to date, and needed improvements. "Approach 1." - leaving reserve pits open is NOT ACCEPTABLE! Page 100 is the ideal location for discussing alternatives to using reserve pits for exploratory drilling. Recycling, backhaul, annular injection, and incineration are alternative methods that merit detailed discussion, given the problems with reserve pit fluid discharges.

7(a). On page 101, further explanation of the "possible creation of 20-30 elongated deep pools" would be germane to the discussion of probable water sources. We recommend that you describe the size (length and width) required, and show probable sites on a map, along with gravel borrow pits.

(b) The discussion of unavoidable effects on the physical environment, also found on page 101, is incomplete. Additional unavoidable effects to address include: construction of a minimum of 50 miles of road from Prudhoe Bay to the Canning River, thermokarsting of tundra, and flooding due to impoundment. Also, a significant difference between Prudhoe Bay and the 1002 area is that oil development in the 1002 area will require many more crossings of major river drainages than were necessary at Prudhoe Bay. This is important, as experience at Prudhoe Bay and Kuparuk has shown that industry favors the use of culvert crossings over bridge construction. Culverts are frequently ineffective for providing cross drainage of water.

8. On page 102 it should be noted that changes in plant species composition result from seismic survey activity.

9. Page 103 should include information on the number and size of reported fuel spills which have occurred along the TAPS corridor, both during construction and production. This might also be a good place to indicate the number and size of unreported spills for which fines or other punitive action has been levied.

10. On page 105, the probability of a catastrophic oil spill should be determined. Cumulative impacts of offshore development, as well as 1002 area development alone, should be considered.

11.(a) Plain English should be used throughout the report. On page 108, the statement "The lack of observable adverse effects from displacement exhibited by the CAH would be unlikely for the PCH" should be changed to "Observable adverse effects from displacement are likely for the PCH."

(b) According to the second to last paragraph on page 108, the Secretary's recommendation directly violates the FWS mitigation policy. Full oil and gas leasing would ensure the projected displacement from preferred calving habitat of the Porcupine Caribou Herd. This displacement represents a complete loss of habitat values from at least part of an area which is designated as Resource Category 1 habitat. The mitigation goal for Resource Category 1 habitat is no loss of existing habitat value. What is the justification for a wildlife protection agency violating its own goals?

12. The negative stimulus conditioning for caribou described on page 110 would have the additional negative effect of reducing the quality of wildlife viewing opportunities on the Arctic NWR. This activity is a major recreational use of the refuge.

13. On page 111 under Mitigation, Item 9 states that additional mitigation measures would be implemented after the Porcupine Caribou Herd started to decline. We believe it would be too late at that time. Also the discussion of additonal mitigation measures is very general and nebulous. We would like to see some elaboration and clarification of what these additional measures might be. What does "state-of-the-art" mean in this context?

14. The conclusion on page 114 about negligible effects on Dall sheep is flawed. We think that the increased human population in the area would have at least a moderate if not a major effect on the Dall sheep population of the northern Brooks Range. The report assumes more restrictive hunting regulations. However, unless enforcement activities were concurrently increased, the more restrictive regulations would be largely ineffective. Currently, law enforcement on the Arctic NWR is negligible. Can we assume that things would be different in the future? What sort of budget increase is proposed for the refuge to ensure effective enforcement?

15. On page 116, the statement "Measures designed for prey species such as caribou, muskox, and moose will also benefit wolverines" is misleading. The word "will" should be replaced by "could" or "might".

16. The conclusion of moderate impacts on the wolf population stated on page 115 is overly optimistic, again relying on adequate enforcement. Past experience with this species has shown that where it comes into direct contact with humans, it tends to be diminished. It is a species that requires true wilderness to survive. We believe that most wolves would be eliminated from the area as has happened in the Central Arctic as a result of oil development activities (see 1002 report, p. 108).

17.(a) The conclusions concerning brown bear stated on pages 116-117 are likewise flawed. The same concerns expressed above for the wolf can generally also be stated for brown bear. In particular, the statement that

"Brown bears are not readily displaced by human activity" is highly questionable. "If the petroleum development program results in a decline in use of the area by PH caribou, a corresponding decline in brown bear population will be expected." (USFWS, 1986, p. 603). A population decline or distribution change for 20-40 percent of the Porcupine Caribou Herd is projected in the 1002 report.

(b) Brown bears are also likely to suffer the adverse impact of increased man-caused mortality if full oil and gas leasing of the coastal plain occurs. Under the summary of unavoidable impacts, Alternative A (p. 132), it is predicted that development would cause the loss of one brown bear per year in the 1002 area. Upon what is this prediction based? The final baseline study report says "Brown bears have historically not abandoned previously occupied areas when those areas were developed by man. Instead bears continue to use the newly occupied areas and eventually are eliminated by killing because they pose a threat to human safety. The mortality rate of these encounters are unknown." (USFWS, 1986, p. 603). The same report indicates that increased access has the potential for increasing the hunting mortality of brown bears, citing other studies showing that this occurred during the construction of TAPS. In view of the above, it seems reasonable to propose that death is another, and perhaps the ultimate, form of displacement.

(c) Once again, proposed mitigation measures sound good on paper but in reality are likely to be ineffective in their present form. Strict enforcement and active monitoring programs cost lots of money. What level of increase is proposed for the annual refuge budget, in order to fund these programs? It seems probable that under a full leasing program brown bears would suffer a major decline in the 1002 area.

18(a). The conclusion with regard to possible development impacts on polar bears (page 118) is flawed. This section states that development in the 1002 area causing "...exclusion and decline in natality would likely not affect the species' overall survival, so long as similar intensive developments did not occur along the entire northern coast of Alaska and Canada." In fact, similar intensive developments have already occurred in these coastal areas, and more are proposed both on and off shore. Thus it appears likely that polar bears in the Beaufort Sea region will be adversely affected by the cumulative impacts of industrialization of the area. The 1002 report's failure to address these undeniable cumulative effects is one of its major flaws.

(b) The conclusion section goes on to state that annual mortality is approximately equal to annual natality for the Beaufort Sea population of polar bears. Under the mitigation section, it is proposed that polar bear den areas be documented so that "oil-development activities avoid them to the maximum extent possible." That has been shown to be ineffective in the past, as the den abandoned by the suspected pregnant female polar bear in 1985 had been well documented (the bear was radio-collared). The cause of abandonment in this case was strongly suspected to be repeated disturbance by motorized exploration support equipment. It was also thought that this bear aborted her pregnancy.

(c) In the general section on polar bears, the 1002 report tells us that "preserving undisturbed onshore denning habitat each year is very important

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for the 12 to 13 percent of females denning on land rather than offshore ice. Moreover, if there is an especially significant area for denning on land in Alaska, it is on and adjacent to the 1002 area." Yet we also learn from the report that oil development would require the citing of facilities, such as the Pokok port site, in the exact areas where polar bear denning has been documented to occur. Furthermore, the report indicates that the construction of onshore facilities in polar bear habitat will probably help increase development activities offshore in polar bear habitat.

(d) Given the above, please indicate why the Secretary's recommendation is for full oil and gas leasing of the 1002 area. Please also indicate how this recommendation augments the purposes for which the Arctic NWR was established under ANILCA. Specifically, how will full leasing help "to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats" (ANILCA Section 303(2)(B)(ii))? According to page 33 of the 1002 report, "Polar bears are protected under the provisions of the Marine Mammal Protection Act of 1972." How will full leasing supplement the provisions of this Act? Also on page 33, we read that the U.S. and four other countries ratified an agreement for the conservation of polar bears in 1976. "Article II requires that appropriate actions be taken to protect ecosystems of which polar bears are a part, especially denning and feeding sites." In our view, protection of the delicately balanced Beaufort Sea population of polar bears and their habitat is one of the strongest reasons for prohibiting oil and gas development activities in the 1002 area.

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19. In the discussion of marine mammals on page 119, the additional impacts of contaminants, including both chronic and catastrophic spill possibilities, should be considered. Again, this discussion is deficient in light of the indication, found elsewhere in the report, that port facilities built for production in the 1002 area would facilitate development of offshore oil and gas leases. These probable cumulative impacts should be discussed in detail.

20(a). "The judicious placement of transportation corridors south of coastal nesting areas would be particularly important for tundra swans", according to the mitigation section on page 121. How can this be accomplished? What areas would not be leased in order to accomodate nesting swans? It seems likely that impacts to tundra swans in the 1002 area could be moderate to major considering the cumulative impacts that would result from development of KIC lands and state submerged lands offshore. Swans nest in areas with the most lakes. The huge demand for water out of those lakes would likely preempt attempts to keep development away from them.

(b) We agree with the statement on page 121 that "Reserve pit fluid discharges and other contaminants should be adequately controlled." In what specific ways will this be accomplished? As stated before, the effects of these discharges on arctic tundra and wetland ecosystems are not yet fully understood. Perhaps reserve pits should not be used at all if the 1002 area is developed.

(c) The discussion of the effects of various kinds of disturbance on snow geese is inadequate in that it does not consider possible indirect effects such as contaminants from reserve pits, and fuel and seawater spills. The high mobility of staging snow geese is irrelevant, as data has shown their

preference for staging in the 1002 area. Under the proposed full leasing program, the entire area would be subjected to development activities. The protection of internationally important migratory bird resources is another outstanding reason for the prohibition of development of the 1002 area.

21. The conclusions stated on page 123 about impacts to seabird and shorebird populations are vague. This section should document the high potential for moderate to major effects that would result from development in riparian zones and coastal wetland systems. The potential effects of a catastrophic oil spill on birds need to be predicted and discussed.

22.(a) On pages 125-126 the discussion of impacts on fish does not consider the effects of water withdrawal from streams. Unless specific regulations are formulated to the contrary, these impacts would be inevitable if the 1002 area was opened to full leasing. "Water withdrawal in critical areas and/or during critical time periods, and gravel removal from fish-bearing stream systems would not be permitted", claims the 1002 report. Two paragrphs later: "Development in Block A would require both water and gravel. If these materials were taken from the Tamayariak River, moderate adverse effects on grayling would result." No alternative to the Tamayariak is mentioned here for gravel and water sources. This makes it obvious that, even before Congressonal consideration of the coastal plain issue, plans are already being made to withdraw water and gravel from fish-bearing stream systems. Dewatering of fish overwintering pools at Prudhoe Bay has been documented to result in fish kills. "Large reservoirs excavated in "dead arms" of rivers, perhaps in conjunction with gravel removal, may be the only viable option to provide the large quantities of water needed to develop oil reserves at the more inland areas of the ANWR coastal plain" (USFWS, 1986, p. 609).

(b) The cumulative effects on fish populations and habitats of docks and causeways from offshore development are not given adequate consideration. "Impacts can include: impedence of normal fish and prey organism movements; alteration of water temperature, salinities, and current patterns; and changes in disposition of sediments" (USFWS, 1986, p.610). This is important because industry has continually refused to accept causeway and dock designs other than solid-fill with inadequate breaching.

23. At the top of page 127 we read that "Rehabilitation of the entire coastal plain ... could require as many as 1,500 people for several years." This statement implies that rehabilitation can actually be achieved, and therefore is contrary to information contained in the final baseline study report. The discussion of employment also implies that local residents would derive great benefits, when in reality most of the oilfield workers would come in from somewhere else. Any benefits that did accrue to Kaktovik residents would necessarily be as long- or short-lived as the oilfield itself, whereas subsistence from the land has sustained the Inupiat people for 10,000 years.

24. One of the major impacts on subsistence is likely to be the reduced availability of the Porcupine Caribou Herd to the people of Arctic Village and Old Crow if the herd population is reduced. Those villages depend principally on the Porcupine herd for subsistence. Yet the report on page 127 only mentions the possible effects on these villages in passing. We think that these effects should be dealt with more thoroughly.

25. Proposed land exchanges in the 1002 area, between the federal government and other corporate and government entities, could have major environmental and socioeconomic impacts. One of the most glaring major items that the 1002 report fails to address is the so-called "Megatrade" negotiations and their possible effects relative to FWS environmental regulation as well as on state, local, and federal economic systems. These exchanges have the potential to seriously impair the ability of FWS to regulate oil exploration and development activities in the 1002 area. Page 130 would have been the ideal place for a discussion of possible economic impacts of land trades. It is imperative that the above items be addressed in detail in the final 1002 report to Congress.

26.(a) On page 131 under the section on "Recreation, Wilderness, and Esthetics", the first sentence states, "Most recreationists . . . might perceive the existence of oil facilities in the area as lessening the quality of that experience." We think that the word "might" should be replaced with "would."

(b) Concerning impacts on hunting, the report states that hunting would not be allowed and access would be restricted in the oilfield area. Yet the analysis on page 131 goes on to conclude that the effect on hunting would be negligible. This conclusion is ridiculous. If hunting is not allowed within an area, that in itself is a major impact on the activity. It is also patently ridiculous to imply that roads built in the 1002 area to facilitate oil and gas production will improve public access for recreation. Because of tight oilfield security, access would effectively be denied to the general public. Even if it were not, the restrictions on the discharge of firearms would effectively preclude any hunting throughout most of the 1002 area under full leasing. This in turn would cause increased hunting impacts on lands outside the 1002 area.

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27. The summary of unavoidable impacts, Alternative A, should also include the following: direct loss of at least 12,000 acres of shorebird, passerine, waterfowl, and other migratory bird nesting and staging habitat.

28. On pages 105 and 133, we think that the effects on Sadlerochit Spring would be greater than negligible. Effects would likely be at least moderate. Again, the report is relying on more effective enforcement than we believe is realistic.

29. On page 134 the conclusion concerning effects on muskox from limited leasing is inconsistent. The conclusion begins by stating that effects would be the same as for full leasing. Those effects were given on page 114 as major. Yet, the discussion on page 134 goes on to state those effects as being moderate. Which is it? Since the concept of limited leasing appears to be totally guided by concerns relative to caribou, it seems likely that effects on muskox would still be major.

30. We think that the effects on Dall sheep from limited leasing (page 135) would be nearly as great as for full leasing because the increase in hunting by oilfield workers would probably be the same. These effects would probably be moderate to major.

31. We believe that the effects on the wolf and brown bear would likely be

nearly as great for limited as for full leasing (pages 135-136).

32. On page 138 the reduction in economic benefits from limited leasing as compared to full leasing would probably not be quite as great as described (one third). The portion of the coastal plain that apparently would be excluded from leasing would only contribute about 25% of the economically recoverable oil, based on the estimates given.

33. On page 139 the effects of limited leasing on wilderness values were described as not destroying the wilderness qualities of the southeastern portion of the coastal plain. However, on the flat coastal plain, the visual and aural effects of an oilfield would extend much farther than the 5 miles given in the report as being a mitigating buffer distance.

34(a). On page 141 the description of socioeconomic effects of no action deceptively implies that the only chance for economic development in Kaktovik would be from oil development in the area. This is not necessarily true. It is possible for economic change from sources such as tourism (currently an annual industry of over $700 million in Alaska) or other industry. Furthermore, it is incorrect to state that under Alternative E "production of the estimated 3.2 billion barrels of recoverable oil would be forgone." Production of the oil, if it is there, could be postponed indefinitely, but the oil itself would remain.

(b) On page 141 it is stated that under the no action alternative the entire coastal plain within the refuge, including the KIC land would be closed to oil and gas development. That is not necessarily true. It is conceivable that Congress could allow oil development on the Native land without opening up the refuge lands.

(c) Also in relation to the above, on page 141 it is stated that if Congress took no action then the 1002 area would then come under the CCP process. Can the Secretary force Congress' hand? When would it be determined that Congress had taken no action? The day after the report is submitted? One year? Ten years? Never? What happens to the 1002 area in the meantime? It is still part of the refuge.

35(a). On page 142 in the discussion of Irreversible and Irretrievable Commitments of Resources the report fails to consider the possible changes in fish migration patterns and use of lagoon areas that could result from construction of docks and causeways.

(b) Also in this section, wilderness deserves a separate category, for once it is destroyed, wilderness is surely irretrievable. It should be clearly stated that air access for traditional uses is allowed by fixed-wing aircraft only. Helicopter use requires a special use permit on the refuge.

36(a). The recommended mitigation measures listed on pp. 145-147 are inadequate for an area as important as the Arctic NWR coastal plain. Many of the proposed measures have been unsuccessful in the past, or have been totally unacceptable to industry. For example, efforts by the Alaska Department of Fish and Game to restrict oilfield activities during caribou calving at the Kuparuk fields were not completely successful. In this case, so many variances were issued that the original restrictions might as well have never existed. The feeding of Arctic Foxes continues in the Prudhoe

and Kuparuk areas even though prohibited.

(b) Proposed mitigation measures should be made much more specific. For example, under number 13, key species should be listed: caribou (PCH and CAH), polar bears, brown bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds, arctic char and grayling, and other species. Number 14 should show closed areas on a map, where no activity is permitted. Numbers 30 and 31 are extremely vague and rudimentary. Applicable laws and regulations should be cited. Number 32 should define specifically the process whereby the suggestions will occur.

(c) We also recommend additional stipulations. Number 33: lease sale stipulations shall prohibit any permanent facilities until a field has been delineated and a complete development plan approved. Number 34: Prohibit gravel extraction or gravel fill in drained lake basins, river deltas and riparian areas to protect important shorebird and waterfowl habitats. A map of these areas should be provided. Further measures, such as the implementation of stream setbacks for all facilities, should be considered. As stated previously, most of the proposed measures are likely to be ineffective without adequate enforcement.

37. Throughout the 1002 report, and particularly in the Environmental Consequences section, there is a marked failure to include predictions of impacts associated with service and support industries and facilities. Oil production has never occurred without these industries in the past, nor is it likely to in the future. This oversight lessens the predicted extent and level of impacts, and serves to undermine the usefulness of the 1002 report as an instrument for determining what those impacts might be.

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38. Disposal of each solid waste and liquid waste stream should be individually addressed. The treatment of drilling muds in this report is woefully inadequate. The state of Alaska is working on drilling mud regulations and these efforts should be taken into account.

39(a). No discussion of hazardous waste management is included in this report. Of the 99,000 metric tons of waste generated in Alaska in 1984, the oil and gas industry is responsible for managing 97,300 metric tons. Further growth is expected from exisiting production areas and this will increase demand for disposal. The state is in the process taking over hazardous waste management from the EPA and is working on hazardous waste siting facility regulations. These efforts will have direct bearing on any development in the 1002 area and must be addressed.

(b) Given the importance of the 1002 area to refuge wildlife populations, and the possible effects of wastes on populations and habitats, it might be appropriate to lift the oil and gas industry exemptions extended under the Resource Conservation and Recovery Act. If so, such a recommendation should be made to Congress. Hazardous waste presents another problem under other federal legislation, the Comprehensive Environmental Response Compensation Liability Act (CERCLA). If a hazardous waste spill were to occur in the 1002 area, it could significantly increase the federal government's liability under CERCLA. The potential for such a spill, and the resultant economic impacts to the federal government, should be addressed in the final 1002 report.

NATIONAL ENERGY NEEDS AND THE 1002 AREA'S POTENTIAL CONTRIBUTION

It is difficult to imagine what the actual basis is for justifying the opening of the 1002 area to full oil and gas leasing. It seems obvious that private corporations will benefit the most from a full leasing program, if economically recoverable oil deposits exist. As private entities benefit, the public will lose as lands set aside in the national interest have their surface permanently modified. Considering the arguments below, there seems to be nothing substantive to support claims that oil from the coastal plain is needed for national security. Nor would it seem that such oil, if it exists, could make enough of a contribution to domestic oil production to significantly reduce our nation's dependence on foreign oil.

We do not agree with the conclusions reached in Chapter VII. The fact that no national energy conservation policy is either implemented or proposed indicates to us that there is no serious desire to address energy problems in this country. Furthermore, it is difficult to support invading a wildlife refuge for non-renewable energy resources while at the same time providing no support for the development of renewable energy resources. Workable techniques and technologies currently exist in this country for both energy conservation and alternative energy, yet there is no national leadership to foster either of these long-term solutions to our energy problems. Instead, as the next paragraph graphically illustrates, the public is continually asked to believe that it is in the nation's best interest to sacrifice environmental values in favor of developing non-renewable resources so that they can be wasted.

According to some estimates, the recently vetoed National Appliance Energy Efficiency Act, passed by both the House and the Senate, would have saved the equivalent of over 1.5 billion barrels of oil over the next 20 years. That amount of oil constitutes almost half of the mean conditional resource estimate for the coastal plain (3.2 BBO) used in the 1002 report. There are also moves afoot to repeal the federal 55 mph speed limit. It is estimated that a national speed limit of 70 mph could increase daily U.S. energy consumption by as much as 1%. According to the 1002 report, if mean resource estimates prove correct for the coastal plain that area will contribute only 4.17% of U.S. oil demand by 2005. Recent recommendations from the Regulatory Review Task Force chaired by Vice President George Bush have supported the repeal of fuel economy standards for American cars. Thus, it would seem that more than 25% of the oil from the coastal plain would be used to enable Americans to go faster in their gas-guzzlers. This flagrant waste certainly does not constitute a "national need for domestic sources of oil."

Significant questions remain unanswered relative to the need to lease the coastal plain at this time, as is recommended. Right now on the North Slope, producing oil fields and fields with proven reserves are shutting down or going undeveloped. Examples of this are at Milne Point and the West Sak fields. This indicates that economic factors, not the national interest, are the true motivating forces behind oil exploration and development.

Chapter VII does not go far enough in evaluating the nation's total energy

needs and the development of energy sources other than fossil fuels. We realize that this would have been beyond what was technically required by ANILCA Section 1002, but it is certainly not precluded by that Act.. We think that the assessment would have been more meaningful if this had been done. Our specific problems are as follows.

1. Throughout this chapter the analyses presented use the mean conditional, economically-recoverable estimate of 3.23 BBO. The probability associated with this estimate is only 40%. We believe this has resulted in unrealistically high predictions of possible benefits as described in this chapter. The report should have at least presented alternative figures based on the most reliable estimate at the 95% probability level. Otherwise the data presented are misleading.

2. On page 161 the second to last paragraph, first column states that geologic conditions are "extremely favorable for major discoveries." Perhaps the authors of this section have access to information that is missing from Chapter III; we don't believe that chapter supports such a conclusion as it now reads. One of the most expensive dry holes ever drilled was in Arctic Alaska, in an area with a predicted 70% chance of finding economically recoverable oil. The chance for this in the 1002 area is 19%.

3(a). On page 163 several statements in the left column support the concept that the nation's (and by inference, the world's) oil reserves are finite and will probably be exhausted in the not too distant future. The figures of 9 to 30 years are given for exhaustion of known reserves. In light of this it would be appropriate for the report to acknowledge that if the 1002 area contains any oil at all, it would only be a short-lived supply, and not very significant at all in terms of solving our long-range energy problems.

(b) The third paragraph in the right column on page 163 contains a key statement as to why we believe that the oil industry is so intent on getting into the 1002 area. The fact that all of the known promising onshore areas have already been explored for oil makes the 1002 area that much more attractive; offshore exploration and development are expensive. We believe that the "forbidden fruit" concept may be at work here and that it is serving to inflate ideas about the real oil potential of the area. That appears to be obvious when one looks at the Secretary's recommendation in comparison to the data contained in the report. If an area's untapped energy potential were sufficient reason for developing it, then Yellowstone National Park would be a geothermal energy project and Grand Canyon National Park would be a hydroelectric project. Commitments to preserve areas like these (including the Arctic NWR) in their natural states have been made by the American people repeatedly in the past. Continuing to preserve these areas is a reaffirmation of that commitment.

4. The answers to our long-range energy needs will be found only in looking at a broad range of sources and technologies, in addition to the implementation of effective energy conservation measures. On page 164 the second paragraph focuses only on fossil fuel energy sources. In this regard the report is extremely short-sighted. Also in this paragraph, what is meant by "long-term energy supplies"? Thirty years until the oil runs out isn't a very long time.

5. On page 164 the report concludes that full leasing of the 1002 area could significantly reduce the country's dependence on foreign oil. However, previous pages indicated that the United States would continue to rely heavily on foreign oil despite any possible contribution from the 1002 area. Also, in reference to Table VII-2 on page 162 we see that under full leasing the 1002 area would, if mean resource estimates prove correct, contribute at best less than 5% of U.S. oil demand. In terms of oil imports it would be just over 8%. We don't see how these figures can be termed "significant" by anyone's definition.

6. Also on page 164 the report states that oil produced from the 1002 area would enhance national security. Under the proposed development scenario, oil from the 1002 area would only be as reliable as the Trans-Alaska Pipeline System. America does have highly effective military forces, yet even they might be hard put to defend the 800 mile length of the pipeline. One well-placed bomb or cruise missile, or even land-based sabotage, could effectively eliminate this source of energy very early on in any conflict. If oil is needed for national security, it is difficult to understand why additions to the Strategic Petroleum Reserve have been halted. It seems like now is the time to make such additions in the interest of national security, when oil prices are low and foreign oil is available.

7. We note that the report states on page 165 that oil production from the 1002 area could reduce the foreign trade deficit by just over $8 billion in the year 2005. Presumably this figure is based on the inflated $33 per barrel price of oil used elsewhere in the report. Predictions should also be made using a $20 per barrel price or other lower and more realistic oil prices. The report doesn't project what trade deficits or oil prices will be in 2005, but it does state the deficit will likely increase from its present level. The report gives the 1984 deficit as $123 billion. If the trade deficit in 2005 is not any more than this, which is not likely, the reduction from oil production on the 1002 area will only amount to about 6.5%. Realistically, it might be somewhat less than this.

8. Table VII-4 on page 165 fails to take into account the potential effect of land exchanges inside the 1002 area. These exchanges have been under negotiation for years, and draft agreements currently exist. Above the Table it is noted that if non-Federal subsurface areas are leased by others, then portions of bonus, rent and royalty income shown as Federal revenue will accrue to others. Although this statement referred to the potential leasing of seismically mapped structures off-refuge, it remains true for lands traded out of federal ownership inside the 1002 area. Thus, under what now appears to be the most likley scenario if the 1002 area is developed, significantly smaller amounts of revenue will accrue to the federal government because of land exchanges.

9. We note, to the report writers' credit, that in the first paragraph on page 166 it is acknowledged that the coastal plain's economically recoverable estimates are speculative and not very precise. The conclusion to Chapter VII goes on to state that "Only actual exploration can provide the information needed to determine the extent and distribution of the resources, and, therefore, the potential benefit to the economy." This seems to provide a logical basis for the next chapter, the Secretary's Recommendations. However, the advice was not heeded, as review of that chapter shows.

SECRETARY'S RECOMMENDATION

We do not agree with the Secretary's Recommendations presented in Chapter VIII. The recommendation does not appear to be based on the information presented in the report, nor does it appear to be compatible with refuge purposes as defined in ANILCA. Bearing in mind the purposes for which the Arctic National Wildlife Range, and later Refuge, was established, we urge that the Secretary's Recommendation be rewritten to favor protection of the area's wilderness and wildlife resources over environmentally destructive development. To fulfill his obligations as guardian of our wild lands, the Secretary of the Interior should recommend wilderness designation for the 1002 area.

Our specific observations regarding the Secretary's Recommendation are as follows:

1. (a) The first paragraph on page 169 is highly misleading. It states that the 1002 area has been predicted to contain as much as 29 BBO but fails to mention that the probability associated with this prediction is only 5%. The failure to mention probabilities or to take them into consideration in the recommendations is highly deceptive, as is the failure to state that 29 BBO is the highest figure predicted relative to oil in place. To be accurate and informative, the Secretary should mention here that even if there are 29 BBO in place, the amount that could be recovered would be a much smaller figure.

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(b) The second paragraph on this page states that the coastal plain could make a significant contribution to the economy and security of the nation, again with no accounting for the probabilities associated with the oil estimates. This statement is not based on information gathered through a careful reading of the report, nor is it based on a realistic evaluation of the national and international situation. This paragraph also states that development of the 1002 area could occur in an environmentally sound manner. For reasons stated and documented in our comments relative to the Executive Summary section, we emphatically disagree with this statement.

(c) The third paragraph makes several statements that are not at all supported by the text of the report, in particular the text of Chapter III. By not basing the recommendations on the report, the Secretary demonstrates extreme negligence, which amounts to a gross misuse of the government funds spent in conducting years of baseline studies and doing the geological analyses.

(d) This page goes on to paint an incredibly gloomy picture of the nation's energy future. And then it proposes to destroy the last area of the Alaskan North Slope that could be preserved as wilderness, in exchange for a meager supply of oil that would be a stop-gap measure at best in providing for that energy future. This indicates irresponsibility on the part of the person who is supposed to be the chief steward of this country's natural resources.

2. In the last paragraph on page 169 the recommendations make reference to the fact that the Central Arctic Caribou Herd population has increased substantially since oil development began in the Prudhoe Bay oilfield, using

this as part of the justification for recommending full leasing. This statement ignores information presented in Chapter V of the report which predicts major impacts on the Porcupine Caribou Herd and other species from full leasing of the 1002 area. Information included on page 108 of the 1002 report itself describes important differences between the two caribou herds, and reasons why conclusions based on comparisons of the two herds cannot always be relied upon. On page 169, the Secretary oversimplifies the situation. The Central Arctic Herd is much smaller than the Porcupine Herd and has available to it much more extensive potential calving areas than does the Porcupine Herd. We could go on with this discussion of impacts to caribou, but it has already been treated elsewhere, and we refer the reader to that source (Elison et al. 1986).

3(a) On page 170 the second paragraph presents an elaborate scenario for developing and offering lease sales in the 1002 area. It sounds like a lot of effort for an area that the DOI is already making extensive plans to trade away to private entities.

(b) The statement "Development must result in no unnecessary adverse effects, and unavoidable habitat losses should be fully compensated", is found on page 170 and in Assistant Secretary Horn's cover letter to the 1002 report. This is not only vague and contradictory, but has no bearing on reality (legislative, administrative, or otherwise). It seems like unavoidable habitat losses would be unnecessary adverse effects. Please explain what the words "unnecessary" and "compensated" mean in the quoted sentence. What standards will be used to define what "necessary adverse effects" are?

(c) ANILCA Section 304(b) reads: "...the Secretary may not permit any use, or grant easements for any purpose ... unless such use (including but not limited to any oil and gas leasing ...) or purpose is compatible with the purposes of the refuge." Does the 1002 report make such a compatibility determination? If so, where in the report can it be found? If not, then how can the Secretary propose full leasing without first determining compatibility? Given the purposes for which the Arctic National Wildlife Refuge was established under ANILCA Section 303, and the 1002 report's admission that many adverse impacts will be unavoidable under a full leasing program, we submit that full leasing cannot possibly be compatible with refuge purposes.

5. The report fails to consider the cumulative impacts on coastal plain resources from other activities, such as possible oil development in Canada, on adjacent state lands and offshore. Development of the Arctic Refuge coastal plain will most likely lead to development of those other areas, thereby ensuring that cumulative impacts occur. The federal government has already sold offshore oil and gas leases in the Beaufort Sea, and the State currently plans to conduct two lease sales in waters offshore of the refuge in 1987 and 1988. It is highly likely that additional infrastructure within the 1002 area would be required to support future exploration and development activities in these other areas. Failure to consider these cumulative impacts makes the environmental impact evaluations in the report less realistic.

6. The report fails to consider some of the other more widespread, insidious impacts that would result from burning of the fossil fuels that

might be produced from the refuge. These include decreased air quality, with attendant disease and, in some cases, death. It is estimated that as many as 50,000 deaths occur each year in the U.S. as a result of fossil fuel pollutants (USOTA 1984 as cited in Postel 1986). Combustion products of fossil fuel are known also to be a major contributor to the global atmospheric increase in carbon dioxide and other compounds, which are predicted to begin producing some major climatic changes and other adverse effects on human health, food production, and forests during the early part of the next century (Mercer 1978 as cited in Hayes 1978, Postel 1986).

7. We are particularly disappointed that the report does not bring into its consideration of the nation's energy future alternatives to this country's futile reliance on fossil fuels which will someday be expended. Such consideration would have been widely regarded as a progressive step into the future. In Menzies (1978)(as cited in Hayes 1978), Robert Donahue, then Vice Chairman of Sun Oil Company, was quoted as saying, "We are in a business that is dying." Some new source or sources of energy will be required to fill the gap; that is inevitable. It has been predicted that by 2025 as much as 75% of the world's energy could be obtained from solar sources (Hayes 1977). Hayes (1977) states that "Every essential feature of the proposed solar transition has already proven technically viable; if the 50-year timetable is not met, the roadblocks will have been political -- not technical." By disallowing oil development on the 1002 area, the federal government would be helping in a small way toward speeding this transition, while at the same time preserving one of the world's most significant wildlife and wilderness areas.

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SUMMARY AND CONCLUSION

Our major problems with and objections to the 1002 report in its present form are:

a) The report fails to consider cumulative impacts to coastal plain resources

b) Proposed mitigation measures are likely to be largely ineffective

c) Possible effects of contaminants and hazardous wastes on coastal plain populations and habitats are not adequately addressed

d) The magnitude of activities and facilities that will be necessary for a full leasing and production program are not adequately portrayed

e) Possible sources and impacts of air, water and noise pollution are not addressed

f) The report fails to consider the potential effects of land exchanges that are currently being negotiated for the 1002 area

g) The Secretary's recommendation for full oil and gas leasing not only violates FWS mitigation policy but is contrary to all of the purposes for which the refuge was established under ANILCA Section 303

h) Wilderness review, mandated under ANILCA Section 1004, has not been conducted

In conclusion, the NAEC finds the 1002 report to Congress extremely disappointing. We fail to see how the Secretary's recommendations are supported by information contained in the draft 1002 report if one considers the important wildlife and wilderness values of the Arctic NWR coastal plain, the predicted impacts of oil and gas development there, and the very limited contribution that the coastal plain could ever be expected to make to the country's energy resources. Under these conditions, we do not see how it could ever be in the best interest of this country to destroy the coastal plain's surface in what might be a vain quest for non-renewable resources. Therefore, we believe Alternative E, Wilderness Designation, is the most prudent and meaningful course in this matter, and we urge the Secretary to alter his recommendations accordingly.

We feel that a near total rewrite of the draft 1002 report is necessary, due to the broad extent and serious nature of the problems we have outlined. The language in ANILCA mandates that this report contain the information it now lacks before it can be presented to Congress. Our comments in this letter indicate in detail what that informaton is. We look forward to seeing your responses to our concerns.

Sincerely,

Kate Pendleton

Kate Pendleton
Associate Director

cc: Hon. Ted Stevens
Hon. Frank Murkowski
Hon. Don Young
Governor Steve Cowper
Secretary Donald Hodel
Assistant Secretary Bill Horn
Regional Director Bob Gilmore
Refuge Manager Glenn Elison
Other environmental groups

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DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print

Name Randall R. Rogers

Mailing Address 218 Driveway, Fbks, AK. 99701

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☒ I am speaking for Northern Alaska Environmental Center
(please enter name of organization you represent)

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Northern Alaska Environmental Center

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January 5, 1987

STATEMENT OF RANDALL R. ROGERS, EXECUTIVE DIRECTOR, NORTHERN ALASKA ENVIRONMENTAL CENTER, BEFORE THE U.S. FISH AND WILDLIFE SERVICE ON THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA, COASTAL PLAIN RESOURCE ASSESSMENT

Originally founded in 1971, the Northern Alaska Environmental Center is the northernmost conservation organization in the United States. We have a membership of over 700 persons living both within and outside the State of Alaska. The Northern Center is dedicated to the protection of public lands and waters of arctic and interior Alaska.

The flaws in the reasoning and conclusions of the draft 1002 report are much to numerous to be adequately dealt with which was the original time we thought we had three minutes of verbal testimony. The Northern Center will provide detailed written comments on the draft report prior to the closing of the public comment period.

We are extremely perturbed at the Department of Interior's attempts to keep the voices of the Alaskan public out of the decision on the coastal plain of the Arctic Refuge. It is dispicable that a public agency would go to such great lengths to avoid the involvement of the american people.

We would not be here today if it were not for a court order forcing the Department to provide for public involvement. Even with this court order, Interior has refused to conduct hearings in Fairbanks and Arctic Village, two of the communities who will be most affected by the final decision. We can only speculate that the decision to avoid a hearing in Fairbanks was based on the U.S. Fish and Wildlife Service's knowledge that residents of Fairbanks are deeply concerned with the ecological integrity of the Arctic Refuge. We do not believe it was simply a buerocratic oversight that the people of Fairbanks have been denied the opportunity to voice their concerns on the draft 1002 report.

The Northern Alaska Environmental Center supports Alternative E, which recommends wilderness designation of the entire 1002 area. Information provided in the draft 1002 report does not justify the proposal for full leasing of the coastal plain. In fact, it appears that this recommendation is based largely on political motivations to promote the oil industry, rather than the data derived during the coastal plain resource assessment.

The environmental effects of oil development in the coastal can be summarized by one quote from the report.

> "Long-term losses in fish and wildlife resources, subsistence uses and wilderness values would be the inevitable consequences of a long-term committment to oil and gas development, production and transportation."

A major flaw of the report is its failure to consider the cumulative impacts from other activities on coastal plain resources. The federal government has already sold offshore oil and gas leases in the Beaufort Sea, and the State is proposing to conduct two lease sales in the waters offshore of the refuge in the near future. This failure to consider these cumulative impacts makes the environmental impact evaluations in the report less realistic. In addition, mitigation measures proposed in the report represent wishful thinking at best and do not realistically assure protection of biological resources.

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The high oil and gas potential for the area that is described in the executive summary are not supported by the text of the report. Reasons for this observation include:

a. The report states that there is only a 19% chance of there being economically recoverable oil in the 1002 area. We do not see this 1 in 5 chance of discovering oil as very good odds for risking damage to the internationally significant wildlife and wilderness resources of the refuge.

b. In several places in the report, the proximity of the area to Prudhoe Bay is cited as an encouraging factor. The report states that most of the Prudhoe Bay production is from Ledge Sandstone rocks of the Ellesmerian sequence. It is also stated that these rocks are likely ~~non~~-existant in the 1002 area. NOT

c. Page 66 of the report states that the two largest prospects account for the majority of the estimated in-place oil. Yet it is also stated that these prospects are dependent on the presence of Ellesmerian rocks as reservoirs. Once again, the report states that these types of rocks are not likely present in the 1002 area.

d. On page 54 the report states that if Ledge Sandstone rocks are not present, then the chances of oil being present in the area are much reduced. These rocks are cited as being the major possible source rocks for oil production in the area, but their existence in the area is uncertain. The report states that "Drilling one or two wells in critical areas would resolve this question." Yet, the report recommends full leasing! This recommendation is not logical and prudent considering the predicted environmental consequences of full leasing.

The report bases its arguments on the national need for oil on unrealistically high oil prices of $33 per barrel and estimates of in-place oil with low percentages for probability of occurance. If the report used realistic oil price assumptions and relied on estimates of in-place oil with high probabilities for occurance, strong arguments for the national need for oil could not be made.

In fact, if one looks solely at the economic factors in considering the fate of the Arctic Refuge coastal plain, it does not make sense to move forward with full scale leasing. At a time when existing oil fields in Alaska and other parts of the nation are shutting down production we should not initiate leasing of a field which, in all liklihood, is no larger and lies in one of the most environmentally sensitive areas of North America.

If leases are sold in the 1002 area during this time of low oil prices the only beneficiaries will be the multi-national oil companies. Alaskans and all americans who might benefit from oil lease revenues will see only a minimal return while jobs associated with actual production will not be realized until oil prices rise adequately for the oil companies to reap huge profits with little cost.

In summary, we urge the Department to consider the values for which the Arctic Refuge was established and recommend the best mechanism available to protect those values, namely, wilderness designation of the coastal plain.

PACIFIC LEGAL FOUNDATION

COMMENTS OF PACIFIC LEGAL FOUNDATION
ON THE DRAFT ARCTIC NATIONAL WILDLIFE
REFUGE, ALASKA, COASTAL PLAIN RESOURCE ASSESSMENT

February 3, 1987

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INTRODUCTION

Pacific Legal Foundation is a nonprofit public interest law firm based in Sacramento, California, with a branch office in Anchorage, Alaska. PLF has over 19,000 supporters throughout the United States and has the primary purpose of litigating in the public interest in defense of individual freedoms, private property rights, and the free enterprise system. PLF has extensive experience in the field of natural resource and environmental law and the issues surrounding natural resource development. Because the disposition of the Arctic National Wildlife Refuge (ANWR) coastal plain is of great national significance, PLF is submitting these comments for the purpose of discussing the draft report. PLF believes that the report fully complies with all legal requirements and addresses all issues necessary under law. PLF also concludes that the report's recommendation for congressional action that would allow the leasing of the coastal plain is supported by the facts and is in the national interest.

I

THE FISH AND WILDLIFE SERVICE HAS DONE AN ADMIRABLE JOB IN ENCOURAGING PUBLIC COMMENT ON THE ANWR COASTAL PLAIN

Although some controversy existed over whether or not public comment had to be solicited during the preparation of the ANWR coastal plain report, PLF believes that the level of public participation in the review of the draft report fully satisfies all legal requirements. The hearings in Anchorage, Katovik, and

Washington, D.C., were all very well attended, and it was obvious that the interested public had ample notice and was fully aware of the hearing process. It is especially noteworthy that the hearings in Katovik, Alaska, were well attended by local native individuals and associations who were able to express their concerns, support, or opposition to the recommendation of congressional action for leasing the ANWR coastal plain. Since Katovik will be the community most affected by any oil and gas exploration or leasing activity, the participation of Katovik residents was crucial to the fulfillment of the public participation requirement. In addition to this evidence of compliance, it is to be expected that many other individuals and organizations are participating with written comments. In conclusion, allegations made by some groups of inadequate public hearings are totally unfounded.

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II

THE DRAFT REPORT HAS CONSIDERED FULLY, TO THE EXTENT REQUIRED BY LAW, THE POTENTIAL ENVIRONMENTAL EFFECTS OF EXPLORATION ON THE ANWR COASTAL PLAIN

After reviewing some of the oral testimony given at the Anchorage hearings on the ANWR coastal plain report, PLF is aware that certain criticisms have been leveled against the draft report involving an alleged failure to adequately study certain potential environmental consequences of exploration on the coastal plain. PLF believes that these allegations are baseless and that the Fish and Wildlife Service has more than adequately

studied all potential significant environmental consequences that might result from exploration activity.

A. "Cumulative Effects"

It is especially important that the scope of the proposed report and its recommendation for congressional action be put into perspective when determining exactly what should be included in the final report. For example, it was suggested at the Anchorage hearings that the draft plan failed to address the "cumulative impacts" of a whole menu of activities in the arctic. In other words, the commentator believed that the coastal plain report should have assessed every development activity, actual and proposed, anywhere in the same general arctic geographic region. The draft plan, however, was completely correct in limiting its study to those activities having some rational bearing to the range of proposals found in the plan. Otherwise, there would literally be no end to the scope, detail, complexity, and expense to the study; and there certainly would be no way it could be completed in an efficient and timely manner. When Congress directed Fish and Wildlife to prepare the report it ordered that the coastal plain be studied, not the entire arctic geographical region. More importantly, there is no legal justification for extending the scope of the report beyond that which is the subject of the report--the coastal plain and the study's action alternatives including congressional action to permit leasing.

Statutory and case law requires a discussion of "cumulative impacts" in only two situations. The first is where

an agency is proceeding according to a programmatic or regional plan, as when a proposed activity is merely a segmented part of a larger action. For example, the construction of a forest road cannot be considered in isolation from a timber harvesting plan when that road is designed solely to facilitate the timber harvesting plan. Therefore, a discussion of the environmental impacts from the road construction must also consider the related timber plan. The second instance in which cumulative impacts must be discussed is where a specific proposal for an activity simply cannot be considered in isolation from other similar or related activities in the same specific area.

Neither circumstance is present here and there is no need to study additional "cumulative impacts." The secretary's proposal for Congress to facilitate leasing is in no way related to any other actual or proposed activity in the arctic. There is absolutely no connection between the recommendation for congressional legislation and oil activities to the west on the North Slope, or anywhere else. There is most certainly no relationship to any activities in Canada.

Furthermore, the recommendation for congressional legislation will not result in any immediate leasing activity or environmental effects. Before any leasing commences after appropriate legislation there still must be a comprehensive environmental review. It is at this review stage where cumulative effects, if any, should be considered. Otherwise, the report will simply be far too speculative to be of any value. It is too soon to tell where leasing will be proposed and what its

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extent will be. When there are actual leasing proposals on the table, then and only then will it be appropriate to study the "cumulative effects." For these reasons, the report properly confined its discussion to potential environmental consequences germane to the proposal for congressional action, namely the actual leasing of the coastal plain.

B. "More Study"

Some commentators have suggested that "more study" is required before the Congress can make a reasoned decision on the leasing of the coastal plain. This is untrue. The draft report is fully complete and contains all the data necessary for Congress to make an informed decision. It appears that the call "more study" is nothing more than a thinly disguised attempt to delay the project into oblivion. The nation needs to begin today the exploration for more oil reserves because production will take years to implement after a discovery is made. As domestic reserves decline, the need for future reserves will become imperative. If the needless call for more study is heeded, we will probably study ourselves right into another and more serious oil shortage. More to the point, the critics of oil exploration have submitted no compelling arguments for more study. The coastal plain region is one of the most studied environments in the world.

Indeed this is not the first time calls for more study have clouded the picture in the ANWR. When the Alaskan Arctic Gas Pipeline Company began the process for building a gas pipeline, an exhaustive series of environmental studies were

initiated. Despite objections that the studies were inadequate, the Federal Energy Regulatory Commission conclusively determined that pipeline construction could be compatible with environmental values in the Arctic National Wildlife Refuge.

However there is one area of uncertainty that still must be resolved. Despite a plethora of geophysical and geological surveys, it is still not known how much recoverable oil may lie under the coastal plain. The only way this information can conclusively be discovered is for exploratory drilling to commence. Therefore, the secretary's proposed recommendation for congressional action to facilitate leasing is highly appropriate.

III

THE ECONOMIC BENEFITS OF OIL LEASING WILL INURE TO THE ENTIRE NATION

The draft ANWR report accurately reports that the economic benefits from the development of the coastal plain will benefit the nation by helping to avoid future shortages, reducing our dependency on foreign oil and foreign pricing structures, and improving our balance of trade. A further economic advantage that should be considered is the tremendous economic benefit to the lower 48 states that will result from a major exploration effort on the ANWR coastal plain. The infrastructure and expertise required to take advantage of leasing opportunities on the coastal plain will not all be supplied by Alaska. Instead, the now severely depressed oil exploration industry of the lower 48 will be called on to help explore and develop the coastal

plain. This could very well be a substantial boost to the support industries. For example, between 1980 and 1986 a total of $10,536,000,000 North Slope oil development dollars were spent in the United States, of which $9.18 billion were expended in the lower 48. In the State of California alone, over $1.8 billion was spent through the oil support industries on North Slope production. If the exploration of the coastal plain commences there will be great direct economic benefits to all other states, and, if the exploration is successful, there could be a boost to the lower 48 economies to match that provided by North Slope production. This sort of private sector economic development should be strongly supported. Adhering to the secretary's recommendation will help achieve this goal.

CONCLUSION

The draft ANWR coastal plain report is an important and well designed document. It accurately portrays the potential economic benefits that will arise if the recommendation for congressional action is adhered to. All relevant potential environmental consequences are addressed as well. The report fully complies with legal requirements, and its recommendations should be supported.

DATED: February 3, 1987.

Respectfully submitted,

RONALD A. ZUMBRUN
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By _____
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Attorneys for Pacific
Legal Foundation

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Renewable Resources Inc.

ENVIRONMENTAL CONSULTANTS #211A 1503 WEST 33RD AVE. ANCHORAGE, ALASKA 99503

January 26, 1987

Director
U.S. Fish & Wildlife Service
Division of Refuges
U.S. Department of Interior
Room 2343, Main Interior Building
18th & C Streets
Washington, D.C. 20240
U.S.A.

Dear Sir:

Re: ANWR Coastal Plain Resource Assessment

Enclosed are review comments on the subject Draft EIS. I have also enclosed an unpublished paper which is cited in the review.

Sincerely yours,

RENEWABLE RESOURCES INC.

R.B. Jakimchuk
President

RDJ/ir
enc.

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A REVIEW OF THE REPORT ON THE ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCES ASSESSMENT

Prepared by

R.D. Jakimchuk and L.G. Sopuck

of

Renewable Resources, Inc.

For the

Alaska Oil and Gas Association

January 1987

TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this report is to review the terrestrial wildlife portions of the U.S. Secretary of the Interior's 1002(h) report concerning oil development in the Arctic National Wildlife Refuge (ANWR) in northeastern Alaska. Our approach was to assess the adequacy of the data base used to describe resource values and to predict impacts. We then determined whether the data base was used in an objective and scientifically-sound manner to predict impacts and recommend appropriate mitigative measures. Following sections provide periodic reference to Appendix I which is a list of specific comments keyed to Chapters II and VI of the 1002 report. Appendix I should be consulted for additional and more specific comments.

2.0 ADEQUACY OF THE DATA BASE

The wildlife resource and impact assessment sections of the 1002 report often contain unreliable statistics and poorly referenced and unqualified statements. Conclusions are often based on uncritical acceptance of one or two studies or on unreliable data bases. In some cases, speculative statements are not distinguished from those which are well-documented and hence are misleading.

There are several examples in the report of where the reliability of population data are not addressed. For example, the estimate of 180,000 animals for the Porcupine caribou herd (PCH) in 1986 is crude because the herd has not been properly censused since 1983 when an estimate of 135,000 animals was obtained (Whitten, 1986). However, the uncertainty of the 1986 estimate was not addressed in the report. The report also states that there is a major concentration of Central Arctic herd (CAH) caribou calving on the Canning River Delta. This was based on very limited survey information. In contrast, more extensive calving ground surveys conducted by Renewable Resources Consulting Services Ltd. (RRCS) from 1981-86 show that the Canning River Delta is not a major calving area, but that there tends to be a continuum of calving along the coast with concentrations between major river valleys (Carruthers et al., 1984; Carruthers and Jakimchuk, 1985; Sopuck and Jakimchuk, 1986). These studies were not referenced in the text.

The available data base on the distribution and movements of the PCH and CAH is vastly under-utilized in the report. The calving distribution of the PCH was studied by RRCS from 1972 to 1977 but these studies are not cited directly in the report (Jakimchuk et al., 1974; Roseneau et al., 1974; Roseneau and Curatolo, 1975, 1976; Curatolo and Roseneau, 1977; Bente 1977). However, these reports contain important

site-specific movement and distribution data for the PCH. The report states that caribou use riparian areas during spring and summer but does not cite a recent study by Carruthers et al. (1984a) that shows that females with calves usually avoid riparian habitats. In addition, the movements and distribution of CAH caribou within the 1002 area are described in detail in the report, yet the movements have been very poorly documented to date. If recent unpublished data were used they should have been referenced in the report.

The definition of the "core calving area" for the PCH was derived using information obtained from 1972-85. This report refers to this period as the "14-year study". In fact, the data were obtained from several individual studies and surveys. During some years (e.g., 1973, 1974, 1980) very limited information was obtained on the calving distribution of the PCH, and even more limited estimates of density. Yet it appears in the report that the "core calving area" was defined based on a solid, 14-year data base.

In the impact section of the report, the indirect loss of habitat as a result of behavioral avoidance is quantified using a worst-case scenario. However, based on the studies conducted to date, it is extremely speculative to predict a "zone of total displacement" around a particular development. These speculations are based primarily on one quantitative

study, Dau and Cameron (1986). This study shows short-term partial displacement by maternal groups around an active road system, but also shows that caribou responses can be highly variable. In addition, no quantitative information on how caribou may habituate to these disturbances is available. Habituation over the long term may significantly reduce this "zone of displacement".

The report presents several statements as fact rather than speculation. For example, it is assumed that increased energy demands on individual caribou during the insect relief period will lead to reduced survival and productivity of the herd. However, there are no studies on North American populations of caribou that have established this link. Also, the report makes the implicit assumption that caribou are a "food-limited" species. However, there are no studies that show that mainland populations of caribou in North America are food-limited. European references are not appropriate because reindeer herds are maintained at artificially high stocking levels in largely predator free systems.

The report states that the PCH may have difficulty accommodating to developments such as pipelines because they will interact with them for short periods during the year. However, the report fails to discuss RRCS studies of the Nelchina herd (Carruthers et al., 1984b) which shows that this

herd is exposed to TAPS only twice each year, but crosses it successfully. In the assessment of the impacts of aircraft overflights on caribou, the report ignores the work by Davis et al. (1985). The 1002 report appears to cite references selectively rather than presenting a more balanced viewpoint. Davis et al. show that caribou populations can continue to grow despite sometimes severe harassment from aircraft and other military activities including bombing and strafing within traditional calving ranges.

In summary, the 1002 report does not adequately qualify or reference its conclusions and hence presents an unbalanced assessment of impacts. In many cases, the worst case scenario for impacts is unjustified.

3.0 MAJOR ISSUES FOR THE PORCUPINE AND CENTRAL ARCTIC HERDS

Although a worst case scenario is a valid approach to environmental analysis, for significant resources such as the PCH it should incorporate the following:

1. Assumptions should be realistic and properly qualified.
2. The factual basis for analysis should be supported and well documented.
3. Impact criteria should be well defined and supported.

4. Use of the scientific literature should be objective rather than selective.

3.1 The Displacement Issue

The impact assessment on the PCH is largely based on two studies: Whitten and Cameron (1985) who concluded that calving of the CAH has been displaced from the Prudhoe Bay area since the onset of petroleum development, and Dau and Cameron (1986) who reported local displacement of maternal caribou along the Milne Point Road. Whitten and Cameron (1985) present conclusions based on anecdotal data which are largely correlations after the fact. Jakimchuk (1986) presents a detailed rebuttal to the principal conclusion that calving of the CAH has been displaced from Prudhoe Bay. Their own paper recognizes the possibility of other factors such as flooding which may account for the lower calving density in the Prudhoe Bay Complex (PBC). Jakimchuk (1986) reviews evidence that indicates that the PBC was not an important calving area even before development and that the correlations made by Whitten and Cameron reflect a calving distribution in response to natural influences. However, neither viewpoint can be termed conclusive because of the post facto correlations which are made and the limitations of pre-development data and possible comparisons. Jakimchuk (1986) does, however, present a

critical appraisal of those data and the conclusions of Whitten and Cameron. The evidence supports the notion that the Prudhoe area is similar to other deltas in having a low calving density which existed pre-development and that conclusions that calving has been displaced from the PBC are unsupportable.

Because of the contentious and inconclusive nature of the Prudhoe Bay scenario, the report of Whitten and Cameron (1985) is not a sufficiently strong basis to rely on for the PCH scenario analysis.

Dau and Cameron (1986) present a far better study design and basis for assessing the implications of sensory disturbance to the distribution of calving caribou. Because of its importance as the basis for the impact analysis we have reviewed that study (Appendix II) for its relevance and validity. Several points have emerged from that review which are important to the analysis for the PCH.

1. The Dau and Cameron study, although a better design than previous studies, is not definitive. It documents a partial avoidance by maternal cows over a period of high disturbance. However its limitations include lack of a control, and no discussion of conflicting results with West Sak Road studies which show no avoidance by calving groups along the West Sak Road. Their comments on lack of habituation by caribou to disturbance are unsupportable.

Although Dau and Cameron document reduced habitat use (i.e., lower densities) by maternal groups near the road, they did not in fact document displacement which may be defined as an active process of dislocation of caribou from a previously used area in response to a stimulus. Further, they do not comment on the significance of the fact that numbers of calving caribou in their study area almost doubled between the pre- and post-development study periods.

The most significant error of the scenario analysis for the PCH is the assumption that what is termed "behavioural displacement" would be total for a 2-mile zone adjacent to roads using Dau and Cameron (1986) as a basis for that analysis. A total displacement was not found by Dau and Cameron and there is no basis for the assumption of a zone of habitat loss of that magnitude. Moreover, the analysis unjustifiably fails to discuss the potential for habituation and is highly selective in use of relevant references. It specifically ignores those references which may temper conclusions pertaining to the adverse effects of disturbance and displacement on caribou demography.

For example, Davis et al. (1985) report no short term demographic effects on the Delta herd from displacement from their core calving area and no adverse demographic effects on the herd from severe disturbances on the calving grounds. This

reference is not even cited in the EIS. The analysis of aircraft disturbance ignores at least a dozen aircraft disturbance studies, many of which are more quantitative or relevant than those cited. The gratuitous editorial comment on Bergerud et al. (1984) (ref. 41, p. 110, App. I) as a paper that is "widely disputed" indicates a biased approach to dissenting viewpoints. We consider that such an arbitrary dismissal of a major, refereed, published paper is unethical.

Previous sections of this review and Appendix I identify omissions of specific papers relevant to an objective analysis of impacts. Another example is omission of Carruthers et al. (1984b) on crossing success of TAPS by the Nelchina herd, which has a direct relevance to the question of effects on caribou which only periodically contact a pipeline (ref. 36, p. 109, App. I). This report is not listed in the bibliography of the EIS.

The assumption that displacement from the PCH core calving area would be complete is not justified on the basis of known examples. The further link to population decline is even more speculative. There is inadequate treatment of alternative habitat use and the potential mitigating effects of habituation. The net result of the foregoing omissions is to greatly exaggerate the worst case beyond what can be supported on scientific evidence.

Although the qualifiers "could be", and "maybe" are, frequently used in the impact predictions they are not defined. The assessment would be enhanced considerably by an objective risk or probability analysis in order to place predictions in context with their likelihood of occurrence.

The analysis of comparative calving densities for various herds has been linked to the vulnerability of the PCH to population decline if displacement occurs because of its higher calving densities. That analysis, however, depends entirely on undocumented assumptions that:

a) There is a relationship between calving density and herd productivity.
b) That alternative calving areas are incapable of sustaining the PCH at current levels.
c) That displacement would be complete.
d) That the growth of the CAH is partially a result of its low calving density.

The arguments presented in the EIS regarding assumed relationships between calving density and herd productivity are both speculative and hypothetical. There is no supporting data to warrant the conclusions made. Therefore, the severity of the impacts predicted are overstated and subject to question.

We have given little attention to the impact assessment of the CAH in this summary and refer the reader to specific notes and comments in Appendix I. In general, projected impacts on tne CAH are highly overstated since 1002 developments would impinge on a smaller portion of the herd than do existing petroleum developments in the Central Arctic region.

3.2 The Insect Relief Habitat Issue

Although there is considerable theoretical concern for, and discussion of, the importance of insect relief habitat to the PCH and CAH, there is very little documentation of its role or significance to the herds. The overall requirements for insect relief and its relationship to herd health and energetics requires additional study and assessment. As a migratory herd the PCH has insect relief habitat options both north and south of the study area and has utilized both coastal and montane habitats for that purpose. Overall, insect relief habitats are neither scarce nor inaccessible. Maintenance of movement patterns as specified in the mitigation measures and as experienced by the CAH would ensure access to insect relief habitats both along the coast and inland. In addition, elevated areas of gravel pads will increase availability of insect relief sites inland albeit to a minor extent compared to natural areas.

At present, there is no basis to conclude that access to insect relief habitat will be impaired by the development scenario provided that mitigation measures proposed are implemented.

3.3 Mitigation

In general, we agree with the mitigation analysis. The major exception is the recommendations for ramps to facilitate caribou passage. Recent studies show that ramps are not necessary to ensure caribou passage across pipeline corridors provided adequate pipe clearance is available. Further, the construction of ramps has biological costs associated with gravel removal and transport and habitat alteration at source locations and ramp locations.

Although we are in agreement that air traffic should be controlled to minimize disturbance the mitigation analysis presents a one-sided scenario by omitting references to caribou populations exposed to aircraft disturbance which have not suffered demographic effects (Bergerud et al., 1984; Davis et al., 1985). The restrictions proposed for aircraft appear to be overly conservative. For example 2,000 ft-ceilings on overflights are proposed from 20 May to 15 August. However, by

15 July the majority of caribou have left the 1002 area on their mid-summer migration into Canada.

There is also scope to add to and improve the mitigation measures to further reduce impacts on the PCH. These include site-specific scheduling to minimize activity during sensitive periods.

A major unknown is how large concentrations of caribou (100,000 or more in post-calving aggregations) would respond to and negotiate oil development infrastructure. There is reason to believe that large groups are more susceptible to influences such as deflection because of the impetus of their numbers and the dynamics of group leadership. Because of these unknowns it would be prudent to establish facilities such as roads and pipelines in areas of minimal potential conflict with large aggregations of caribou.

Despite evidence that caribou cross under pipelines with clearances as low as 5 ft, we have previously recommended a higher clearance where interaction with large aggregations are anticipated. We feel that a minimum of 7 ft ground/pipe clearance within the range of the Porcupine caribou herd would be a highly significant improvement as a mitigation measure. The major rationale for increasing the clearance is to provide a larger margin for facilitating passage of large

concentrations of caribou and because of the aforementioned impetus of large groups which can govern directional movements during post-calving and mid-summer migration. A higher clearance would facilitate passage of mature antlered bulls and would maintain a physical opening between passing animals and the overhead pipe which would be visible to those animals in the rearguard of large herds.

The existing scenario shows a proposed pipeline location traversing the known post-calving aggregation area for the PCH south of Camden Bay. Additional study is recommended to improve that location, possibly by moving it further north to avoid the area of massive aggregation without precluding access to insect relief habitat.

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The foregoing and other measures such as scheduling or convoying traffic during periods of major caribou movements would serve to greatly minimize adverse impacts on the herd and reduce the magnitude of predicted impacts considerably.

In view of the foregoing we disagree with the statement (ref. 43, p. 111, App. I) that mitigation is not possible in Resource Category I lands and feel that there are significant mitigative opportunities and measures to reduce the adverse effects of development activities on those lands.

4.0 OTHER SPECIES

Appendix I provides specific annotations for other species. A major deficiency in the analysis is incomplete use of available literature and data sources. As a result, potential negative impacts tend to be over-emphasized, e.g., the status of Polar Bear denning is accorded considerable attention. However, denning in the 1002 area is an extremely minor component of denning adjacent to ANWR which in turn is a minor component of denning overall for the Beaufort Sea polar bear population.

We are in agreement with the projected impacts and description on grizzly bears. The exponential growth rate of muskoxen may be limited by habitat availability in future. Effects of disturbance on this growth rate are speculative at the present time. The history of the transplant and growth have established the capability of muskoxen to pioneer a new environment and is evidence that they are responsive to opportunities provided by mitigation. In the absence of controls or management, muskoxen would be forage regulated at some future point and might compete with caribou in a conflicting way.

APPENDIX I.

Detailed review comments on the ANWR impact assessment report, pp. 27-170.

A) Chapter II, Existing Environment, pp. 27-45.

Page	Reference No.	Comments
28	1-2	The "core calving area", as defined, has caribou densities of 50 animals/mi^2 or more during five of 14 years. Caribou use of their calving grounds is very dynamic with site-specific densities varying greatly within the calving period. Core calving area is not necessarily "traditionally" favored and the words "strong fidelity" are misleading. It is in fact an area where high density of calving has occurred frequently, i.e., yearly overlap within the overall calving range.
28	3	This paragraph lacks references and is misleading. The generalization that caribou use riparian areas as travel routes and important feeding areas is not fully supported by the available literature (see Jakimchuk and McCourt, 1975; LeResche and Linderman, 1975).
28	4	References or qualifications are required on types of disturbances which may affect bonding and increase in mortality. We need a more realistic impact prediction on the effects of disturbance on calf mortality.
28	5	Uplands are in southern part of calving grounds, not the northern part. Also, use of uplands by most calving cows contradicts previous statement (see #3) that calving "caribou" use vegetated riparian habitats (see Jakimchuk et al., in press). There are no citations of work done by Renewable Resources Consulting Services Ltd. on calving distribution of the Porcupine caribou herd during the 197us.

Page	Reference No.	Comments
28	6	It is important to distinguish between post-calving movement and aggregation and the mid-summer migration (see Jakimchuk and McCourt, 1975). Summer movements (midsummer migration) are the most consistent movements of the year. Post-calving movements are also quite predictable.
28	7	There is no attempt to define the phrase "critical life stages".
29	8	Is productivity the basis for determining 'impact' or is habitat? Unless the direct link implied is documented for caribou both definitions should not be used simultaneously.
29	9	More documentation of August numbers is needed to determine the frequency of August occupation of the 1002 area (e.g., are numbers closer to 15,000 or to lower end of range?).
29	11	This paragraph requires references. The movements of Central Arctic herd in the 1002 area have not been adequately documented to date.
29	12	Again no references are provided. The most detailed information on calving distribution of the Central Arctic herd is available from Sopuck and Jakimchuk (1986), Carruthers and Jakimchuk (1985) and Carruthers et al, (1984a). The presence of 1,000 females and calves on Canning Delta in most years contradicts data which show more of a calving continuum along the coast with concentrations between major river valleys. Also, the calving situation at Prudhoe Bay oilfield is misleading. The results of Whitten and Cameron (1985) were rebutted by Jakimchuk (1986) who reviewed evidence that the Prudhoe Bay area was never an important calving area for the Central Arctic herd.
29	13	Use of riparian areas as travel corridors and feeding areas by the Central Arctic herd by cows and calves is not supported by the literature (see Carruthers et al., 1984a; Jakimchuk et al., in press).

Page	Reference No.	Comments
		This paragraph ignores the Central Arctic herd as a whole and only discusses the 1002 area and is therefore, incomplete. Since most of the herd occurs outside the 1002 area, this paragraph gives a misleading view of importance of the area to the Central Arctic herd.
29	15	In the presentation of Central Arctic herd distribution and abundance there are no comments on productivity. This omission downplays the tripling of herd size which has occurred since the Prudhoe Bay development started.
30	16	Additional data on moose obtained in the 1970s are available from the Arctic Gas Biological Report Series, Vol. 6, Ch. 1.
20	17	Data on the Sadlerochit Mountains sheep herd are available in an earlier reference (see Arctic Gas Biological Report Series, Vol. 6, Ch. 1).
31	19	More detailed information than available in Chesemore (1967) on Arctic fox distribution in the 1002 area is available from Quimby and Snarski (1974), Arctic Gas Biological Report Series, Vol. 6, Ch. 2.
32	20	Additional information on wolverines in the 1002 area is available from Quimby and Snarski (1974), Arctic Gas Biological Report Series, Vol. 6, Ch. 2).
32	21	Again, earlier work on bears in the 1002 area by Quimby and Snarski (1974) is ignored.
33	24	This paragraph lacks references which are especially required since conculsions presented are controversial.
33	24	Numbers of polar bears in the ANWR part of the Beaufort should be indicated; the Beaufort Sea estimate of 2,000 includes Canadian waters. "Influx of females" implies large numbers moving into the 1002 area. This is not so. References for the population estimate are not given.

Page	Reference No.	Comments
33	25	This paragraph contains very vague and misleading statements. It leaves the impression that a high percentage of the 2,000 bears in the Beaufort population use ANWR. This is not the case. One to two dens in each of four out of five years does not indicate high use of the area by denning bears. See Moore and Quimby (1974) for earlier studies on polar bear denning locations (Biological Report Series, Vol. 32, Ch. 2) which also found a low frequency of denning in ANWR. The 15 dens found between 1951-1985 is cumulative and does not represent actual numbers in any one year.
34	30	Additional information on ringed seals adjacent to ANWR can be found in Moore (1976)Biol. Rept. Series, Vol. 36, Ch. 2. This reference was not cited.
37	31	Studies conducted by McCart et al. (Biol. Rept. Series) on fisheries resources in the ANWR area are not cited.
45	32	The impacts of oil development on the Wilderness resources of the 1002 area will be a key issue.

B) Chapter VI, Environmental Consequences, pp. 95-119.

96	1	These definitions of impacts do not attempt to quantify the changes in abundance in wildlife populations from the natural state that corresponds to each level of impact. Also there is no allowance for accommodation or habituation by species to modifying influences.
98	2	We agree that the PCH concentrated calving area is considered unique and irreplaceable.
98	3	The remainder of the 1002 area cannot be considered scarce habitats, nationally vs. regionally, and should be category 3-4 for most species.

Page	Reference No.	Comments
105	5	Although up to 82 percent of calving for the Porcupine caribou herd has occurred in the 1002 area, in some years almost no calving has occurred there. However, use of the area is more consistent during the late June/early July insect relief period. The statement that the insect relief period is highly stressful is based largely on theoretical considerations - insect relief habitats are widespread north and south of the 1002 area. An inland pipeline may interfere with movements to the coast and post-calving aggregations; however, a coastal pipeline would not.
105	6	This statement should be qualified as to extent of displacement and should indicate that only a minor component of the Central Arctic caribou herd is involved.
106	7	These statements are hypothetical and too generalized because: 1) Density is only an important consideration if proposed activities have effects on populations. 2) It is debatable if the interaction would be greater than at Prudhoe Bay. The Porcupine caribou herd does not always calve in core area and not all of the core area will be affected. 3) Nonetheless, calving and post-calving densities and numbers do differ significantly from the Central Arctic caribou herd and differing implications may occur. If an adverse effect occurs it would certainly affect a greater proportion of the population especially during post-calving aggregation. We agree also that the Porcupine caribou herd will form larger groups than the Central Arctic caribou herd during post-calving and that predator populations also differ between the two areas.
106	8	This paragraph is of major importance and is highly misleading (see Jakimchuk, 1986; Caribou workshop paper) because: - the Prudhoe Bay oil field was never an

Page	Reference No.	Comments
		important calving area. - Whitten and Cameron (1985) do not show an absence of calving for the entire period but co-incidentally with delayed snowmelt. - Whitten and Cameron also discuss other possibilities for low pre- and post-calving densities. - Other Central Arctic caribou herd calving areas show similar pre- and post-development low calving distributions. This section superficially covers a very important topic and uncritically accepts selected findings of one study (i.e., Whitten and Cameron, 1985).
106	9	Inappropriate secondary reference to a review paper when other references, e.g., Carruthers et al. (1984a), are original sources of systematic data with wider coverage than any other.
106	10	Long term data collected from 1981-86 by Renewable Resources Inc. indicates that the Canning River Delta is not a major calving area for the Central Arctic herd. However, it receives greater use during the post-calving period.
106	11	Table VI-4 shows progressive increase in calving numbers in the oilfield from 1972-1974. A detailed critique of these data is available in Jakimchuk (1986). Also, population estimates for the Central Arctic herd for 1981-1986 are available from various RRCS studies.
106	12	The amount of the "core calving areas" within the 1002 area depends on the definition of core calving ground used. The criteria of >50 caribou/km^2 in at least 5 of 14 years resulting in 80 percent within the 1002 area may be too conservative (i.e., the major calving grounds are actually much larger).
106	12	There are no recently published population estimates for the Porcupine caribou herd since 1983. The 1983 photocensus estimate

Page	Reference No.	Comments
		since 1983. The 1983 photocensus estimate was 135,000. Therefore recent estimates of 165,000 in 1985 and 181,000 in 1986 are guesses rather than actual censuses as implied.
106	13	Year-round use of the 1002 area by 4,000 Central Arctic caribou is undocumented.
106	14	Core-calving and concentrated calving areas are defined using the density of ≥50 caribou/ mi^2 yet there is no indication of how these estimates of density were made. Also, a better indication of the use of the 1002 area for calving would be data on the percentage of the herd that calved there each year.
107	16	Indirect habitat losses as a result of behavioral avoidance are difficult to quantify. Studies to date show that the degree of avoidance by caribou is variable and that caribou may habituate to these disturbances over the long term. Indirect habitat losses due to physical barriers may be more signficant depending on the success of mitigation measures employed. Insufficient pipe heights or over-reliance on ramps in combination with disturbance may impede free movements of caribou. This problem may be significant for very large aggregations of Porcupine herd caribou during the post-calving (insect relief) period. Data on the responses of very large groups of caribou to physical barriers are presently unavailable.
107	17	Present studies of behavioral avoidance by caribou of roads do not prove that disturbance is a major source of habitat loss. We need to know how many caribou show the displacement response and whether habituation will occur in the long term.
107	18	The statement is not true, and not definitive. Dau and Cameron (1986) show local response to roads consisting of reduced densities of maternal caribou not displacement from calving grounds. Conclusions and statements by Cameron and Whitten (1979) have been challenged by

Page	Reference No.	Comments
		Bergerud et al. (1984). Citation is used inappropriately here.
107	19	This statement is grossly misleading since there is no evidence available to support it. The following sentence can also apply to many other areas within the range of the CAH. Both the statement and cited study are misleading (Whitten and Cameron, 1985) and have been separately criticized by Jakimchuk (1986) and Carruthers et al. (1984a). The extent of displacement in the Prudhoe Bay area caused by development is difficult to quantify since the area was never an important calving area and because pre-development data are not sufficiently quantitative.
107	20	The study by Dau and Cameron (1986) shows reduced habitat use by caribou. However, the extent of reduced habitat use shows considerable variation. Habituation of caribou may reduce this effect in the long term.
108	21	If displacement does occur, adjacent areas may not be undesirable since they are frequently used with no short term adverse effects on productivity. Long term studies on effects on productivity of displacement would be required to determine the significance of displacement from a high density calving area. Although displacement of the Porcupine caribou herd from a "core calving area" may be deleterious, studies of the Central Arctic herd show that caribou numbers can increase despite development within their calving areas. We agree, however, that caution should be used in extrapolating Central Arctic caribou herd results to the Porcupine caribou herd since the Porcupine caribou herd occurs at much higher densities on their calving grounds and because predators are more abundant adjacent to the Porcupine caribou herd calving areas. In addition, caution should be used in the assumption that displacement of the Porcupine caribou herd

Page	Reference No.	Comments
		from a "core calving area" would occur in total as implied. The probability of this is low based on evidence from the CAH.
108	22	This statement presupposes a food limiting habitat and a complete loss - the references used deal with non-caribou apparently since caribou are not a food limited species and comparable references are not available for mainland herds of Barren-ground caribou in North America.
	25	There is no basis for "unlikely" conclusion. This is speculation only based on inference of higher density. Also presupposes a "massive" displacement rather than a local displacement. This is an example where the CAH experience is downplayed despite the existence of data on compatibility with development. "...no recognizable... long term effect... has been demonstrated to date (emphasis ours).
	26	However, all participants of the FWS workshop did not agree to the extent or significance of that displacement.
108	27-28	Dau and Cameron (1986) indicate that reduced density of maternal caribou which they term displacement may occur within 2 miles from active roads. However, the percentage of caribou affected is uncertain. A significant number of caribou within 2 miles may be unaffected by disturbance. Therefore, development would not result in the complete loss of 32 percent of the Porcupine caribou herd core calving area as calculated.
108	28	It is erroneous and misleading to imply a "total displacement" two miles wide. The term probable population decline is unsubstantiated i.e., displacement is linked to decline, but such an effect has never been demonstrated or documented. The assumption of massive displacement is unwarranted based on the Central Arctic caribou herd experience.
108	29	Several studies show that pipelines such as TAPS and Kuparuk do not create a barrier. Note one-sided refs. Need to clearly

Page	Reference No.	Comments
		establish the likelihood of conditions which constitute interference or provide better qualifications of statements made.
109	31	Agree - valid concern. I have previously recommended 7' ground to pipe clearance rather than the 5' level cited in this and the workshop report.
109	31	We agree that the effect of potential barriers are greater during post-calving than during calving because of the very large size of post-calving aggregations and the sudden, erratic movements between inland areas and coastal insect-relief habitats. There is insufficient evidence, however, to indicate that survival or productivity of caribou may be reduced as a result of a disruption in movements during this period. We recommend that the location of a main east-west pipeline be studied further and that pipe heights should be raised from the minimum of 5' cited in the EIS to 7' within the range of the PCH.
109	32	The European references used are not appropriate - carrying capacity and nutritional limitations are greater for European populations.
109	34	This statement is based on one example and hence is not objective.
109	35	There is no evidence that ramps will significantly increase crossing success - rather pipe heights and the presence of vehicular traffic are more important.
109	36	It is appropriate to discuss RRCS studies of the Nelchina herd (Carruthers et al., 1984b) here and reference it. This herd is exposed to TAPS only twice a year, but crosses it successfully.
109	37	This worst case is unjustified on the basis of known responses of caribou. It is unrealistic and ignores experience to date. Also should not assume 2-mile sphere of influence even without mitigation.

Page	Reference No.	Comments
110	38	Disturbance and harassment are significantly different. There is no evidence that disturbance will result in direct or indirect mortality as a result of trampling or increased energy loss.
110	39	This paragraph ignores several other studies some of which are more quantitative.
110	40	Davis et al. (1985) report no demographic effects or calving ground displacement on the Delta caribou herd from severe aircraft disturbance and other disturbance associated with military activity. This is an example where significant conclusions of a recent peer review paper (Davis et al., 1985) are ignored in favour of an outdated non-peer review reference.
110	41	The editorial comment "widely disputed view" is an inappropriate and unsubstantiated comment on a peer-review published paper.
111	43	We disagree with this conclusion since Category 1 habitats would not suffer an inevitable "loss". Mitigation of Category I habitat is possible because: 1) A 2-mile avoidance zone is not a valid assumption (see previous comments). 2) Many mitigation options are available including: - Traffic control - Reduced human activity during calving - Reduced aircraft overflights - Speed limits on traffic, etc.
111	44	Ramps are over-emphasized and not justified. Elevation of pipelines to 7' above ground (because of large groups) should be a priority over ramps.
111	46	Davis et al. (1985) do not indicate a problem. Restrictions could be lifted after 15 July because most PCH animals are gone on summer movements by that date. We agree with a minimum altitude of 2,000' May 20 through July 15th.
111	47	We basically agree with all mitigation measures except for ramps. However, more

Page	Reference No.	Comments
		measures could also be listed, to further ameliorate impacts.
112	48	Environmental description map in Chapter II shows extent of alternative habitats. Whether these could sustain a growing population assuming loss of all core calving area (although unlikely) is unknown.
112	49	Insect relief habitats need to be more accurately described. We need to know how much space is necessary to give relief to the Porcupine caribou herd.
112	50	There is a major step between potential undocumented effects and a population decline. However this paragraph seems to be properly qualified.
112	51	Is it a decline or distribution change or both? There is no basis for predicting either a 5-10 percent decline or distribution change. The opposite, a three-fold population increase in the CAH accompanied the Prudhoe Bay development which interacted with a much larger proportion of the CAH than would be the case for the 1002 area. The prediction of a decline and distribution change for the CAH throughout its range based on the 1002 interaction totally ignores the well-documented facts of the actual effects of development. This paragraph is unfounded.
113	52	There is no basis given for extrapolating effects on individuals to population effects.
113	54	A major unjustified assumption here is that disturbance will result in absolute loss of habitat value. Also an exponentially expanding population suggests that in the near term it is below carrying capacity.
114	55	Evidence is opposite, these sub-groups all originated from two transplants, one made on Barter Island (1969) and the other at Kavik Camp (13 muskox transplanted in 1970).

Page	Reference No.	Comments
116	56	These conclusions are entirely speculative and there is no possibility of subsequent determination if they are correct or incorrect.
117	57	Agree with this section in general.
118	59	This paragraph is misleading because 12-13 percent of the Beaufort Sea Population do NOT den on land.
119	60	This paragraph should be qualified with a more objective review of likelihood of effects on productivity of bears.

APPENDIX II

Review of Dau and Cameron (1986) Report entitled "Effects of a road system on caribou distribution during calving". "Rangifer", Special Issue No. 1:95-101.

Dau and Cameron have demonstrated a local, short-term reduced density of maternal caribou groups adjacent to an active road system which they refer to as partial displacement. However, several qualifications to their results need to be made that were absent in the report. The authors admit that it is speculative to extrapolate the local effects on maternal caribou to the population as a whole. Yet they imply that displacement will result in widespread, long-term loss of traditionally-used habitat. We argue that such conclusions are unwarranted at this time.

The experimental design of Dau and Cameron, although more rigorous than previous work, did not include adequate controls. The design requires a control area containing a hypothetical road alignment and located in an area of similar habitat and calving density, well away from human activity. Monitoring of a control area during an equivalent study period (1978-85) would indicate whether changes in caribou distribution similar to the experimental area can occur in the absence of development.

In addition, Dau and Cameron fail to note that:

1) despite partial displacement and increasing development activity, caribou densities increased in their study area from 1978-85;

2) most of the displacement was observed in the middle sections of the road, the north and south ends of the road alignment supported lower densities of caribou before and after the development;

3) non-maternal groups, which included up to 25 percent calves, occurred at higher densities (although not significantly higher) near the road alignment than away from the alignment during the post-development period;

4) habituation was not evident up to 1985 because the intensity of human activity was also increasing dramatically at this time.

The Dau and Cameron study showed statistically significant differences in caribou density vs. distance but also indicate that annual variability was high. In fact, the annual variability within each 4-year period was almost significant ($p = 0.053$) for calves. This suggests that the displacement response varied considerably from year to year.

It is noteworthy that Dau and Cameron showed that non-maternal caribou were not displaced by the road development. Also, the response by maternal groups was partial displacement within a zone of 0-3 km (0-1.9 mi). In the ANWR report it is implied that all caribou show a total displacement within 2 miles. This scenario is not supported by the Dau and Cameron report.

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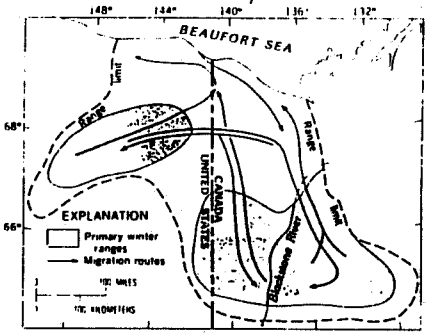

Figure II-4.--Migration routes and winter range of the Porcupine caribou herd.

were as low as 101,000 (LeResche, 1972). The lower levels of earlier estimates may reflect a truly smaller population, less accurate or less complete survey techniques, or a combination of these factors. Caribou populations appear to fluctuate unpredictably over the long term. The long-term maximum and minimum population of the PCH and the carrying capacity of the PCH are unknown.

The PCH ranges over 96,100 square miles of northeast Alaska and northwest Canada, and constitutes the largest population of large mammals shared between the two nations (fig. II-4).

The traditional calving grounds of the PCH extend throughout the Arctic foothills and coastal plain from the Canning River in Alaska to the Babbage River in Canada. Including the entire 1002 area, the calving grounds encompass an area of nearly 8.9 million acres (pl. 2A). From year-to-year, the distribution of caribou on these calving grounds varies considerably, with most calving usually taking place in the area between the Hulahula River and the Canadian border. During 1972-85 detailed observations were made of calving areas of the PCH. As a result of these studies, areas where caribou were present during calving at a density of at least 50 caribou/square mile were identified as concentrated calving areas. The core calving area is a location to which pregnant cows have shown a strong fidelity as traditionally favored calving habitat. Those concentrated calving areas used in at least 5 years during the 14-year study were identified as the core calving area. Of the 2.1 million acres identified as concentrated calving areas, 934,000 acres (44 percent) are within the 1002 area. An even greater proportion, 242,000 acres (78 percent), of the 311,000 acres of core calving area is within the 1002 area.

Spring migrations to the calving grounds start in May from winter ranges, which are usually south of the Continental Divide in Alaska and in central Yukon Territory and adjacent Northwest Territories in Canada (fig. II-4). Timing and routes of migrations vary annually depending on winter distributions, snow conditions, and the onset of spring weather. Most caribou migrate to reach the calving grounds of the 1002 area from Canada, moving westward along the northern foothills of the Brooks Range. In some years many caribou also pass through the first snow-free mountain valleys east of the Aichilik River in Alaska. As spring conditions progress, caribou in the foothills spread northward along a broad front, primarily following the major river corridors and associated terraces where snowmelt has advanced.

During years when snowmelt on the coastal plain is early, a broad zone north of the foothills is used for calving. In such years calving concentrations tend to be more northerly and scattered calving extends to the coast. When spring is late, calving is more southerly and easterly, followed by a distinct movement west and northwest. Once caribou have reached the calving grounds there is less directional movement. During and immediately after calving, foraging caribou use vegetated riparian habitats as well as tussock uplands. Riparian areas (pl. 2A) are used as travel corridors and important feeding areas in both spring and summer.

The percentage of PCH cows using the 1002 area for calving was estimated to be 74 percent in 1983 and 82 percent in 1985. In 1984, 35 percent of the cows calved in the 1002 area; 38 percent calved adjacent to the 1002 area, east of the Aichilik River. The latter group moved into the 1002 area within a week of giving birth and joined the cows already there (U.S. Fish and Wildlife Service, unpublished data). These estimates were extrapolations from locational data on radio-collared cows

In arctic areas, caribou reproduction is highly synchronous. The majority of calving occurs within a 2- to 3-week period, when a single calf is born to most adult females (3 years old). Caribou calves are precocious being able to stand and nurse within 1 hour following birth. They are capable of travel with adults within a week. The first 24 hours of life is critical, when a behavioral bond is formed between the calf and its mother. Disturbance of cow-calf groups on the calving grounds may interfere with bond formation and can increase calf mortality.

Usually caribou begin to arrive on the calving grounds of the Arctic Refuge during mid- to late May. The first calves are born during the last week of May; peak calving occurs during June 4-8. Although calving has been observed in a variety of terrains, most calves are born in snow-free areas of sedge tussock uplands, where the cows seek suitable vegetation. Predator densities are apparently less in these areas and, subsequently, calf survival is better in the northern parts of the calving grounds which become snow-free when snowmelt is early (U.S. Fish and Wildlife Service, 1982; Mauer and others, 1983; Whitten and others, 1984, 1985).

After calving, small bands of cows with newborn calves gradually merge into larger groups. Yearlings, barren

females, and bulls occupying the southern and eastern periphery of the calving grounds begin to mix with the cows and calves, ultimately forming huge postcalving aggregations. By late June or early July aggregations of 80,000 or more caribou on the 1002 area are common. Postcalving movements show considerable annual variation.

Although rather small in proportion to the herd's entire range, the calving/postcalving area is an important, identifiable habitat that has been repeatedly used by the PCH during these critical life stages.

As the spring progresses, weather conditions promote the emergence of swarms of mosquitoes. Harassment by these insects drives the caribou into dense aggregations and results in their increased movement to areas of relief. The groups usually move rapidly toward the coast seeking relief on points, river deltas, mudflats, aufeis, large gravel bars, barrier islands, and in the shallows of lagoons (pl. 2A). Some groups also move to higher elevations in the mountains for relief. In other years there can be a gradual westward shift across the coastal plain and northern foothills.

The postcalving season is the low point of the annual physiological cycle when energy reserves of parturient cows are especially low. The stresses of winter, pregnancy, migration, birth, lactation, hair molt, antler growth, and insect harassment draw heavily upon this segment of the population (Dauphine, 1976; White and others, 1975). Access to insect-relief habitat and forage resources during this period may be critical to herd productivity. In early July the herds usually move east and south, vacating the 1002 area by mid-July. In certain years, residual groups numbering up to 15,000 animals have remained on the 1002 area and adjacent foothills and mountains through August. Occasionally, remnants of such groups (up to 2,000 animals) have wintered in northern mountains and foothills.

An international agreement for management of the PCH is currently being negotiated between the governments of the United States and Canada. The State of Alaska and Provincial governments as well as local users are participating in the negotiations.

Harvest of the PCH occurs in both the United States and Canada. The harvest by individual Native villages is highly variable, depending upon herd movements. Recent annual harvests from the PCH by Kaktovik, the only village adjacent to the 1002 area, have ranged from 25 to 75 animals (Pedersen and Coffing, 1984). Annual harvest of the PCH throughout its range was estimated at 3,000-5,000 animals (LeBlond, 1979). The harvest varies greatly from village to village and from year to year within the same village. The annual harvest at Arctic Village, Alaska, ranges from 200 to 1,000 (LeBlond, 1979). During 1963-85 annual harvest of the PCH within Canada averaged approximately 1,700 animals for the years in which data were available (Yukon Territory Wildlife Branch, unpublished data).

The Central Arctic caribou herd (CAH) has been increasing, and in 1985 numbered about 12,000 to 14,000. Its range is entirely north of the Continental Divide, from the Itkillik and Colville Rivers on the west to the Sadlerochit River on the east (pl. 2B). The TAPS, Dalton Highway corridor and Prudhoe Bay-Kuparuk oil fields lie within the herd's range. In July 1983 the herd comprised 46 percent cows, 21 percent calves, and 33 percent bulls (Hinman, 1985).

Females of the CAH wintering in the mountains and foothills near the western part of the 1002 area migrate north-northwest across the rolling uplands south of Camden Bay to the calving grounds on or near the Canning and Staines River deltas. A northward movement along the Canning River corridor also occurs.

CAH calving activity has been concentrated in two areas: the vicinity of the lower Kuparuk River and the Canning River delta. Most years as many as 1,000 females calve on the Canning River delta within the 1002 area (pl. 2B). Scattered, low-density calving extends as far east as the Sadlerochit River. Little or no calving has been observed in the TAPS-Prudhoe Bay oil field area since about 1973 (U.S. Fish and Wildlife Service, 1982; Whitten and Cameron, 1985).

After calving, some CAH caribou move southeastward, to the uplands south of Camden Bay. During the insect season (July) there is often a strong eastward movement along coastal habitats between the Canning River delta and Camden Bay. An estimated 2,000-3,000 caribou of the CAH use the 1002 area (Canning River delta and coastal habitats along Camden Bay) for post-calving and insect-relief (pl. 2B). During the summer, an additional 1,000 animals may be scattered west of the Sadlerochit River and north of the Sadlerochit Mountains. Riparian areas are used for travel corridors as well as important spring and summer feeding areas. In late summer and fall, CAH caribou are found scattered across the coastal plain south of Camden Bay, in foothills north of the Sadlerochit Mountains, and in uplands south of the Sadlerochit Mountains where they remain for the winter. During most winters, scattered groups of CAH caribou range throughout the 1002 area west of the Katakturuk River and adjacent uplands to the south. The number of wintering animals ranges from 100 to 1,000.

The annual harvest of CAH caribou by Kaktovik residents has most recently been estimated to be 25-75 animals (Pedersen and Coffing, 1984). This harvest occurs along the coast during the summer when residents can travel by boat and inland during the fall and spring when snowmachine travel is possible (pl. 2D).

MUSKOXEN

Muskoxen were exterminated from the North Slope by the late 1800's, so carrying capacity and past historic levels are unknown. In an effort to reestablish an indigenous

population, 69 muskoxen were reintroduced to the Arctic Refuge in 1969 and 1970 (Rosenau and Stein, 1974). The muskox population has grown exponentially since 1974 (fig. II-5) because of high productivity and low mortality. In 1985, the postcalving refuge population was estimated at 476, more than triple the 1979 population.

Muskoxen are highly social, usually found in mixed sex herds. Herd size of the 1002 area population varies seasonally. The smallest herds occurring during the rut in August. Many bull muskoxen do not remain with a mixed sex herd for long periods of time, but move from herd to herd, associate with other bulls in small groups, or travel alone (Reynolds and others, 1985). In response to predators or other threats, muskoxen form a compact defensive formation.

Muskoxen have used the same areas along the Niguanak-Okerokovik-Angun, Sadlerochit, and Tamayariak-Katakturuk river drainages for the past several years with approximately 80, 160, and 230 animals using those drainages, respectively. Muskoxen using the Sadlerochit and Tamayariak areas seem to be part of the same subpopulation, whereas animals in the Okerokovik area seem to be a separate subpopulation. Many of the cows marked for the baseline study research in 1982-85 have remained in these areas (pl. 2C) and show a high site-specific fidelity. Riparian areas are important travel corridors and muskoxen regularly feed there year round. Dispersal of mixed sex herds into new areas on the Katakturuk River and drainages east of the Aichilik River is also occurring.

Though not migratory, muskoxen apparently move in response to seasonal changes in snow cover and vegetation. In summer and fall, they are often found in riparian habitats along major drainages, where they feed on willows and forbs. In winter and spring many animals move to adjacent uplands with less snow cover to feed on tussock sedges (Reynolds and others, 1985). Preliminary FWS data indicate that muskoxen apparently reduce both their movements and activity during winter, probably as an adaptation to conserve energy. Table II-2 and plate 2C show the extent of muskoxen habitat within the Arctic Refuge and 1002 area and delineate those seasonal or year-round use areas where muskoxen have been observed most frequently, year after year (1982-85).

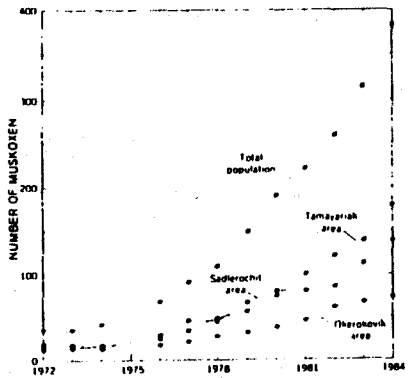

Figure II-5.--Estimated numbers of muskoxen in post-calving populations in the Arctic Refuge, 1972-84.

Table II-2.--Observed muskox range within the Arctic National Wildlife Refuge and within the 1002 area, 1982-85

	Within Arctic Refuge (acres)	Within 1002 area (acres)	Percent of total use area within 1002 area
High seasonal or year-round use with calving	251,000	207,000	82
High seasonal or year-round use "without calving"	211,000	158,000	75
Total observed range, including high-use areas	1,116,000	760,000	68

Muskoxen hunting on the Arctic Refuge under permit from the Alaska Department of Fish and Game started in 1983. Five bull-only permits have been issued annually; the 1983, 1984, 1985, and 1986 harvests were 4, 5, 4, and 3, respectively.

MOOSE

Patterns of moose distribution north of the Brooks Range vary seasonally (pl. 1C). Winter concentrations occur south of the 1002 area where up to 158 and 239 moose have been counted in the Canning and Kongakut River drainages, respectively. A few moose are scattered in other river drainages (U.S. Fish and Wildlife Service, 1982; Martin and Garner, 1984, 1985).

In late May or early June small widely dispersed groups of moose move northward along riparian systems. Moose using the 1002 area have dispersed from populations to the south and use a variety of habitats in July and early August. The number of moose using the 1002 area at any one time probably does not exceed 25. In late August, moose begin to aggregate; the largest groups occur in October during the rut south of the 1002 area. Most moose using the 1002 area move southward to winter in valleys of the Brooks Range. Riparian willow species

comprise a major part of the forage used by moose. mountain alder is an important winter food where available

Subsistence hunters from Kaktovik take one or two moose annually (Jacobson and Wentworth, 1982) Other hunters harvest a few moose. generally less than 10 annually, from the North Slope of the Arctic Refuge Most of this harvest is in the Canning River and Kongakut drainages, and nearly all outside the 1002 area

DALL SHEEP

Although the estimated total population of Dall sheep within the original 8.9-million-acre Arctic Refuge is approximately 6,800 Dall sheep are very rare on the 1002 area, because suitable habitat is lacking The Sadlerochit Mountains contain an estimated 270 sheep, and constitute the northernmost extent of their range in North America (T.G. Smith. 1979)

Traditional summer range consists mainly of alpine slopes and meadows. Winter range, limited mostly by topography, consists of windblown slopes and ridges, usually south-facing. FWS surveys indicate that Dall sheep have used the lower foothill terrain near Sadlerochit Spring, mostly in winter; in summer, they cross this tundra area in moving to other habitats (D Ross and M. A Spindler unpublished data, 1981)

WOLVES

Wolves are found throughout Alaska's North Slope On the 1002 area, the population density is lower than in areas farther south Wolves occupy large home ranges In winter wolves tend to congregate in areas of overwintering caribou and possibly moose or Dall sheep Daily movement depends on availability of prey Estimates of density for restricted geographic areas vary widely, but most fall within the range of 6 to 200 square miles per wolf (Mech. 1970) Mating occurs in March, and pups (usually 4-7 per litter) are born in dens 2 months later Although the 1002 area appears to contain suitable denning habitat, no dens have been found Dens that have been documented are in mountainous terrain 10 to 40 miles south of the 1002 area The number of wolves using the 1002 area on a seasonal basis is low and apparently does not exceed 5-10 animals annually

Populations in or adjacent to the 1002 area were depressed in the late 1970's by an outbreak of rabies A similar outbreak occurred in 1965 when six dead wolves, including four radio-collared animals, were found. Four of the animals were confirmed as rabid. Historical den sites on the Kongakut, Hulahula, and Aichilik Rivers were deserted in 1985 Death of breeding wolves from rabies was suspected as the reason However, four new dens were found, three of them occupied by wolves which were remnants of earlier packs

Wolves on the North Slope are known to prey on caribou, moose, sheep, ground squirrels, small rodents and birds Wolves are typically associated with drainage systems which they use as travel corridors They are also attracted to riparian areas because of the abundance of prey, including ground squirrels During the summer when prey species are most abundant, wolves are distributed throughout all 1002 area habitat types (U.S. Fish and Wildlife Service 1982; Haugen, 1984, 1985; Weiler and others, 1985) Wolves are hunted and trapped by Kaktovik residents Most of the harvest occurs in the Hulahula Sadlerochit, and Okpilak River areas (Jacobson and Wentworth, 1982; Weiler and others, 1986). Generally, fewer than 10 wolves are harvested annually, usually south of the 1002 area

ARCTIC FOXES

Arctic foxes move seasonally between summer breeding habitats in wet tundra and winter habitats along the northern Alaska coast and onto the sea ice (Chesemore, 1967). They are limited in their range by habitat and interspecific competition with red foxes. Periodic outbreaks of rabies can reduce fox populations Productivity of foxes is related to abundance of microtines (small rodents). Foxes regulate their food supply, despite fluctuating prey availability, by caching food in early summer when prey is abundant and utilizing food caches and carrion in late summer when fewer prey are available. At Demarcation Bay arctic foxes spent most of their time in medium relief, low-center polygon and meadow habitats, preying on small mammals and bird nests (Burgess, 1984) In 1979 when rodents were at low population levels, foxes at Demarcation Bay depended mainly on birds and eggs. No pups were produced that year (Burgess, 1984).

Arctic foxes are trapped by Kaktovik residents in the winter for fur The number taken annually fluctuates according to their abundance In years of abundance more than 100 foxes may be taken Most trapping is within 15 miles of the coast, mainly on or near Barter Island (Jacobson and Wentworth, 1982)

WOLVERINES

Wolverines frequent all types of terrain found in Arctic areas as evident from observations and tracks Rivers and mountains are frequently associated with territorial boundaries Snowdrifts are important for wolverine dens sites, and, in the tundra, remnant snowdrifts in small drainages are used by females for rearing their offspring (Magoun 1985)

A few wolverines inhabit the 1002 area. Accurate population figures are unavailable. A rough estimate of the 1002 area wolverine population can be made from the wolverine densities and assumptions used by Magoun (1985) for estimating the population in the Western Arctic On Magoun's assumptions, the estimated density for the 1002 area is 90 wolverines This figure may not be very

accurate Magoun's area and the 1002 area are not identical Magoun studied a virtually unexploited population whereas wolverines in the 1002 area and environs are routinely harvested by Kaktovik residents Furthermore, sighting records for the 1002 area are sparse recent FWS studies have resulted in very few sightings

Wolverines feed opportunistically and have been reported pursuing large ungulates such as caribou, moose and Dall sheep, though they are more commonly scavengers than predators In the Arctic ground squirrels are an important food (Rausch and Pearson 1972) Caribou are scavenged particularly during May and June when they are numerous on the 1002 area During June and July wolverines also prey on birds and eggs

Kaktovik residents hunt wolverines most frequently in the foothills and northern mountainous areas of the Sadlerochit Hulahula, and Okpilak Rivers ADF&G records indicate that an average of about one wolverine per year is harvested from the 1002 area. this may be an underestimate because of incomplete reporting Magoun (1985) believed that harvest in Game Management Unit 26A (Western Arctic) was 2 to 10 times greater than reported During the winter of 1980-81, seven wolverines were taken by Kaktovik residents (Jacobson and Wentworth 1982) Wolverines are sometimes harvested by trappers near the village of Kaktovik These animals are mostly subadults that may be dispersing onto the 1002 area from the foothills to the south Information is lacking as to whether the 1002 area wolverine population is resident or transient

BROWN BEARS

Brown bears seasonally use the 1002 area At periods of greatest abundance (in June) use is estimated at one bear per 10 square miles, or approximately 108 bears (Garner and others 1984) Brown bears north of the Brooks Range are at the northern limit of their range These populations are characterized as having low reproductive rates as a result of short periods of food availability large individual home ranges (95 to 520 square miles) and habitats that provide little protective cover (Reynolds and others 1976, Reynolds 1979, Garner Weiler and Martin 1983)

Brown bears appear on the 1002 area in late May and are generally most abundant during June and July when caribou are most plentiful The bears breed during this same period Brown bears are found throughout the entire 1002 area There are two known high use areas One used by 50-70 adult bears and cubs is in the southeastern section of the 1002 area where caribou calving is concentrated The second, used by 15-20 bears, is a much smaller area along the upper reaches of the Kalakturuk River (pl 1D) Moderate use (30-80 bears) is located between and around the high use areas and are generally used for a shorter period (June-July) (Note that bear numbers from each use area cannot be added because they represent different times of residency Each bear may use more than one or all areas delineated) After caribou leave the 1002 area in early July, brown bears gradually move south into the foothills and mountains (Garner and others, 1983, 1984, 1985) Riparian areas are used as travel corridors. Brown bear habitat changes seasonally according to food availability (U.S. Fish and Wildlife Service, 1982). Spring foods include vegetation, carrion, caribou, ground squirrels, and rodents River courses frequently contain abundant prey as well as preferred vegetation During mid- to late summer, brown bears shift to eating horsetail, grasses, and sedges In the fall, they eat wild sweetpea roots, crow- berries, blueberries bearberries, and ground squirrels and other rodents (Phillips, 1984)

Denning occurs in late September and October, depending on soil conditions (the top soil must be frozen to support den excavation) and weather (Pearson, 1976; Reynolds and others, 1976; Garner and others, 1983, 1984, 1985). Cubs are born in the den in January and early February Litters range from one to three cubs; the average litter for bears using the 1002 area is 1.9 (Garner and others, 1984) Most dens are located in the foothills and mountains south of the 1002 area. Six of 129 (4.6 percent) known den sites within the Arctic Refuge have been located on the 1002 area (Garner and others, 1983, 1984, 1985). Brown bears emerge from winter dens in late April through May. On the 1002 area the survival rate among cubs and yearlings ranges from zero to 100 percent Causes of juvenile mortality on the 1002 area are not well known, but a major cause is probably the killing of juveniles by mature males such as occurs in other brown bear populations (Stringham, 1983).

Residents of Kaktovik harvest an average of 2 brown bears annually. The bears are taken opportunistically on the 1002 area or farther south in the foothills or mountains (Jacobson and Wentworth, 1982). The sport harvest within the Arctic Refuge north of the Brooks Range averages 2-4 brown bears annually. Virtually all sport harvest is south of the 1002 area.

ARCTIC GROUND SQUIRRELS AND OTHER RODENTS

Arctic ground squirrels are found throughout the 1002 area in colonies restricted to well-drained soils free of permafrost. Ground squirrels hibernate from late September through May (U.S. Fish and Wildlife Service, 1982). Activity resumes in the spring, before the snow begins to disappear. Mating is followed by a 25-day gestation period Young ground squirrels grow rapidly in preparation for winter hibernation.

Ground squirrels are a subsistence food for Kaktovik residents. They are also important in the diets of snowy owls, rough-legged hawks, brown bears, arctic foxes, red foxes, and wolves

Other rodents found on the 1002 area include the collared lemming, brown lemming, and tundra vole. Red-backed voles and tundra voles may occur in the foothills in

the southern part of the 1002 area. The brown lemming is the leading herbivore along the coast and in high population years can account for more plant consumption than ungulates (Batzli and others, 1980). Impacts on the vegetation are cyclic and correspond to the brown lemming's 3- to 5-year population cycle. Lemmings and voles are active all year, grazing frozen plant material and breeding under the snow. Maximum population densities occur after successful winter reproduction. Shallow snow depths result in low temperatures under the snow, creating an energy stress that can reduce winter reproductive success.

MARINE MAMMALS

Fourteen species of marine mammals may occur off the coast of the Arctic Refuge. Some of these--the spotted seal and walrus--are occasional visitors. Others such as the killer whale, gray whale, humpback whale, fin whale, narwhal, harbor porpoise, and hooded seal are only rarely seen because this part of the Beaufort Sea is at the extreme margin of their ranges. Five of the species were evaluated: polar bear, ringed seal, bearded seal, beluga whale, and the endangered bowhead whale.

POLAR BEARS

Polar bears are closely associated with pack ice of the Arctic Ocean throughout most of the year. The Beaufort Sea population of polar bears is estimated to be 2,000. Some females move to coastal areas and occasionally farther inland during October and November to seek maternity den sites. Pregnant polar bears, and later their cubs, probably spend more time on the 1002 area than other segments of the polar bear population. Other groups of polar bears seasonally frequent the coastal periphery of the area. Recapture of polar bears marked by the FWS in recent years indicates that an influx of females accompanied by cubs as old as 20 months and subadult animals coincides with the fall ice-edge advance to the shoreline.

Polar bear dens have been found as far as 250 miles offshore and 32 miles inland. Eighty-seven percent of dens located in 1983-85 were offshore. The onshore area from the Colville delta to the Canadian border is within the area used by the Beaufort Sea population of polar bears for denning. However, the most consistently used land denning areas were on and adjacent to the 1002 area where 1-2 dens were found in 4 of the 5 years, between winter 1981-82, when the FWS began a continuing study of North Slope polar bears, and winter 1985-86 (Amstrup, 1986a). The ideal denning sites are riverbanks, draws, and the leeward side of bluffs where snow accumulation is sufficient to support den construction. At least 15 dens were located in the 1002 area, 1951-85 (pl. 1E). Another five dens have been located on ice near the 1002 area.

Three locations in the 1002 area (pl. 1E) have been delineated as confirmed denning areas, that is, areas in which polar bear dens and denning activity have been observed during more than one winter. Dens or denning activity has also been observed in other 1002 area locations, but data are inadequate to confirm recurrent use.

Female polar bears that den on land move onshore to seek out den sites in October and November, depending on ice movement and ice buildup in the fall (Lentfer and Hensel, 1980). Denning females give birth to 1 or 2 cubs in December or January, and bears emerge in late March or early April, depending upon weather conditions. The female and cubs generally remain near the den, making short forays for 1 to 2 weeks until the cubs gain strength and become acclimated to outside conditions. Soon thereafter they move to the sea ice to feed on seals. Many females with new cubs concentrate their foraging on the shore-fast ice, which varies in width from a few feet to more than 30 miles.

When the nearshore ice breaks up in the spring, the bears move with the sea ice and many concentrate at the south edge of the pack ice. This position varies seasonally but usually is between the coast and latitude 72°N.

Except for a shore lead, the Beaufort Sea is ice covered year-round. Open water nearshore begins to freeze in September or October, and nearshore ice does not melt until May or early June. Male and nondenning female polar bears inhabit the sea ice throughout the winter. The distribution of polar bears is influenced by the availability of their major prey species, ringed and bearded seals, which concentrate in areas of drifting pack ice (Lentfer, 1971; Stirling and others, 1975). Ringed seals probably constitute 95 percent of the polar bear's diet (Burns and Eley, 1978).

Polar bears are protected under the provisions of the Marine Mammal Protection Act of 1972. An international agreement for the conservation of polar bears was ratified in 1976 by the governments of Canada, Denmark, Norway, the Union of Soviet Socialist Republics, and the United States of America. Article II requires that appropriate actions be taken to protect ecosystems of which polar bears are a part, especially denning and feeding sites.

Large numbers of polar bears may occur seasonally along the coast of the Arctic Refuge near the village of Kaktovik where whale carcasses can be scavenged (Amstrup and others, 1986). Each year many bears are available to local subsistence hunters, but in most recent years the kill has been small (FWS, unpublished data). Annual subsistence harvest of polar bears by local residents was as high as 23 to 28 in 1980-81; at least one polar bear was confirmed as being taken in each of the following 4 years, with three bears being taken in 1985-86 (Schliebe, 1985; Jacobson and Wentworth, 1982; FWS, unpublished data).

SEALS AND WHALES

Ringed seals, bearded seals and, occasionally spotted seals occur in the Beaufort Sea and along the coast north of the coastal plain, including the lagoons of the 1002 area (U.S. Fish and Wildlife Service, 1982). Although there is some evidence of ringed seals within the refuge in summer and fall, their primary habitats are generally outside the 1002 area. Ringed seals use stable, shore fast ice as their primary pupping habitat (T.G. Smith, 1980). To improve chances of successfully rearing pups, older, more dominant female ringed seals select and actively defend territories on stable shore-fast ice for pupping. Subadult and younger females are forced to construct lairs on active pack ice, increasing the chances of predation by polar bears. Bearded seals are chiefly associated with the pack ice edge throughout the year. Primary breeding and pupping habitat is associated with the ice edge. A small number of bearded seals remain in northern ice-bound areas. The extent of active pack ice use by seals is not well understood within the 1002 area. However, seals in Canada do occupy active pack ice, a preferred hunting area for polar bears (T.G. Smith, 1980).

Kaktovik residents harvest spotted, ringed, and bearded seals for subsistence, though relatively few seals are taken (Jacobson and Wentworth, 1982).

Bowhead and gray whales are listed as endangered species. Gray whales are occasionally found in the Beaufort Sea, north of the 1002 area (U.S. Fish and Wildlife Service, 1982). The bowhead whale is known to inhabit waters offshore of the Arctic Refuge in September and October during its fall migration along the Beaufort Sea coast. The southern boundary of the bowheads' fall migration corridor is generally the 66 foot isobath, although they are occasionally seen in shallower water. Demarcation Bay east of the 1002 area is a feeding area for these whales; waters off the 1002 area may also be used (National Marine Fisheries Service, 1983). Belukha (beluga) whales also migrate through waters north of the 1002 area.

Bowhead whales are taken for subsistence by residents of Kaktovik. Subsistence whaling at Kaktovik began in 1964. During 1981-85 the annual harvest has averaged one whale, with an average of one additional whale struck and lost each year.

BIRDS

One hundred eight species of birds have been recorded on the Arctic Refuge coastal plain (Garner and Reynolds, 1986a, b). The majority are migratory, present only from May to September. Six species are considered permanent residents--rock and willow ptarmigan, snowy owl, common raven, gyrfalcon, and American dipper. The common and hoary redpoll, ivory gull, and Ross' gull occasionally winter on the 1002 area. Twenty-one species occur offshore, mostly from late July to mid-September, with distribution generally limited to within 35 miles of shore. Sixteen offshore species breed locally on coastal tundra or barrier islands (Bartels, 1973). Greatest concentrations of summer resident waterbirds on the Arctic Refuge occur in two general habitats: shallow coastal waters and tundra wetlands (pl. 3A).

Birds begin using coastal lagoons when the snow melts in early June. During this period, river overflows cover lagoon deltas and provide the first open water of the season. Habitat use during the breeding season (mainly June and July) varies with bird species. Peak numbers of birds are often seen in August and September during staging and early migration. Smaller numbers are present until freezeup in late September or early October.

Lagoon areas are relatively high in productivity, and are important during all phases of the avian life cycle. More than 35,000 waterbirds of 20-25 species (primarily oldsquaw) may use the coastal lagoons during the open-water period (July-September). As many as 11,000 birds may be present in a lagoon at one time. Some birds move from terrestrial nesting habitats into shallow lagoons, bays, and sand spits to molt and for protection from predation during this flightless stage. The lagoon systems are also important feeding areas used by oldsquaw, eiders, scoters, and other ducks, loons, phalaropes, terns, gulls, jaegers, and black guillemots (Divoky, 1978).

Migratory birds are international in range; nesting and wintering grounds and migration routes may occur not only in different countries but on different continents. International treaties for the protection of migratory birds have been ratified between the United States and the Union of Soviet Socialist Republics, Japan, Canada, and Mexico. In addition, measures for the protection of migratory birds are contained in the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, an agreement to which the United States is a party.

Species-specific information follows, under five bird categories: swans, geese, and ducks; seabirds and shorebirds; raptors; ptarmigan; and passerines.

SWANS, GEESE, AND DUCKS

Tundra swans are common breeding birds of the thaw-lake plains. Up to 150 nests and 400 to 500 adult swans have been counted on the 1002 area during annual surveys (Brackney and others, 1985a). Swans arrive in late May and early June and concentrate on the Canning-Tamayariak delta, the Hulahula-Okpilak delta, Barter Island lakes, Jago River wetlands, the Aichilik-Egaksrak deltas, and Demarcation Bay area lakes (pl. 3A). Spring surveys from 1982 to 1985 showed average densities of 1 swan per 0.67 square mile in concentration areas. These areas apparently offer highly desirable swan nesting and feeding habitat. Average density for the overall 2,960-square-mile area studied was 1 swan per 7.7 square miles. Swans depart the breeding grounds from late August to late September, those swans with young being last to leave (U.S. Fish and

reported include arctic char, arctic grayling, arctic cisco, arctic flounder, fourhorn sculpin, least cisco, round whitefish, broad whitefish, ninespine stickleback, chum salmon, and burbot. Lake trout are also found in several lakes within the Canning River drainage but outside the 1002 area. Other 1002 area streams (pl. 1B) that support fish populations are listed below.

Streams that support fish populations
(excluding Canning River)

A: Arctic grayling.
B: Resident arctic char
C: Anadromous arctic char
D: Pink salmon

	A	B	C	D
Tamayariak River	X			
Itkilyariak Creek	X	X		
Sadlerochit River	X	X		X
Hulahula River	X		X	
Akutoktak River	X			
Okpilak River	X			
Aichilik River	X		X	

These and many other smaller streams and coastal lakes have populations of ninespine sticklebacks. The other major streams in the 1002 area (Kalakturuk River, Marsh Creek, Carter Creek, Jago River and tributaries, Niguanak River, Sikrelurak River, Angun River, and Kogotpak River) apparently do not support major fish populations. They may support fish locally and serve as summer feeding areas for a few fish but seemingly lack adequate overwintering habitat.

The drainages that originate in or transect the 1002 area range from small intermittent flow tundra streams to the Canning River which has an estimated 50-year flood discharge of 13,500 cfs (Childers and others, 1977). The integrity of riparian areas is important for maintenance of water quality and fish stocks on the coastal plain. Most of the water present is a result of precipitation, surface permafrost-thaw processes, deep-lake drain, or springs. Peak flows are associated with snowmelt in early summer or with rainfall during late summer and fall. By late October, most rivers in the 1002 area have no measurable flow. As riffle areas freeze to the bottom, overwintering fish become isolated in deeper pools, spring areas, or brackish river deltas. Substantial movement from summer feeding areas to small overwintering areas has been recorded (West and Wiswar, 1985). Ice accumulation on Arctic rivers is thickest from late March through early May.

Available fish overwintering habitat, such as deeper pools, is greatly reduced in early spring. Although pool depth is important, several other factors affect suitability for overwintering. These factors, which ultimately affect dissolved oxygen concentration, include density of organisms in the pool area, species' physiological tolerances, volume of the pool, temperature, amount of organic matter, and the influence of springs. Overwintering habitat is probably the greatest limiting factor for Arctic anadromous and fresh water fish populations (pl. 1B).

Springs supply most, if not all, of the free flowing water in the 1002 area during late winter. The importance of springs for spawning, rearing, and overwintering arctic fish populations has been well documented in the Arctic Refuge and other Arctic areas. Macro invertebrates (aquatic insects consumed by fish) are generally much more abundant and diverse in springs and spring-fed sections of stream channels than in other Arctic Refuge stream habitats (Glesne and Deschermeier, 1984).

Lakes are uncommon in the 1002 area. The few that exist are generally thaw lakes located along the coast. Lakes less than 6 or 7 feet deep generally lack fish over wintering capabilities: they either freeze to the bottom by late winter or have poor water quality because of freeze concentrations of dissolved solids and low dissolved oxygen levels. Lakes near the coast may be brackish, owing to saltwater intrusion or windblown ocean spray. In contrast to the more inland lakes, some shallow coastal lakes may be important summer feeding areas for anadromous and marine fish, depending on access.

Coastal lakes near the Canning River delta, sampled during summer, have contained arctic char, arctic grayling, arctic flounder, round whitefish, and broad whitefish (Ward and Craig, 1974). In deeper mountain and foothill lakes to the south of the 1002 area, arctic char, arctic grayling, and/or lake trout may be found. The best known and most widely used for recreation and subsistence are Lake Peters and Lake Schrader, in the headwaters of the Sadlerochit River. These lakes contain all three of the aforementioned fish species.

Most Native subsistence use of fish occurs along the coast. Arctic char and arctic cisco are the primary species caught during summer when they are present in large numbers in the Arctic Refuge lagoon systems. The arctic cisco is an international resource believed to originate in the Mackenzie River in Canada. Some subsistence use of arctic cod occurs in winter in apparent response to its increased abundance during that time. Arctic cod (Lowry and others, 1978) also constitutes more than 95 percent of the diet of ringed seals which in turn are the major prey of the area's polar bears. Some winter subsistence fishing also occurs at fresh-water overwintering sites. The most notable of these are "Fish Hole One" and "Fish Hole Two" on the Hulahula River (pl. 1B) where arctic char and arctic grayling are caught from holes in the river ice.

Sport fishing is currently minimal in the 1002 area because of difficulty in access and seasonal limitations on fish abundance.

school with four classrooms, library, gymnasium, swimming pool, and kitchen. A vocational education building was completed in 1981. Junior and senior high school enrollment for the 1984-85 school year was 36.

Kaktovik has a health clinic staffed by a health aide. Two NSB Department of Public Safety Officers are located at Kaktovik. Federal facilities include the Post Office, the Arctic Refuge field office, and the Bar Main DEW site.

ARCHEOLOGY

Approximately 100 archeological sites are known to occur within the 1002 area (pl. 1A). Dated sites appear to be comparatively recent and of either Historic Inupiat (approximately AD 1838-present) or Western Thule (about AD 900-1838) origin. Several smaller sites--mostly scatters of lithic debris from the manufacture, maintenance, and use of stone tools--are not yet datable but may be considerably older.

Sites near the 1002 area are known to be as much as 6,000 years old (U.S. Fish and Wildlife Service, 1982). A fairly widely accepted date from the Old Crow area of the Yukon Territory (about 150 miles southeast of the 1002 area) indicates that people have been present in the general area for the last 27,000 years. Even though sites of such an early period are few, sites 5,000-6,000 years old may occur on the 1002 area, but are yet to be discovered.

In the 1002 area, archeological sites may occur almost anywhere. However, some areas are much more likely to have sites, especially coastal areas and offshore barrier islands. Most identified sites consist of the remains of sod houses, log cabins, burials, caches, lookout towers and related features. Older sites may have become buried under considerable sediment.

Archeological sites are also likely along rivers and streams that cross the 1002 area from the Philip Smith Mountains. These rivers could have provided fishing areas and would have been natural travel routes between the coast and the foothills. Sites known from the river courses are chiefly tent rings, although there are two interior sites with sod houses. Points of particular interest are high, well-drained banks, especially near stream confluences.

Undiscovered sites may also be on high points of land that provide overlooks above the surrounding moist tundra; such spots are known to produce archeological sites throughout most of northern Alaska and Canada. There are relatively few such locations on the 1002 area, and sites identified in such locations are uniformly small scatters of lithic material.

Archeological sites are even less likely on the relatively stable sandy areas in river deltas. As with the overlook sites, material from blowouts in such deltas is currently limited to lithic remains.

The remainder of the 1002 area consists largely of flat to gently rolling tundra, now very wet. Such areas are least likely to contain sites, or to contain sites that are susceptible to discovery.

RECREATION

Recreational use of the Arctic Refuge is varied and is related to wildlife or wilderness values. Types and amount of recreation are limited by the refuge's remoteness, harsh climate, and poor access. Fewer than 3,000 visits occur annually. Wet and moist ground conditions in the short summer season make surface travel difficult, and extended periods of cold and darkness during the winter reduce recreational uses at that time. Access to the refuge is almost exclusively by aircraft and is costly. Recreational use of the 1002 area is slowly increasing as it becomes better known and scheduled airline services to Barter Island improve.

The most common forms of recreation on the 1002 area are hunting, backpacking, and float trips on some of the larger rivers such as the Canning, Hulahula, and Aichilik. Other recreational pursuits are wildlife observation, photography, sightseeing, cross-country skiing, fishing, and nature study. Most recreationists involve themselves in a variety of these activities. Kaktovik residents also engage in snowmobiling.

In 1984, 13 hunting guides operated on the refuge, though none guided on the 1002 area. An additional 10 recreational guides conducted group float or backpack trips on the refuge. Four of these operated, at least in part, on the 1002 area. Float-trip groups average 6-12 people. Figures on nonguided recreationists are unavailable. But probably fewer than 100 unguided visits occur annually on the ground in the 1002 area. Several hundred visitors fly over the 1002 area annually for sightseeing or en route to other locations on the Arctic Refuge.

WILDERNESS AND ESTHETICS

The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America. Approximately 8 million acres of the refuge is designated as wilderness by ANILCA section 702(3), and adjoin the 1002 area on the south and east. The eastern coastal plain, from the eastern 1002 area boundary to the Canadian border is designated wilderness.

Wilderness is described by the Wilderness Act of 1964 (Public Law 88-557) as ". . . an area of undeveloped Federal lands retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and

Table VI-1.--Definitions of environmental effects

[Long-term, 20 years or more. Short-term, less than 20 years]

Effect level	Definition
	Physical resources
Major	Widespread modification of considerable severity in landforms, surface appearance, or distribution of physical resources, or contamination of those resources, lasting several tens of years. Modifications could occur during development/production phase.
Moderate	Local modification of considerable severity in landform, or surface appearance, or contamination of physical resources, lasting several tens of years; or widespread modification of lesser severity in surface appearance or other characteristics of physical resources, lasting from a few years to several tens of years. Modifications could occur during the exploration phase.
Minor	Localized, relatively isolated change lasting from less than 1 year to no more than 10 years, with no observable residual modification in surface appearance, distribution, or other characteristics of physical resources.
Negligible	Little or no change in the surface appearance, distribution or other characteristics of physical resources.
	Biological resources
Major	Widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of species using the 1002 area. Modification will persist at least as long as modifying influences exist.
Moderate	Widespread, short-term change in habitat availability or quality which would likely modify natural abundance or distribution of species using the 1002 area; or local modification in habitat availability or quality which would likely modify natural abundance or distribution at least as long as modifying influences exist.
Minor	Short-term, local change of species abundance, distribution, habitat availability, or habitat quality.
Negligible	Little or no change in population, habitat availability, or habitat quality.
	Socioeconomic resources
Major	Requires substantial changes in governmental policies, planning, or budgeting, or is likely to affect the economic or social well-being of residents of the area.
Moderate	Requires some modification of governmental policies, planning, or budgeting, or may affect the economic or social well-being of residents of the area.
Minor	Requires marginal change in governmental policies, planning, or budgeting, or may marginally affect the economic or social well-being of residents of the area.
Negligible	Not sufficient to have any measurable effect on governmental policies, planning or budgeting, or any measurable effect on the economic or social well-being of residents of the area.

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Table VI-3.--Resource categories and mitigation goals

[FWS Mitigation Policy: FR, v. 46, no. 15, January 23, 1981. Habitat value: a measure of the suitability of an area to support a given evaluation species]

Resource category	Designation criteria of habitat to be affected	Mitigation planning goal
1	Habitat of high value for evaluation species. Unique and irreplaceable on a national basis or in the ecoregion.	No loss of existing habitat value
2	Habitat of high value for evaluation species. Relatively scarce or becoming scarce on a national basis or in the ecoregion.	No net loss of in-kind habitat value.
3	Habitat of high to medium value for evaluation species. Relatively abundant on a national basis.	Minimize loss of in-kind habitat value. No net loss of value.
4	Habitat of medium to low value for evaluation species.	Minimize loss of habitat value

consequent determination of mitigation goals is based upon the habitat values assigned to specified evaluation species. This habitat value is a measure of the suitability of the area to support a given evaluation species.

The mitigation policy recommends that legally designated or set-aside areas, such as National Wildlife Refuges, be given special consideration as either Resource Category 1 or 2. As described in Chapter II, high-value habitat for each of the five evaluation species exists within the 1002 area. The Porcupine caribou herd (PCH) core calving area is considered unique and irreplaceable. Habitat in this area has been designated Resource Category 1 (pl. 2A) because of its high fish and wildlife values, particularly for PCH caribou. The remainder of the 1002 area has been designated Resource Category 2.

The FWS normally recommends that all losses of Resource Category 1 habitat be prevented, as these one-of-a-kind areas cannot be replaced. Insignificant changes that do not result in adverse impacts on habitat value may be acceptable, provided they will have no significant cumulative impact.

Assumptions

Assumptions used in the physical, biological, and socioeconomic assessments include:

1. The Secretary of the Interior, through the FWS, would retain authority to issue refuge special-use permits for activities in the 1002 area, and to provide site-specific stipulations for all necessary authorizations.

2. Planning, design, construction, operation and maintenance, and rehabilitation would be accomplished using the most current available technology and practices. It is assumed that the 32 mitigation measures summarized at the end of this chapter, or measures as least as effective, will be included in development, construction, and operation plans, and will be implemented.

3. Any authorized operations and related activities would comply with all applicable Federal and State laws and regulations, as well as with any special laws and regulations the Congress or the Secretary of the Interior promulgate to govern activities on the 1002 area.

4. The environmental protection standards governing the seismic exploration program on the 1002 area (50 CFR 37.31-33) and the land-use stipulations for exploration drilling on the KIC/ASRC lands (August 9, 1983, agreement between ASRC and the United States) would continue to be in effect for oil and gas activities in the 1002 area. This would include special protections for terrestrial and aquatic environments and cultural resources, and designation of special areas such as Sadlerochit Spring. These regulations and stipulations may duplicate some of the mitigation measures recommended in this analysis, but also include specific references to the handling and disposal of garbage, combustible and noncombustible solid wastes, used equipment, sewage and gray water, fuel and hazardous or toxic materials, and provision for hazardous substances control and contingency plans.

ALTERNATIVE A--FULL LEASING

Effects on Physical Geography and Processes

Potential and probable impacts to the physical environment of oil development resulting from a full leasing program on the 1002 area are considered in four phases, each having progressively greater impact: geological and geophysical (principally seismic) exploration; exploratory drilling; development drilling; and construction of all-season

what methods, without seriously affecting fish, wildlife, and habitat that rely on the spring. However, the existing "no surface occupancy" restriction for oil exploration and development is assumed to remain in effect. This precludes surface development and disturbance, maintaining the area's physical features and important fish, wildlife, and subsistence resource values.

Conclusion

Development as a result of fully leasing the 1002 area would have negligible effects on the Sadlerochit Spring Special Area under current protective management regulations.

COASTAL AND MARINE ENVIRONMENT

Petroleum development and production in the 1002 area and associated transportation at both onshore and offshore sites would have a variety of effects. Docks and causeways can affect dispersion, nutrient transfer, temperatures, salinities, invertebrate abundance and diversity, fish passage, and other uses of those areas by fish and wildlife. Disruption of natural nearshore currents can result in sea water intrusions into lagoons causing lower water temperatures and higher salinities. Salinity and temperature changes could alter invertebrate abundance; decreases in invertebrates would mean lower coastal area values to fish and wildlife. Such intrusions may also alter fish movements by reducing existing favorable habitat conditions in nearshore zones.

Noise created by construction and other operations in coastal areas could be a disturbance factor, sufficiently reducing the quality of the coastal and marine habitats to cause avoidance by some marine birds and mammals.

Debris washing ashore from transport and offshore activities could increase with increased human activities in the area. The driftline is used for nesting habitat by several species of waterfowl and seabirds (pl. 3A, B, C). Disruption and physical alteration of the driftline from activities associated with oil development could affect bird nesting success by disturbing nesting birds or altering their nests. Debris and disruption of driftlines would also affect esthetics. Occasional fish and wildlife mortalities could occur where animals become entangled in or ingest debris.

Any spill of oil or other hazardous materials along the coast could severely affect coastal and marine habitats and fish and wildlife. For example, decreased invertebrates result in decreased food for fish and wildlife. Sea ducks, such as oldsquaw which heavily use this coastal area, could be displaced, and direct mortality could occur. Level of impact would relate to the volume of oil spilled, location, effectiveness of cleanup, time of year, and fish and wildlife species present.

Mitigation

Experience gained from construction and operation of docks and causeways for Prudhoe Bay should be used to plan and construct docks and causeways for the 1002 area so that those facilities do not affect longshore water transport and lagoon water chemistry or impede fish movements. Release of fuels and other hazardous substances to the environment should be minimized by developing and implementing control, use, and disposal plans for such substances.

Conclusion

Overall, the effect of full leasing is anticipated to be minor on coastal and marine habitats. However, there is a small probability of major adverse effects depending on the extent and duration of future cumulative developments or in the event of a catastrophic offshore or coastal oil spill.

TERRESTRIAL MAMMALS

CARIBOU

Caribou use the 1002 area during the summer months for two important activities, calving and seeking relief from insect harassment. During that period, 3,000-4,000 caribou from the 12,000-14,000 member CAH use the 1002 area. Up to 82 percent of the calving caribou in the PCH calved on the 1002 area in recent years (1972-85) and the entire 180,000-member PCH may use the area in some years, mainly during the late June/early July insect-relief period. Concentrations of caribou are generally absent from the 1002 area in winter, except for as many as 1,000 animals (7 percent) of the CAH scattered between the Sadlerochit Mountains and Camden Bay.

Exploration

Winter seismic programs in 1984 and 1985 on the 1002 area, and exploratory drilling on adjacent Kaktovik Inupiat Corporation (KIC)/Arctic Slope Regional Corporation (ASRC) lands in the winters of 1985 and 1986, resulted in no apparent conflict with CAH or PCH activities. Similar results were found during both seismic and exploratory drilling work in the NPRA and on State lands within the range of the CAH (U.S. Bureau of Land Management, 1983; Fancy, 1983). Winter oil exploration, including exploratory drilling, would likely have a negligible effect on PCH caribou since they are generally absent from the area. Disturbance, resulting in displacement, could occur to the CAH. Disturbance and displacement to both the CAH and PCH from the short-term, scattered and local activities of summer surface geology programs would be almost negligible.

Production, Transportation, and Development

Effects on caribou from petroleum field development, production, and transportation would occur from direct habitat modification, indirect habitat loss (displacement, barriers to movement which reduce access to insect relief and other habitats, and disturbance/harassment), and direct mortality (e.g., hunting, collisions with vehicles, or other accidents). Analogies comparing the effects of current oil development on the CAH and effects of potential 1002 area development on the PCH must be drawn with caution. Movements, density, and traditions of the PCH differ from those of the CAH (Chapter II). Because of the greater density of PCH on their calving grounds, the PCH would interact with oil development much more extensively and intensively than the CAH has interacted with oil development in the Prudhoe Bay area.

Caribou calving in the Prudhoe Bay area was reported by Gavin (1971), Child (1973), and White and others (1975), when development of the Prudhoe Bay oil field was beginning. Later studies (Cameron and Whitten, 1979, 1980; Cameron and others, 1981; Whitten and Cameron, 1985) indicate an absence of calving near the coast at Prudhoe Bay during 1976-85, possibly due to avoidance of the activity area by calving caribou. Two centers of concentrated calving activity were identified: (1) west of Prudhoe Bay in the vicinity of the Kuparuk and Ugnuravik Rivers (including recent oil development in the Milne Point and Kuparuk areas); (2) east of Prudhoe Bay, primarily in the Bullen Point to Canning River delta area (Shideler, 1986). Surveys in 1981 indicate that the Canning River delta area may support more calving caribou than the Kuparuk area (Whitten and Cameron, 1985). Table VI-4 compares calving in the Prudhoe Bay area and population of the CAH with development of the Prudhoe Bay oil field. The apparent herd increase has been attributed to high calf production and survival as well as relatively light hunting pressure (Whitten and Cameron, 1983).

Even more tenuous are parallels between caribou activities and population trends on NPRA with those which might result from oil development on the 1002 area. Although NPRA has been extensively explored, no oil production or infrastructure development has occurred.

Approximately 242,000 acres of the 1002 area used as a core calving area by the PCH has been determined Resource Category 1 habitat in accordance with the FWS mitigation policy. More than 50 caribou/sq mi have been present during calving in at least 5 of 14 years (1972-85) for which detailed data exist (pl. 2A); nearly 80 percent of the total core calving area for the 180,000 member PCH occurs in this portion of the 1002 area (table VI-5). The remaining approximately 1,304,000 acres, considered Resource Category 2 habitat, includes areas used year-round by up to 4,000 CAH caribou and for concentrated and scattered calving, postcalving aggregations, and insect-relief habitat by the PCH.

If the 1002 area's anticipated oil and gas resources were developed across the entire area, direct modification of caribou habitat could total approximately 5,650 acres. East of the Sadlerochit River about 3,650 acres used by the PCH, of which about 1,300 acres are Resource Category 1 habitat, would be affected. West of the Sadlerochit River some 2,000 acres, predominantly used by the CAH, would be affected. Slightly more than 0.3 percent of all Resource Category 2 habitat would be directly modified. Most of the reduction in habitat value would result from covering feeding and calving habitat with gravel.

Because insects are easily blown off somewhat elevated, unvegetated areas by wind, some positive effect might occur in the form of increased insect-relief habitat (Curatolo and others, 1982; Ellson and others, 1986). However, it is generally during the oestrid fly (nose bot and warble flies) harassment period from late July to early

Table VI-4.--Central Arctic caribou herd population calving in Prudhoe Bay area, and Prudhoe Bay development activities, 1969-85

[Information from Shideler (1986); some variation exists in calving areas surveyed. Long-term investigations of the CAH begun in 1974 by ADF&G. N.A., not available]

Year	Total CAH population	Number cows and calves	Development activities
1969-70	(1)	(1)	Oil discovered.
1972	N.A.	13	Deadhorse airport, road system, several drill pads developed.
1973	N.A.	42	
1974	N.A.	51	Construction of TAPS; rapid area growth in roads, facilities, and drill pads.
1976	N.A.	(2)	Oil production begins.
1978	6,000	(3)	Drill sites and road connecting Kuparuk with Prudhoe Bay developed.
1981	9,000	N.A.	Kuparuk pipeline connecting to TAPS completed.
1983	N.A.	0	Expansion of Kuparuk oil field.
1985	12,000-14,000	N.A.	Pipeline to Milne Point constructed.

[1]Reports of area used for calving by the 3,000 or so caribou residing in Prudhoe Bay area, early 1970's

[2]A handful.

[3]About 10.

Table VI-5.--Porcupine caribou herd calving area potentially affected by development under full leasing or limited leasing, assuming an approximately 2-mile sphere of influence

	Concentrated calving area[1]	Core calving area[2]
Total calving area within 1002 area (acres)	934,000	242,000
Area (acres) potentially influenced by development:		
Full leasing	357,000	78,000
Limited leasing	261,000	10,000
Percent of 1002 calving area potentially influenced by development:		
Full leasing	38	32
Limited leasing	28	4
Total calving area (acres) in U.S. and Canada	2,117,000	311,000
Percent of total U.S. and Canada area potentially influenced by development:		
Full leasing	17	25
Limited leasing	12	3

[1]At least 50 caribou/square mile during calving, in 1-4 years, 1972-85.
[2]At least 50 caribou/square mile during calving for at least 5 years, 1972-85.

August that caribou seek relief on unvegetated gravel roads, well pads, or the shade of pipelines and buildings on those pads (Curatolo, 1983; Fancy, 1983). Insect harassment of PCH on the 1002 area generally results from swarms of mosquitoes early in the summer season. The PCH usually leaves the 1002 area prior to the emergence of oestrid flies.

Secondary modification of habitat due to changes in surface water flow, snow accumulation, roadside dust deposition, gravel spray from vehicle movements, and pollution incidents would reduce the habitat value of additional acreage. These changes in vegetation, and thus food availability, could occur on approximately 7,000 acres, of which nearly 1,800 acres is in Resource Category 1 (1 percent). Total modification of caribou habitat attributable to direct and secondary changes would occur on about 12,650 acres, or 0.8 percent of the 1002 area, and 1.3 percent of the core calving area (Resource Category 1 habitat).

Major indirect losses of habitat and additional reductions in habitat value would be widespread throughout the 1002 area. The habitat value losses from these indirect effects would result from behavioral avoidance of development areas; decreased accessibility to undeveloped areas (insect-relief habitats along the coast) due to physical barriers and disturbances such as pipelines, traffic, or facilities; and other disturbances or harassment by oil development activities and personnel during sensitive caribou life stages.

Disturbance to caribou is unavoidable if oil development occurs on the 1002 area. Historically the entire area has been used by PCH caribou at varying levels of intensity. Disturbance can result from a variety of sources including presence of pipelines and roads, aircraft operations, general construction, routine operation of the oil field, presence of people, and hunting. Reactions depend upon several factors, including caribou age and sex, herd size, presence of calves, season, and type and distance of the disturbance.

Behavioral avoidance of development areas displaces caribou from preferred habitats of traditional use. It is generally believed to result from human activity (noise, vehicle movements, presence of people, and odors), instead of the mere presence of roads, pipelines, and buildings. Avoidance of oil development and other human activity by caribou has been reported by numerous investigators (Dau and Cameron, 1985; Cameron and others, 1979; Whitten and Cameron, 1983; Fancy and others, 1981; Urquhart, 1973; Wright and Fancy, 1980). The reported extent of displacement varies. Displacement of the CAH from historic calving grounds in response to oil development at Prudhoe Bay has been documented (Dau and Cameron, 1985; Cameron and Whitten, 1979). Whitten and Cameron (1985) found consistently low numbers of caribou and generally low percentages of calves in the Prudhoe Bay oil field from their annual surveys of the CAH calving grounds, 1978-82, with caribou being displaced to adjacent areas already used for calving. Mean densities of caribou in five other regions of the calving grounds were 2 to 18 times higher than at Prudhoe Bay. Dau and Cameron (1985), in what may be the most systematic study of caribou displacement by oil development, reported that maternal caribou groups showed measurable declines in habitat use within approximately 2 miles on either side of the Milne Point road in the central Alaskan arctic.

Caribou select calving areas because of favorable weather causing early snowmelt, advanced emergence of new vegetation, relative absence of predators, proximity to insect-relief habitat, absence of disturbance, or some combination of these and other factors. Maternal cows and their calves are most sensitive to disturbance during calving and immediately thereafter (Calef and others, 1976; Miller and Gunn, 1979; Elison and others, 1986).

Displacement of the PCH from a core calving area to a less desirable area would be expected to reduce caribou productivity. Loss of important habitat has been shown to directly impact ungulate populations (Wolfe, 1978; Skovlin, 1982). But no recognizable, long-term effect upon the CAH as a result of displacement by oil development in the central Alaskan Arctic has been demonstrated to date. In considering the effects of displacement of the CAH from traditional calving grounds, Whitten and Cameron (1985) contend that the CAH has not experienced a reduction in productivity or consequent population decline because: (1) the CAH has been displaced from only part of its calving grounds; (2) suitable alternative high-quality habitat appears available for caribou displaced from Prudhoe Bay; and (3) overall density of CAH caribou on their calving grounds is much lower than that of other arctic herds in Alaska. Although the CAH and PCH calving grounds are roughly equal in size and the Western Arctic herd calving ground is about 50 percent larger, the population of the PCH is about 15 times larger and that of the Western Arctic herd is about 18 times larger than the CAH (based on 1982 population estimates).

Both absolute (number of caribou, including calves, on the calving grounds divided by area of calving grounds) and effective (allowing for the length of time a herd uses its calving grounds each year) densities of the CAH are a fraction of PCH and Western Arctic herd calving ground densities. As described by Whitten and Cameron (1985), absolute density for the PCH is nearly 14 times, and for the Western Arctic herd nearly 15 times greater than for the CAH. The difference in effective densities is even greater, particularly for the PCH, which are found at approximately 24 caribou per square kilometer as compared with approximately 5 caribou per square kilometer for the CAH. Effective density of the Western Arctic herd is 15 caribou per square kilometer.

With the CAH calving density remaining low compared to other herds, despite a recent population increase, overcrowding and consequent habitat stress that might result in reduced productivity have not yet occurred, nor have caribou been displaced to areas of reduced habitat value or areas where they might be exposed to increased predation. Unlike the Western Arctic or Porcupine caribou herds, the CAH has been exposed to minimal predation in recent years. With the influx of workers and use of the haul road for Prudhoe Bay development, the wolf population in the Central Arctic area decreased in the mid-1970's because of hunting. At that time CAH numbers began increasing. The wolf population has remained low and brown bears, which also prey on caribou, are only moderately abundant in the area.

The lack of observable adverse effects from displacement exhibited by the CAH would be unlikely for the PCH. The PCH is much more crowded in its calving habitats, and a substantially greater proportion of important calving habitats would be involved with development that included their core calving area. Furthermore, predators are more abundant adjacent to their core and concentrated calving areas. For example, preliminary analysis of radio-relocation data indicate that brown bears shift habitat use patterns to coastal areas in June and early July (pl. 1D) to coincide with occupancy of those habitats by calving and postcalving caribou (Garner and others, 1985).

Biologists participating in the FWS workshop all agreed that displacement from areas of human activity related to oil and gas activities would occur (Elison and others, 1986).

Plates 2A and 2B show the substantial overlap of potential oil development facilities with PCH calving areas and smaller overlap of such areas with CAH calving areas. Calving caribou of the PCH and those CAH caribou using the 1002 area are the most sensitive segment of those herds. They would annually encounter oil development during one of the most, if not the most critical time in their yearly cycle. Based upon the work of Dau and Cameron (1985), caribou are displaced approximately 2 miles out from development. This is most applicable during calving and immediately postcalving, which coincides with the greatest caribou use of the 1002 area. Within this approximately 2-mile area of influence are about 357,000 acres (38 percent) of the total concentrated calving grounds in the 1002 area.

For this analysis, core calving areas for the PCH are defined as concentrated calving areas used by at least 50 caribou/sq mi in 5 or more of the last 14 years (Chapter II and pl. 2A). Development in these areas is of particular concern. Seventy-eight percent of the PCH's core calving areas is within the 1002 area and is designated as Resource Category 1 habitat. An approximately 2-mile displacement of caribou out from petroleum facilities would include loss of 32 percent of the most critical PCH core calving areas (table VI-5). The mitigation goal for Resource Category 1 habitat is no loss of existing habitat value. The projected displacement from preferred calving habitat would represent a complete loss of habitat values. Measuring the probable population decline from complete loss of habitat values in calving areas is impossible and the ultimate effects of displacement are unknown.

Barriers to caribou movements are another source of indirect habitat loss. Roads without activity generally present little problem to free movement of caribou. Depending upon design pipelines may create a barrier; those adjacent to or close to active roadways would probably most impede free movement (Elison and others, 1986). Several investigators have described where passage

of caribou through oil or other development areas has been inhibited because of linear oil-development facilities and associated activities (Curatolo and others, 1982; Smith and Cameron, 1985a, b; Klein, 1980). This is of particular concern in the 1002 area because the probable pipeline/haul road route would bisect the area.

Barriers to caribou movements could result in decreased calving success by reducing access to preferred calving areas, compounding the displacement from calving areas which could result from disturbance as discussed previously. A greater concern, relative to the location of potential barriers under the full leasing scenario, would be inhibiting movements for the large postcalving aggregations which annually occur on the 1002 area as they move between inland feeding areas and coastal insect-relief habitats. In years when ice breakup is late and more of the PCH calving occurs east and southeast of the 1002 area, there is a strong westward movement following calving. Virtually the entire PCH gathers on the 1002 area for foraging and insect relief, with large portions of the herd tending to remain on the 1002 area later into July and August during the years of late breakup (Roseneau and Stern, 1974; U.S. Fish and Wildlife Service, 1982; U.S. Fish and Wildlife Service, unpublished data). The insect season is a period of extreme natural harassment and one of the primary driving forces in the annual caribou cycle. This harassment follows closely behind the critical calving period. Insect harassment can have a pronounced negative effect on caribou survival. Helle and Tarvainen (1984) reported that insect harassment reduced growth in reindeer calves in Finland and contributed heavily to increased mortality the following winter. Insect harassment also affected the body size at maturity. Insect harassment and the avoidance actions of caribou put considerable energy stress on caribou (Reimers, 1980; White, 1983). Davis and Valkenburg (1979) reported several dead and sick calves in the Western Arctic caribou herd, all with heavy infestations of nose bot larvae. Reduced access to insect-relief habitat would result in greater energy stress with possibly reduced survival.

Numerous investigators have reported on the varying successes of caribou in crossing roads and pipelines associated with Prudhoe Bay facilities (Fancy, 1982, 1983; Curatolo, 1984; Curatolo and Murphy, 1983; Smith and Cameron, 1985a, b). Crossing success depends on several factors including traffic and human activity levels, pipeline design, season, and type and amount of insect harassment. Caribou crossing success is generally greatest at buried pipelines and then decreases for roads without traffic, to elevated (at least 5 feet above ground) pipelines adjacent to roads without traffic, to pipelines adjacent to roads with traffic. Large mosquito-harassed groups do not readily cross beneath elevated pipelines (Curatolo and Murphy, 1983; Smith and Cameron, 1985b); deflections of up to 20 miles during which caribou trotted or ran have been observed in the central Alaskan Arctic. During the oestrid fly season, caribou crossing success was markedly increased. In summarizing their 1981-83 studies of caribou crossings at roads and pipelines in the Prudhoe Bay and Kuparuk oil fields, Curatolo and Murphy (in press) attributed the lower crossing frequencies at pipeline/road sites to the combined stimulus of vehicular traffic and a pipeline.

After evaluating caribou responses to pipelines, roads, and pipeline/road complexes in the Kuparuk oil field, Curatolo and Murphy (1983) suggested that caribou movements could be facilitated by separating pipelines from heavily traveled roads and constructing ramps at strategic locations over elevated pipelines. Other researchers have concurred that roads should be separated from pipelines as a means of improving caribou passage through development areas (Curatolo and others, 1982; Robus and Curatolo, 1983; Ellson and others, 1986). The optimum separation between roads and pipelines depends upon terrain; preliminary information indicates that a separation of at least 400-800 feet improves caribou crossing success (Curatolo and Reges, 1986).

Where Curatolo and Murphy (1983) and Smith and Cameron (1985a, b) documented reduced crossing success in areas of oil-related development, it has been for caribou exposed to major oil and gas development for extended periods annually in the central Alaskan Arctic since the early 1970's. Because some habituation would presumably have occurred, animals in the CAH may be more likely to cross an oil-field development than the PCH which would encounter such developments for only 2 or 3 months each year.

Eighteen percent (294,000 acres) of the 1002 area, including KIC/ASRC lands, used for insect-relief and other purposes by the PCH lie north of the proposed pipeline/road corridor. Use of this area by the PCH could be affected by two possible factors. If caribou refuse to cross through any development areas, then 294,000 acres would be unavailable as habitat. That area encompasses 52 percent of total insect-relief habitats and over 80 percent of coastal insect-relief habitats. This would mean that all coastal insect-relief habitats within the 1002 area, except for a small area in the eastern portion, would become unavailable under full development. The second factor is to assume the approximately 2-mile sphere of influence for oil development used previously. Under that assumption, caribou crossing through the development area would avoid using approximately 72,000 acres or 29 percent of identified coastal insect-relief habitat within the 1002 area and KIC/ASRC lands (Pank and others, 1986). Failure to obtain relief from insect harassment from either factor could shorten foraging time, leading to poorer physical condition and subsequently to increased susceptibility to predation and reduced overwinter survival.

Notwithstanding the limited sample size and timeframe covered, the satellite telemetry work of Pank and others (1986) provides an indication of the extent to which 1002 area caribou could interact with facilities and infrastructure necessary for full leasing. Their preliminary analysis of the potential interaction between PCH and CAH caribou and the oil development scenario used in this report involved 10 caribou radio-collared on winter range in the Arctic Refuge, two from the CAH and eight from the PCH. An interaction was defined as whenever a caribou point location, or any segment of a line connecting two point locations calculated for the same caribou on adjacent days, was within approximately 2 miles of a road, pipeline, drill pad, airfield, or other development facility. Point locations for the five caribou from the PCH which entered the 1002 area in summer 1985 can be examined to indicate the extent of time caribou usually spend within the development area. Of the 232 point locations, 51 (22 percent of the time) were within approximately 2 miles of the infrastructure for full development. Moreover, 34 percent of caribou routes between locations on adjacent days were also within the approximately 2-mile area influenced by development. The two CAH caribou encountered the development scenario to a much greater extent than did the collared PCH caribou: 413 (32.7 percent) of 1264 point locations and 83 percent of routes were within the approximately 2-mile interaction area.

Effects of disturbance might also include injury by trampling during stampedes, particularly calves; energy stress, possibly critical during times of low energy reserves such as winter and postcalving; and inability to reach insect-relief habitat which also increases energy loss. Miller and Gunn (1979) and Northwest Territories Wildlife Service (1979) noted that major physiological responses to harassment may occur in the absence of visible behavioral changes.

Aircraft activities are another cause of disturbance; numerous instances involving caribou have been documented. For example, Calef and others (1976) reported that helicopters which hazed caribou from the rear caused the most severe panic reaction. Large herds of up to 60,000 animals could be herded by flying at altitudes of up to 2,000 feet above ground level (AGL). Calves were more sensitive than other age classes and caribou on calving grounds were most reactive.

Recommendations for aircraft restrictions differ. According to Calef and others (1976), flight elevations of 500 feet AGL would prevent most injurious caribou reactions and altitudes of 1,000 feet AGL would avoid mild escape responses. These investigators recommended that aircraft maintain altitudes of 1,000 feet AGL during caribou calving, caribou rut, and early winter. Davis and Valkenburg (1979) also noted an inverse relationship between the altitude of aircraft and severity of the caribou's reaction. They recommended altitudes of 2,000 feet AGL from May to August. The Peary caribou herd in Canada reacted similarly to helicopters (Miller and Gunn, 1979); altitudes of 2,000 feet AGL were recommended for May to November and 1,000 feet AGL at other times.

Davis and Valkenburg (1979) reported that caribou may respond more to people on the ground than to flying aircraft. They recommend that people and vehicles maintain a minimum distance of 3,000 feet from caribou during calving. Curatolo and others (1982), Miller and Gunn (1979), and Elison and others (1986) have all reported that traffic, people, or general activity is more disturbing to caribou than merely the presence of roads or structures. No agreement on effects, and sometimes even causes, of disturbance exists. For example, Bergerud and others (1984) have a dissenting, though widely disputed, view. For review of the effects of various human developments on the demographics of seven North American caribou herds and one wild Norwegian reindeer herd, they postulated that caribou can withstand periodic severe disturbance without adverse effects on productivity and survival. They discounted the effects of much of the disturbance associated with development activities, concluding instead that increased hunting along transportation corridors through several herd ranges was responsible for distributional changes.

One of the more significant effects on caribou as a result of better human access to their habitats has been increased harvest (Bergerud and others, 1984). Obviously, hunting directly reduces the number of caribou in a population. More important, it reinforces the negative stimulus in surviving animals to associate human activity and development with danger. This negative stimulus increases the intensity and duration of disturbance and displacement. It also reduces habituation which, over time, could otherwise offset some displacement. Habituation of caribou to structures and activity occurs more readily in unhunted than hunted populations (Klein, 1980).

Legal harvest outside developed areas would be expected to increase moderately as workers could conveniently travel to adjacent areas to hunt caribou in season. The State of Alaska as lead, in cooperation with the FWS, sets seasons and bag limits for the 1002 area. Closing the oil development area to hunters should reduce illegal take to a minor level. Still, law enforcement in such a remote area is often difficult. For example, notwithstanding the fact that a 5-mile corridor along either side of the Dalton Highway from the Yukon River north to Prudhoe Bay, the gravel TAPS haul road, has been closed to firearms since 1975, State Fish and Wildlife Protection Officers and Alaska Department of Fish and Game (ADF&G) biologists are discovering increasing numbers of people hunting illegally within the corridor and outside the corridor through illegal access using all-terrain vehicles. The ADF&G has been monitoring the kill; their biologists estimate that as many as 800 caribou were taken in Game Management Unit 26B (Central Arctic) during fall and winter 1985-1986. All but 82 came from along the approximately 200 miles of the haul road between Prudhoe Bay and Atigun Pass (K.R. Whitten, ADF&G, unpublished data). The majority of this harvest is illegal because hunters either lacked a road permit where necessary or illegally used all-terrain vehicles for access. While the prohibition on discharging firearms extends to all users, including subsistence users, subsistence take is not considered a significant factor in the total harvest because of the distance of subsistence users from this area. State protection officers have found it

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difficult to assign staff to such remote areas to enforce existing laws and regulations

Based upon experience with TAPS and Prudhoe Bay, mortality as a result of vehicle collisions, entanglement and other accidents should be minor (R.D. Cameron and K.R. Whitten, unpublished data).

Mitigation

The following measures would help avoid and minimize habitat value losses in the 1,304,000 acres of Resource Category 2 caribou habitat. Mitigation of the loss of caribou habitat in Resource Category 1 (242,000 acres of core calving area) is not possible.

For exploration activities, all environmental protection measures required during the previous 1002 coastal plain exploration program (50 CFR 37.31) and the drilling of an exploration well on KIC/ASRC lands (August 9, 1983, Agreement between Arctic Slope Regional Corporation and the United States of America, Appendix 2, Land Use Stipulations) will maintain most habitat values. Oil exploration, with the exception of surface geology studies, should be limited to the period of winter conditions, generally November 1 to May 1

For oil development, the success of various stipulations designed as mitigation will ultimately determine the degree to which oil development actually affects caribou using the 1002 area. Measures previously used with success for Arctic oil development as well as other measures which should further help to reduce negative effects on caribou include:

1. Bury all pipelines where possible (Cameron and Whitten, 1979; Elison and others, 1986). Because of permafrost, opportunities for pipeline burial will be few. Where burial is not feasible:

   A. Place ramps over structures in areas of natural crossings or where development tends to funnel caribou (Curatolo and Murphy, 1983; Robus and Curatolo, 1983; Elison and others, 1986).

   B. Elevate pipelines (the most common practice) to allow free passage of caribou in areas without ramps (Elison and others, 1986).

2. Reduce disturbance from vehicle activity by limiting use of development infrastructure to essential industry and agency personnel on official business (Elison and others, 1986).

3. Close the area within 5 miles of all development and associated infrastructure to hunting and trapping, as well as to discharge of firearms, so as to reduce disturbance to caribou and to protect people and equipment (Elison and others, 1986; Carruthers and others, 1984).

4. Site nonessential facilities outside calving areas and major movement zones (Cameron and Whitten, 1979; Elison and others, 1986).

5. Separate roads and pipelines as necessary in areas used for crossing to improve crossing success (Curatolo and Murphy, 1983; Curatolo and others, 1982; Robus and Curatolo, 1983; Elison and others, 1986; Curatolo and Reges, 1986).

6. Acquire authority to establish time and area closures or restrictions on surface activity to minimize disturbances during calving or in concentrated use areas (Cameron and Whitten, 1979; Curatolo and others, 1982; Robus and Curatolo, 1983).

7. Establish time and area closures and minimum altitude restrictions for aircraft operations of 1000 feet AGL (Aug. 16 through May 19) and 2000 feet AGL (May 20 through Aug. 15). Altitude and time restrictions may be modified after further study.

8. Monitor the effects of oil development on caribou.

9. Annually monitor herd size, productivity, movements, distribution, and general health. If greater or additional adverse effects are found to occur than those initially predicted, additional mitigation or protective management actions would be implemented upon the recommendation of the FWS, in conjunction with the State where effects extend beyond the boundaries of the 1002 area. Additional mitigation could include further seasonal area closures, surface or air traffic restrictions, phasing of field development, or state-of-the-art measures.

10. Protect insect-relief habitat and facilitate free movement and access for caribou by reducing surface occupancy in the zone from the coast to 3 miles inland (Elison and others, 1986). Occupancy would be restricted to marine facilities and infrastructure necessary to move inland beyond the restricted zone

11. Protect riparian and adjacent areas by placing permanent production facilities outside the areas within 3/4 mile of the high-water mark on both sides of identified watercourses (pl. 2A) and by limiting crossings of transportation facilities

Conclusion

Surface geologic exploration and study conducted throughout the year would be controlled by specific time and area closures to avoid conflicts with caribou calving and movements during the insect-relief period. Seismic activity would be confined to winter work only. Based upon experience from the 1983-1985 exploration program in the 1002 area, only negligible effects would occur. Localized avoidance and disturbance of a minor nature may occur in the area of exploration wells if caribou entered the area while well drilling activities were underway. Because human activity would be low, effects would most likely result from some avoidance and displacement around well pads

The expanding population trend for the CAH in the past decade would indicate that the CAH is not at carrying capacity (the number of healthy animals that can be maintained by habitat on a given unit of land). However, the point at which cumulative effects and expanding developments all modify suitable displacement habitat is unknown. Also unknown is carrying capacity of the PCH. Given the geography of the calving areas and current densities in those areas, the availability of suitable alternative habitats is not apparent.

A major change in distribution as an adverse result of displacement of both that portion of the CAH using the 1002 area as well as the entire PCH could occur if the 1002 area were fully developed. The main oil pipeline would bisect the 1002 area between the western and northeastern boundaries. Disturbance would occur from the presence and activities of up to 6,000 people, hundreds of vehicles, and major construction and production activities scattered throughout the 1002 area, including sensitive caribou calving areas. Use of approximately 25 percent of the total PCH core calving area and 29 percent of the coastal insect-relief habitat could be reduced or eliminated. Potentially a much larger portion, nearly 80 percent of coastal insect-relief habitat, could be affected if development proves to be a barrier to caribou movements. Loss of calving habitat, barriers to free movement causing reduced access to insect-relief and other areas, disturbance, stress, and other factors would cumulatively reduce both available habitat and habitat values on remaining areas, resulting in caribou population declines.

These changes in habitat availability and value, combined with increased harvest, could result in a major population decline and change in distribution of 20-40 percent, based on the amount of calving and insect-relief habitats to be adversely affected. Because of the many variables involved and lack of relevant experience in estimating impacts on this herd and because of the difficulty in quantifying impacts, this estimate is uncertain.

For the CAH, a moderate change in distribution or decline in that portion of the CAH using the 1002 area could occur. The effect on the entire CAH population throughout its range may also be moderate. Those effects on the segment of the CAH within the 1002 area would be similar to those on the PCH that occur from disturbance, displacement and barriers to free movement. The population decline or distribution change would be 5-10 percent for the CAH throughout its range.

MUSKOXEN

Recently reintroduced to the Arctic Refuge, muskoxen are rapidly expanding and pioneering new areas. From the 69 muskoxen introduced between 1969 and 1970 the population has grown to 476 in 1985. Carrying capacity has apparently not been reached.

Experience in the Arctic Refuge from winter seismic exploration in 1984 and 1985 and summer surface exploration in 1983, 1984, and 1985, indicates that these activities have only minor disturbance effects upon Arctic Refuge muskoxen. Harassment may result in a net energy drain if it occurs during the critical winter period, and can thereby reduce survival. Reynolds and LaPlant (1985) reported no long-term or widespread changes in distribution or use of traditional areas in response to disturbance by seismic exploration. In response to seismic activity, one herd did move 2.8 miles and another herd moved 1.9 miles within 24 hours. Jingfors and Lassen (1984) found that muskox disturbed by seismic vehicles either ran or gradually moved away. Other investigators (Carruthers, 1976; Russell, 1977) reported similar responses by muskoxen from winter seismic exploration in Canada.

Potentially economic prospects in blocks A, C, and D occur partially in year-round high-use areas, including calving areas (pl. 2C). Direct loss of muskoxen habitat from oil development could total approximately 2,700 acres.

Disturbance caused by routine oil field operation and associated infrastructure may exclude or reduce muskoxen use of preferred habitat. Muskox reaction to helicopters depends on sex and age of animals, group size, number of calves in a group, the position of the sun and wind direction relative to the disturbance, what the animals are doing at the time of disturbance, and terrain (Miller and Gunn, 1979). In their extensive study of the reaction to helicopter disturbance of muskoxen on Banks Islands, Northwest Territories, Canada, Miller and Gunn (1979) reported that: cows and calves and solitary bulls were the most responsive to disturbance; the reaction of muskoxen to disturbance was similar to their response to a predator; and the degree of reaction to disturbance was generally inversely related to the distance of the disturbing stimuli. The presence of people on the ground in association with helicopters that had landed increased the disturbance. Although muskoxen disturbed by helicopters usually moved less than 0.2 mile, Miller and Gunn (1979) recommended minimum altitudes of 2,000 feet AGL during May-November and 1,000 feet AGL during December-April.

Muskoxen may also be disturbed by seismic surveys. One herd was reported to have run at least 0.6 mile after being disturbed by seismic vehicles 1.9 miles away (Reynolds and LaPlant, 1985). Temporary displacement of up to 2 miles has been observed on both sides of seismic lines (Russell, 1977). While oil field development and operation would be much more intrusive and sustained than seismic exploration, the increased disturbance may be

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partially offset by habituation which has been observed by Miller and Gunn (1979) during experimental helicopter harassment

Muskoxen are present on the 1002 area throughout the winter when most exploration and construction activities would take place Muskoxen daily activity may decrease during winter (Reynolds, 1986) as part of their behavioral strategy for energy conservation Repeated disturbance causing increased or prolonged activity during the winter results in energy drain which may adversely affect survival of individuals or productivity of pregnant females

The effects on muskoxen from habitat loss or stress due to disturbance have been difficult to measure Miller and Gunn (1979) concluded that lack of visible response does not necessarily mean the absence of physiological changes or energy drain which may have a major effect on the population over time Muskoxen, as residents on the 1002 area, will be exposed to year-round activity As described in the previous section on caribou, loss of important habitat has been shown to have major negative effects on ungulates Muskoxen, like caribou, presumably select wintering and calving areas because of factors favorable to herd productivity and survival availability of preferred forage, better weather or snow conditions, relative absence of predators lack of disturbance or some combination of these and other factors Displacement from calving areas would have a negative effect on muskoxen production The magnitude of that effect is difficult to accurately predict, particularly in view of the expanding nature of the population and refuge management objectives to allow continued population expansion The effect on production would likely be related to the magnitude and duration of displacement

No information is available on the reaction of muskoxen to sustained oil development and production activities From the reports of Russell (1977) and Reynolds and LaPlant (1985), a 2-mile sphere of influence was assumed in calculating the range which could be affected by full leasing Table VI-6 shows that habitat values could be lost or greatly reduced throughout about one third (256,000 acres) of the muskox range within the 1002 area Habitats used for high seasonal or year-round use, including calving, would be disproportionately affected; muskoxen would be displaced from approximately 53 percent of those habitats Habitat values could be lost on nearly 75 percent of the high use habitats in which calving occurs Such a high percentage of loss in valuable calving habitat could have a major negative influence on herd productivity

Direct mortality could result from hunting, vehicle collisions, and other accidents associated with development Muskoxen are highly vulnerable to hunting, and direct mortality would be expected to increase over time as access into previously undeveloped areas increased Increased hunting regulation and enforcement would be required to reduce illegal harvest With adequate enforcement of season and bag limit restrictions, the number of animals killed would be expected to permit only a minor effect on the population

Mitigation

Negative effects to muskoxen could be mitigated by standard stipulations prohibiting disturbance, implementing necessary time and area closures, and requiring on-site monitoring Continued monitoring of the population's growth, distribution, and movements would detect changes and determine what, if any, additional mitigation may be needed Because riparian areas are favored habitats, those stipulations for caribou that close valuable riparian areas to siting of permanent facilities and limit crossings of those areas by transportation facilities would minimize potential interactions and disturbance, which would reduce effects on muskoxen as well (pl. 2C)

Table VI-6.--Observed muskox range potentially affected by development under full leasing or limited leasing, assuming a 2 mile sphere of influence

	High-use range seasonally or year-round		Other range	Total range
	Without calving	With calving		
Total muskox range (acres) within Arctic Refuge	251,000	211,000	654,000	1,116,000
Area (acres) within development sphere of influence:				
Full leasing	46,000	112,000	98,000	256,000
Limited leasing	46,000	110,000	98,000	254,000
Percent of Arctic Refuge range influenced by development:				
Full leasing	18	53	15	23
Limited leasing	18	52	15	23
Total muskox range (acres) within 1002 area	207,000	158,000	395,000	760,000
Percent of 1002 area influenced by development:				
Full leasing	22	71	25	34
Limited leasing	22	70	25	33

Conclusion

Major negative effects upon the muskoxen population from oil development could occur, considering the present management objectives for continued population growth of the herd under natural regulation and the displacement from habitat likely to occur Muskoxen could be displaced from up to 71 percent of their high-use, year-round with calving, habitats within the 1002 area. This, coupled with direct mortality, and the unavoidable disturbances would cause the population to decrease and its distribution to be altered. Effects would be most pronounced on the subpopulation using the Niguanak-Okerokovik-Angun River area This subpopulation is the smallest (approximately 80) and has the least amount of interchange with other subpopulations Consequently the likelihood of immigration offsetting population-depressing forces on this subpopulation would be very limited.

Predicted population changes resulting from petroleum development are speculative. There are no references in the literature to analogous activities in other muskoxen ranges. However, considering the large extent (158,000 acres, 43 percent) of all high-use muskoxen habitats within the 1002 area, as well as more than 33 percent of the population's high-use habitats throughout the Arctic Refuge which could be affected under full leasing, a change in distribution or decline affecting 25-50 percent of the population may occur

MOOSE

The 1002 area is not high-quality moose habitat. Peak use by moose is during the summer when the 1002 area population probably is less than 25; during the winter, moose are rare on the area The portion of the total refuge population represented by this figure is not known

Direct loss of habitat is expected to be about 140 acres out of the 96,000 acres of the 1002 area identified as moose-use areas. Affected areas are low-density habitats (less than one moose per 28 square miles), mainly in Block D (pl 1C)

Moose adapt readily and habituate to the presence of human activity; they are not easily disturbed (Denniston, 1956; Peterson, 1955). Moose have expanded their range in North America at the same time that human disturbance has spread (Davis and Franzmann, 1979). On the Kenai National Wildlife Refuge in Alaska, helicopter-supported winter seismic surveys using explosives did not modify moose distribution patterns, movements, or behavior (Bangs and Bailey, 1982). Most studies have dealt with moose in forested areas. The response of moose to disturbance in tundra areas has not been demonstrated

Increased human development on the Kenai Peninsula, Alaska, has resulted in increased moose mortality from hunting, vehicle collisions, poaching, and other causes (Bangs and others, 1982). Moose mortality on the 1002 area could occur as a result of hunting or accidental death especially vehicle collisions Because so few moose use the area and because of the area's open nature, the number killed would probably be very low.

Moose populations south of the 1002 area would come under increased hunting pressure due to the influx of workers to the area Declines in the population age structure and average antler size would probably occur Moose concentrate in riparian habitats south of the 1002 area where they are highly visible and vulnerable to hunting

Mitigation

None would be needed beyond those general measures for caribou such as limiting use of transportation corridors and closing the area within 5 miles of project facilities to the discharge of firearms. Moose harvest on Arctic Refuge would be regulated by the State of Alaska in cooperation with the FWS, and should consequently be kept within sustainable limits by modifying harvest seasons and bag limits.

Conclusion

Effects on the regional moose population from habitat loss and mortality due to oil development in the 1002 area would be minor.

DALL SHEEP

Dall sheep are rarely found north of the Sadlerochit Mountains in the 1002 area, although they are common in the Brooks Range, south of the 1002 area. Increased hunting pressure, air traffic, and harassment by sightseers could adversely affect Dall sheep.

Mitigation

More restrictive hunting regulations could be required if increased harvest affects the health of Dall sheep populations or reduces the quality of hunting and associated recreational use.

Conclusion

Indirect effects on sheep outside the 1002 area would be minor. Full leasing would have a negligible effect on Dall sheep in the 1002 area; average age and, consequently, horn size of rams may decline somewhat as a result of increased hunting pressure.

WOLVES

Five to ten wolves seasonally use the 1002 area (Weller and others, 1985), mainly in the summer for hunting when prey is most abundant. Wolf dens have not been documented in the 1002 area. Wolves have denned infrequently on the coastal plain east and west of the 1002

known to be cautious and wary of humans (Krott, 1960). Wolverine distributions and movements on the 1002 area would be altered by the presence of human activity associated with oil development. Displacement of wolverines from local areas of development on the 1002 area is very likely. In considering potential population effects to wolverines from the proposed Susitna hydroelectric project, Whitman and Ballard (1984) thought that local avoidance of work camps would not significantly influence wolverine movements or productivity.

Because wolverines are primarily scavengers, their abundance is related to the biomass and turnover of large herbivore populations (van Zyll de Jong, 1975). Thus, the magnitude of anticipated effects on populations of caribou, muskox, and moose upon which wolverines depend will directly affect the degree of effects on wolverines. Major effects have been projected for caribou and muskox populations, minor effects for moose. Magoun (1985) stated that successful management of wolverines in Game Management Unit 26A on the North Slope was directly related to successful management of the Western Arctic and Teshekpuk Lake caribou herds. She further stated that a decline in these herds could result in a decline in wolverine productivity. Whitman and Ballard (1984) believed that a decrease in the populations of moose and other prey as a result of the proposed Susitna hydroelectric project could eventually affect wolverine densities, population size, and movements. Reduction in abundance of the primary predators (wolves and brown bears for which moderate and minor effects are predicted, respectively) could also decrease the abundance of prey carcasses available for scavenging by wolverines.

During the winter wolverines on the tundra are vulnerable to hunting from snowmobiles and aircraft. Increased hunting and trapping could occur on the 1002 area as a result of the greatly improved access provided by the roads, trails, and airstrips associated with oil and gas development, and the increased human populations in the region. Hornocker and Hash (1981) found that trapping was the primary cause of wolverine mortality. Van Zyll de Jong (1975) felt that human predation was the factor most likely to affect wolverine numbers.

Mitigation

Measures designed for prey species such as caribou, muskox, and moose will also benefit wolverines. Control of access and harvest to minimize direct mortality would be the most important determinant of effects. This control is recommended as mitigation for effects on several species.

Conclusion

The cumulative effects of displacement/avoidance and reduced food resources could result in localized, long-term changes (a moderate effect) in wolverine distribution. Inadequate controls on access and harvest could possibly reduce by half or more the 1002 area wolverine population. If this occurred, it would result in a major effect.

BROWN BEARS

Brown bears are common on the 1002 area during May-September when they forage and range widely. The 1002 area contains habitat used seasonally by bears at moderate or high density (pl. 1D). Habitat use and populations throughout the Arctic Refuge have not been similarly delineated.

Under full leasing, direct loss of brown bear habitat would total about 3,500 acres. Oil-field activities would take place throughout approximately 17 percent of high and moderate brown bear use areas within the 1002 area. Quantifying the number of animals involved is difficult. Seasonal density of bears on the 1002 area averages one bear/30 square miles, but local densities can range from one bear/18.5 square miles to one bear/2,200 square miles.

Brown bears use the 1002 area mainly for feeding from late May through July when caribou are present. The potential decline in caribou population and change in distribution probable with full leasing (major for the PCH and moderate for the CAH) could cause a decline in an important brown bear food source. This could result in decreased bear productivity and survival of young in years when alternate food sources, such as small rodents, are scarce.

Brown bears are not readily displaced by human presence or activity. Brown bears along the TAPS corridor became so habituated to development activity that they occasionally entered occupied buildings in search of food (Follmann and others, 1980), routinely fed at garbage dumps, and waited along roads and other activity areas for handouts. Electrified fencing successfully eliminated problems with both brown and black bears in two summer camps of 100 people each in the Brooks Range (Follmann and Hechtel, 1983).

Disturbance to brown bears denning on the 1002 area could occur, particularly from winter seismic exploration because such activity occurs after brown bears have denned and den sites may not be known. Disturbance of denning bears, once development is complete, should be negligible since bears would likely avoid denning in areas where activity was occurring. Hanley and others (1981) found that brown bears in their dens were disturbed by seismic blasting 1.2 miles away, as demonstrated by movement within the den, but no negative effect such as den abandonment was documented. Reynolds and others (1983) reported that seismic vehicles or shot detonation resulted in increased heart rate and movement in the dens of instrumented brown bears. Harding and Nagy (1980) reported brown bears successfully wintering within 1-4 miles of active oil exploration camps. Conversely, they also reported a den being abandoned when a seismic vehicle drove over it, and den destruction during gravel mining. Quimby (1974) reported that 5 of 10 brown bears apparently abandoned dens in early October after being followed to their dens by helicopters.

Only 6 of 129 (4.7 percent) den sites documented during the Arctic Refuge baseline studies were located on the 1002 area (Garner and others, 1984, 1985). Therefore, the potential to disturb denning habitat and disrupt denning activities of the regional brown bear population from oil exploration and development would be low, and impacts would be expected to be minor.

Aircraft disturbance of bears is unavoidable. Doll and others (1974) and McCourt and others (1974) reported variable reactions by bears to aircraft disturbance at 1,000 feet AGL or less. Douglass and others (1980) reported bears reacted strongly to hazing by vehicles and aircraft.

Direct bear mortalities from accidents or being shot in defense of human life and property will occur. Drug-induced death of bears occasionally occurs when nuisance bears are immobilized for relocation. Accidents, such as vehicle collisions, could also reduce bear numbers. Follmann and others (1980) reported 13 brown bears killed in conjunction with TAPS construction and operation during 1971-79. The BLM (1983) estimated that oil development on NPRA in an area of bear density similar to the 1002 area would produce a loss of one bear annually as a result of confrontation between bears and oil development personnel. The rate of mortality would presumable be similar on the 1002 area. Most deaths would probably result from bears' being attracted by improper garbage or food handling, or illegal feeding.

Bears that seasonally use the 1002 area are part of the same regional population inhabiting the mountains and foothills of the Brooks Range. Hunting pressure on this population could increase if oil workers remained on the 1002 area during off-duty periods to pursue recreational activities. Increased harvest of bears occurred during construction of TAPS (Follmann and Hechtel, 1983). Schallenberger (1980) similarly reported an increase in bear harvest as a result of increased human presence associated with oil development. Further regulation of hunting by the State and the FWS would probably be required.

Mitigation

In addition to those measures listed earlier in the chapter, strictly enforcing prohibitions on feeding wildlife, adequate food storage, control of harvest, and control of aircraft flight altitudes and corridors would lessen adverse effects of development resulting from full leasing. An active monitoring program for brown bears during seismic exploration, construction, and other development activities would help avoid disturbing denning bears. Buffer zones of at least 1/2 mile would be established around any known dens as required for previous exploration in the 1002 area [50 CFR 37.32 (c)].

Conclusion

A moderate decline in brown bear numbers or change in distribution could result from the additive effects of direct mortality, decreased prey availability, harassment, and disturbance in denning areas.

ARCTIC GROUND SQUIRRELS AND OTHER RODENTS

Arctic ground squirrels are commonly found throughout much of the 1002 area. Moderate effects would result from localized habitat alterations such as placing gravel pads over squirrel colonies. Minor effects would be expected as a result of road kills.

Other rodents, primarily lemmings and voles, are naturally cyclic in abundance but can be expected to be affected somewhat by development on the 1002 area. Some effects may be positive--structures and debris would provide protective cover from hawks, owls, or other predators. Negative effects could include localized destruction of nesting sites and increased mortalities from entrapment and traffic.

Mitigation

None additional to that already outlined is recommended

Conclusion

Developing oil resources throughout the 1002 area would cause minor to moderate effects on squirrel populations because of habitat loss and alteration. Effects on lemmings and voles should be minor.

MARINE MAMMALS

Though 14 species of marine mammals may occur off the coast of the Arctic Refuge, only 5 species were evaluated: polar bear, ringed and bearded seals, and beluga and bowhead whales.

POLAR BEARS

Polar bears are one of the few large mammal species present on the 1002 area during winter.

Polar bears are particularly sensitive to human activities during the denning period. Belikov (1976) reported that females will usually abandon their dens prematurely if disturbed. Early den abandonment can be fatal to cubs unable to fend for themselves or travel with their mother. Development of potential petroleum prospects in Block C could have a moderate adverse effect on the continued suitability of the eastern portion of the 1002 area for denning polar bears, substantially decreasing the habitat values of this area. At least eight polar bear dens were located within this area between 1972 and 1985 (pl. 1E).

Factors that may influence responses of denning female polar bears to disturbance include: frequency and level of disturbance, distance of the disturbance from the den, and the stage of denning when disturbance occurs.

Pregnant females beginning to den in the fall are especially vulnerable. A radio-collared female polar bear denning in the 1002 area emerged from her den in early February 1985 (Amstrup, 1986b), as the suspected result of repeated disturbance from motorized exploration support equipment within 1,600 feet of the den site. The bear was suspected of being pregnant when she entered her den, even though no cubs were later observed.

Pipelines and roadways may prevent female polar bears from moving to and from inland denning areas (Amstrup and others, 1986; Lentfer and Hensel, 1980). Disturbance from oil exploration, construction, and production in the immediate vicinity of polar bear dens could cause the bears to abandon dens. Production activities could create disturbances that would likely keep bears from returning to those preferred denning areas.

Locating petroleum resources, with resultant development and production facilities, in confirmed coastal-denning areas could produce a major reduction in the availability of 1002 area denning habitat. Although the number of bears returning each year varies depending on ice, snow, and weather conditions, some researchers believe female polar bears show fidelity to birth sites and try to reach areas previously used for denning (Lentfer and Hensel, 1980). Recent analyses suggest that mortalities of female polar bears are now about the maximum the Beaufort Sea population can sustain (Amstrup and others, 1986) without a decrease in population levels. Thus, preserving undisturbed onshore denning habitat each year is very important for the 12 to 13 percent of females denning on land rather than offshore ice. Moreover, if there is an especially significant area for denning on land in Alaska, it is on and adjacent to the 1002 area (U.S. Fish and Wildlife Service, unpublished data).

Additional habitat value losses would result from development of marine facilities. The Pokok port site is located in a confirmed coastal denning area; polar bears were known to have denned within approximately 1 mile of the site in 3 of the last 5 years. The Camden Bay area has also been used by denning polar bears

The effects of oil development on nondenning segments of polar bear populations are not well known. These segments of the population generally inhabit the pack ice throughout the year, although in the fall a number of animals, primarily family groups composed of females and juveniles, are seen along the coast (Amstrup and others, 1986). Potential adverse effects to bears inhabiting pack ice could be caused by shipping traffic and its concomitant disturbance of water and ice or from an accidental oil spill from a ship or loading facility. Disturbance alone may not greatly affect nondenning bears Direct effects of oil contamination are not well known. Initial results of a study conducted in Canada (Hurst and others, 1982) indicate that bears forced to enter an oil slick and then subjected to cold temperatures and wind will die; that study did not determine if polar bears will voluntarily enter an oil slick

Polar bears are attracted by garbage dumps and could become a nuisance or threat to personnel in camps. Because bears are attracted to the Barter Island area to scavenge on whale carcasses, nearby oil facilities could experience a higher occurrence of nuisance bears than other facilities report.

Mitigation

Some adverse effects to polar bears could be reduced by documenting den locations and use areas so that oil-development activities avoid them to the maximum extent possible. Avoiding suitable denning habitat is most important. To prevent disturbance which could cause early den abandonment, buffer zones of at least 1/2 mile should be established around known dens, such as the zones described for brown bears [50 CFR 37.32 (c)]. Activities along the coast during the late October-early November period when bears come ashore to den should be minimized. Where possible, orienting seismic lines, pipelines, and roads at right angles to the coast in coastal areas could further minimize interference with denning bears. Also, ice quality and movement data collected by industry should be made available to the FWS to augment research attempts to understand polar bear movements and behavior. Such data would be invaluable in learning how to predict and minimize adverse effects of industrial activities on polar bears.

If attracted by garbage, polar bears could become a nuisance or threat to personnel and would need to be relocated. Proper garbage control and fencing of camps would reduce this problem. Because killing polar bears by anyone except Alaskan Natives is prohibited under the Marine Mammal Protection Act of 1972, nuisance bears would have to be trapped and relocated.

Conclusion

Although only a few polar bears use the 1002 area, the exclusion of only one or two bears from areas consistently used for denning would be a moderate impact on that segment of the Beaufort Sea population because some decline in the reproduction rate could result. Given the apparently stable Beaufort Sea population of approximately 2,000 polar bears, such exclusion and decline in natality would likely not affect the species' overall survival, so long as similar intensive developments did not occur along the entire northern coast of Alaska and Canada. Biologists believe that the Beaufort Sea population can sustain little, if any, increase in mortality of females because population surveys and calculations show that the number of animals dying each year is approximately equal to the population increase from reproduction (Amstrup and others, 1986).

SEALS AND WHALES

Oil-development activities with the greatest potential for affecting seals and whales would be those occurring along the immediate coast or just offshore. Under full

DRAFT - 27 October 1986

THE RELATIONSHIP OF CARIBOU SUMMER DISTRIBUTIONS AND THE TRANS-ALASKA PIPELINE: DOES ABSENCE MEAN DISPLACEMENT?

By

R.D. Jakimchuk

for

Joint Industry - Alaska Department of Fish & Game

Caribou Workshop

28-30 October 1986

INTRODUCTION

The ideal experimental design to test whether calving and post-calving cow/calf groups avoid TAPS and are displaced by oil developments in the Prudhoe Bay area is not available to us. Such a design would have as its basic elements comparable pre-development baseline data for control areas and areas which would subsequently be perturbed. Comparable techniques would be used to measure changes of various ecological variables in control and exposure areas before and following perturbation. The experimental design would be careful to ensure that comparisons are valid and would eliminate biases owing to either environmental variables or to the changing seasonal behaviors and distributions of caribou. The designs would endeavor to eliminate biases associated with the highly clumped or non-homogeneous distributions of caribou which characterize the species by recognizing the implications of differing densities, grouping behaviour, sexual segregation, and differential habitat use to the analysis. Surveys would be conducted during comparable time and life cycle periods to reduce the foregoing potential biases. The foregoing would ensure that data were comparable for the test and control areas within years, so that between-year comparisons could be made

between controls as well as test (exposure) areas both before and after development. Finally, the study design would encourage identification and measurement of exogenous environmental influences such as snow characteristics, plant phenology or seasonal flooding which may, independently of the previously mentioned variables, affect the distribution of and habitat use by caribou between two apparently similar areas. Such measurements would help account for variations in use or density which might occur even where exhaustive attempts were made to standardize the experiment based on the criteria I have previously mentioned.

The lack of many of the foregoing elements has contributed to differing interpretations on the relationship between caribou distributions and North Slope petroleum developments, especially as it pertains to calving distributions and the percentage calves associated with the TAPS corridor. These differing interpretations, in turn, have generated controversy which has often obscured rather than clarified issues. However, despite deficiencies in many of the data requirements I have described, there are numerous bodies of evidence which can objectively focus on questions of caribou interaction with the TAPS corridor and the implication of that interaction. These data, accumulated over a period of the past 16 years, provide a basis for interpreting the relative role of ecological factors and disturbance in governing the

distribution, movements and habitat use of Central Arctic caribou. In this paper I can only develop and substantiate some important principles: I do not intend to review and debate the minutiae of 15 years of survey data but to point out some of the most significant findings which encompass the period prior to and following development of the TAPS corridor.

Specific data for the area are available for the period before extensive oilfield development, the construction of the Dalton Highway in 1974, or the pipeline between 1975 and 1977. The main sources of pre-development data are studies by Angus Gavin from 1969 to 1978 (Gavin 1977; Gavin and Chamberlain 1979), White et al. (1975), and Child (1973). Post-development data are derived from a wide range of ADF&G and industry sponsored studies from 1975 to the present.

METHODOLOGICAL PROBLEMS: UNEQUAL COMPARISONS

One of the major difficulties in any analysis of Central Arctic caribou and development interactions is separating out the relative influence on caribou of the pipeline, the Dalton Highway and the oilfield development. Although this paper deals with the TAPS corridor, it cannot ignore pre-construction calving distributions as they relate to Prudhoe Bay and TAPS. Therefore I must comment, in part, on

the conclusions pertaining to the oilfield presented by Smith and Cameron (1983) and Whitten and Cameron (1985). Figure 1 shows the study area and the TAPS corridor.

The major conclusions of Cameron and Whitten (1980_) and Cameron et al. (1979) are that cow/calf groups avoid the TAPS corridor during calving and the summer period based on a comparison of calf percentages along the corridor versus regionally. The major conclusion of Smith and Cameron (1983) and Whitten and Cameron (1985) is that calving caribou have been displaced from the Prudhoe Bay Oilfield. This conclusion is based on low densities of calving caribou in the field and a lower calf percentage of total caribou in the field versus the regional percentage.

The problem of comparability of data is a major limitation to the conclusions drawn by Cameron and Whitten (1980_), Cameron et al. (1979, 1985). In the latter final report, comparisons of calf percentages between regional and corridor values during the calving period (June) are available for only two years (1975-76) of the seven-year study (1975-1982). Other seasonal periods were compared but they combined periods in which seasonal distributions are known to vary considerably and frequently in response to environmental factors. Thus, comparisons of short yearling percentages in April/May between the TAPS corridor and regional values does

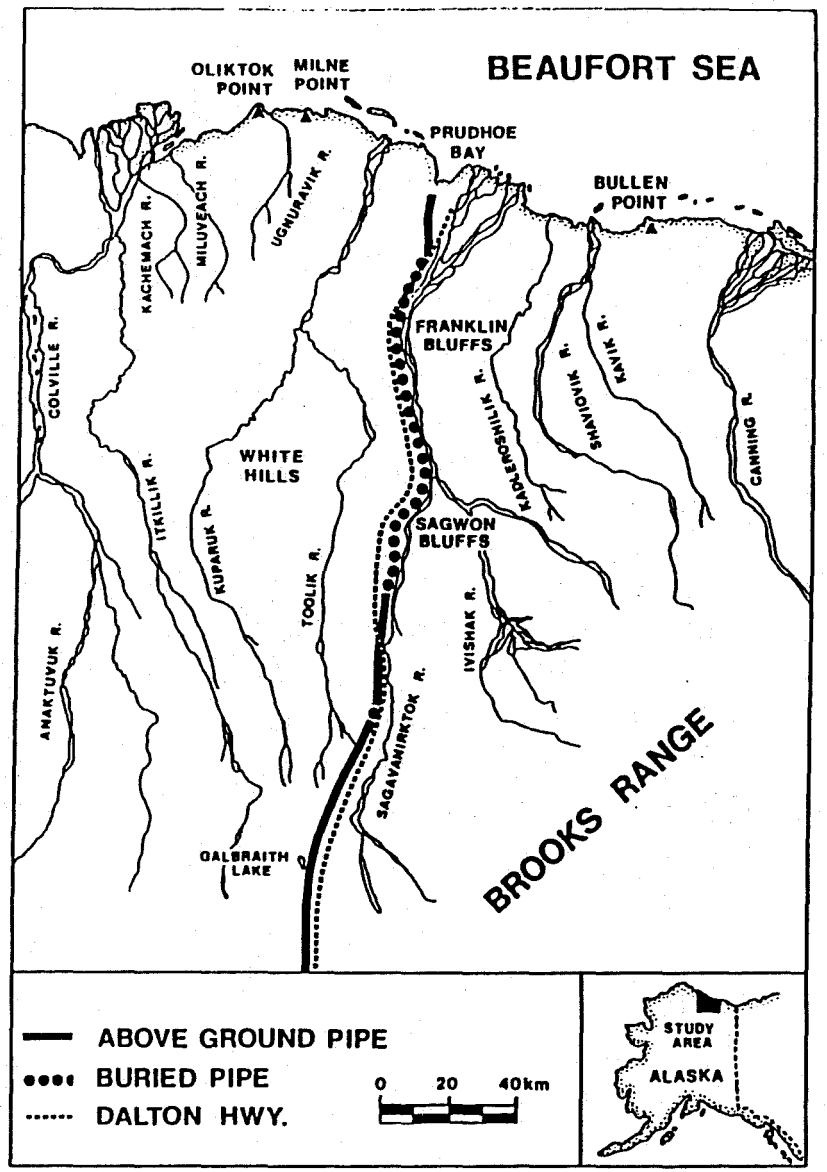

Figure 1. The study area.

not take into account sexual segregation (Figure 2) and differential habitat use by the sexes at that time (Figure 3), while comparisons for the July-August period are confounded by the extreme flux in movements in response to insects which can affect calf percentages in a specific area drastically even on a given day (White et al. 1978). Even so, calf percentages along the corridor and regionally were the same in two of five years for the July-August period (Cameron et al. 1985), suggesting that factors other than the TAPS corridor influenced those percentages.

Although Cameron et al. (1985) attempt to reduce previous biases in survey coverage of non-riparian habitats regionally by deleting road surveys south of Region 4 and coastal transects from aerial surveys, regional surveys still appear to oversample non-riparian habitats. The published methodology (Cameron and Whitten 1979) states a deliberate effort to sample non-riparian habitats on regional surveys for at least 3 km on either side of riparian habitats. Thus, many high density non-riparian calving areas are sampled in the regional surveys (Figure 4) and compared to the 1 km wide surveys on either side of the Dalton Highway which is closely associated with riparian habitat of the Sagavanirktok River (Figure 5). The route of TAPS does not transect such calving concentrations and traverses approximately three times the regional percentage of riparian habitat (Carruthers et al. 1984).

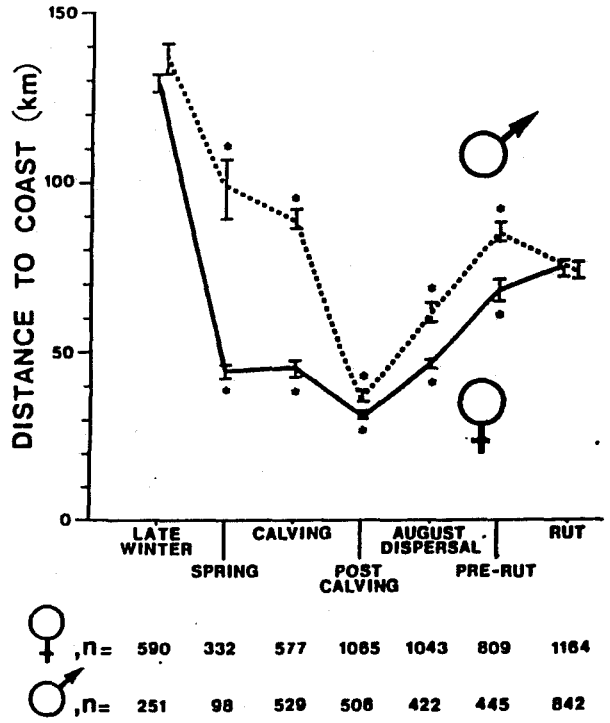

Figure 2. Seasonal variation in average distance to coast for male and female caribou groups within the study area (1981-1983).

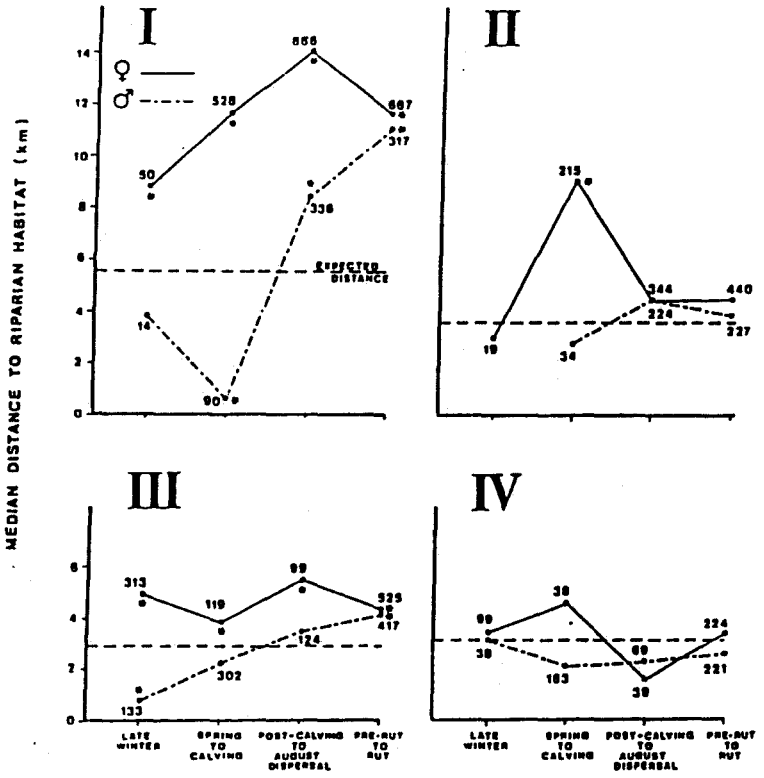

Figure 3. Seasonal variation in median distance to riparian habitat (km) of male and female caribou for four subregions of the study area (1981-1983).
*Asterisk denotes that median distance is significantly different than expected based on a random distribution. $p < .05$

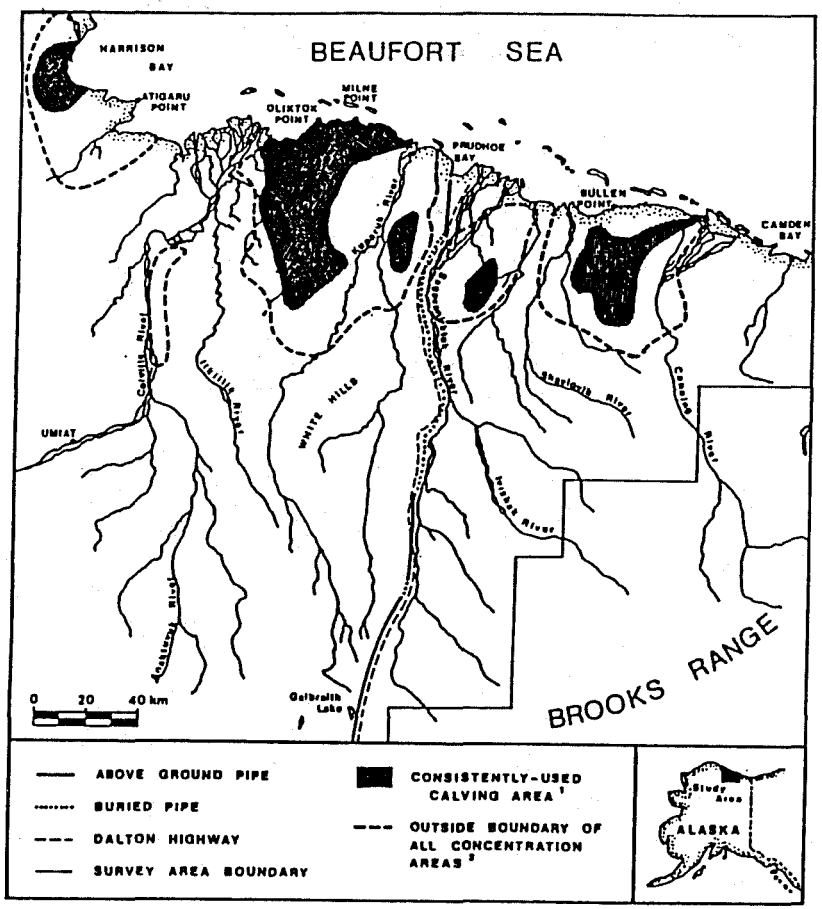

Figure 4. Location of calving concentration areas, 1981-1986.
[1]Area of concentrated calving in 4 of 6 years from 1981-1986 (between Canning and Colville Rivers) and in 2 of 3 years from 1984-1986 (west of Colville and east of Canning River only).
[2]This boundary encompasses all concentration areas recorded from 1981-1986.

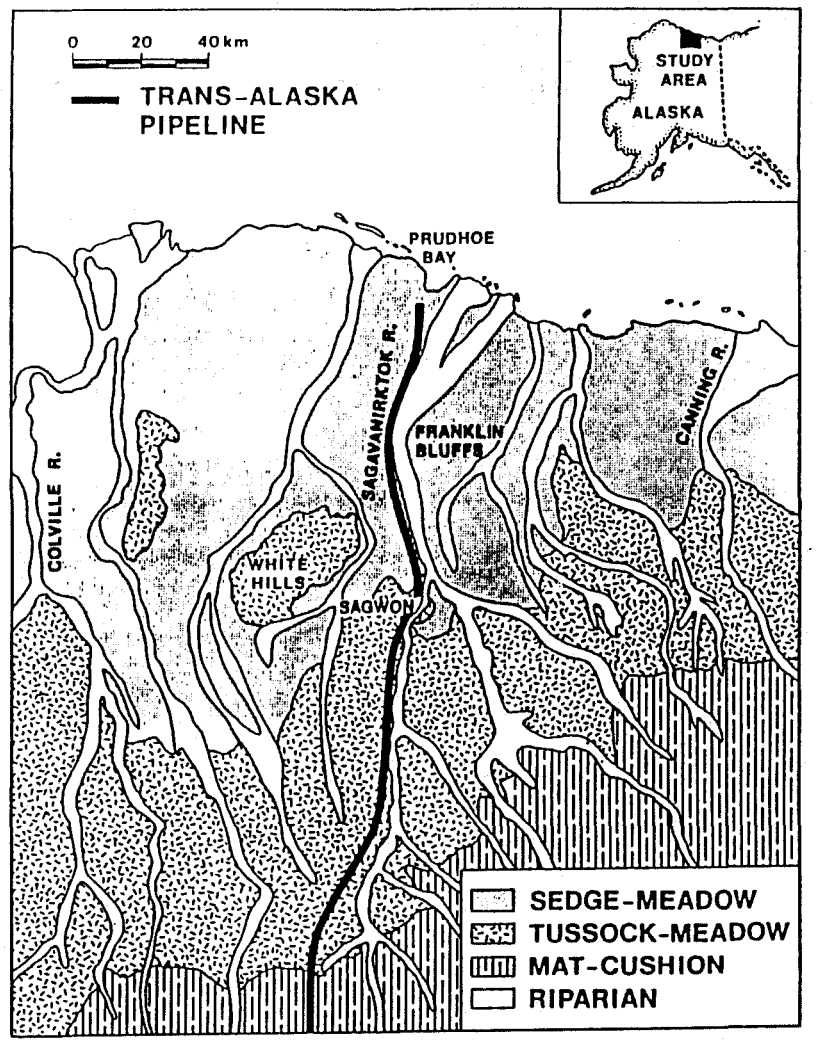

Figure 5. Generalized habitat types within the study area.

I do not disagree that calf percentages are lower along the TAPS corridor than for the region as a whole but with the interpretation of why they are lower. There is considerable evidence that:

1. The Prudhoe Bay area was not an important calving area even prior to development (Table 1; White et al. 1975; Gavin 1977; Gavin and Chamberlain 1979) (Figure 6).

2. There is well documented evidence that sexual segregation (Cameron and Whitten 1979; Carruthers et al. 1984) and differential habitat use result in different distributions of cow/calf and bull groups in riparian versus non-riparian habitats (Jakimchuk et al., in press; Curatolo 1985). Indeed, Curatolo found that this differential habitat use occurred even within intensively developed areas and that calf percentages were consistently lower in riparian habitat. Jakimchuk et al. (in press) show that differing distance relationships to riparian habitats between bulls and cows are consistent regional distributional trend.

3. Finally, along the West Sak Road, where habitats normally used by cows and calves have been traversed by a road corridor, thus eliminating the habitat bias to a large degree, summer calf percentages have been the same or

Table 1. Estimated caribou populations, North Slope, Alaska, 1970-1978.

	Colville-Canning Region, Ca. 9000 Sq. Mi.						Prudhoe Bay Area[1], Ca. 455 Sq. Mi.					
Year	Cows	Calves	Calves per100[2] Cows	Year-lings	Bulls	Total	Cows	Calves	Calves per100[3] Cows	Year-lings	Bulls[4]	Total
1970	8,868	5,962	67	5,193	1,581	21,604	24	17	71	8		49
1971	8,600	3,100	36	2,000	1,300	15,000	16	7	44	7		30
1972	1,200	450	37	350	500	2,500	8	5	63	4		17
1973	9,200	3,500	38	2,500	1,200	16,400	24	9	38	9		42
1974	10,000	3,800	37	3,500	1,100	18,600	34	9	27	8		51
1975	7,800	2,800	36	2,600	1,300	14,500	27	13	48	4		44
1976	2,200	750	34	1,100	950	5,000	19	4	21	5		28
1977	3,200	1,200	37	600	1,000	6,000	14	11	79	3		28
1978	3,170	1,580	50	970	1,100	6,820	29	15	52	7	6	57

[1]Encompasses the area from the Sagavanirktok River to Kuparuk River and from the Coast to Franklin Bluffs.
[2]Colville-Canning Region ten year average = 41 calves per 100 cows per year.
[3]Prudhoe Bay Area ten year average = 46 calves per 100 cows per year.
[4]No data available except for 1978.

SOURCE: Gavin and Chamberlain (1979).

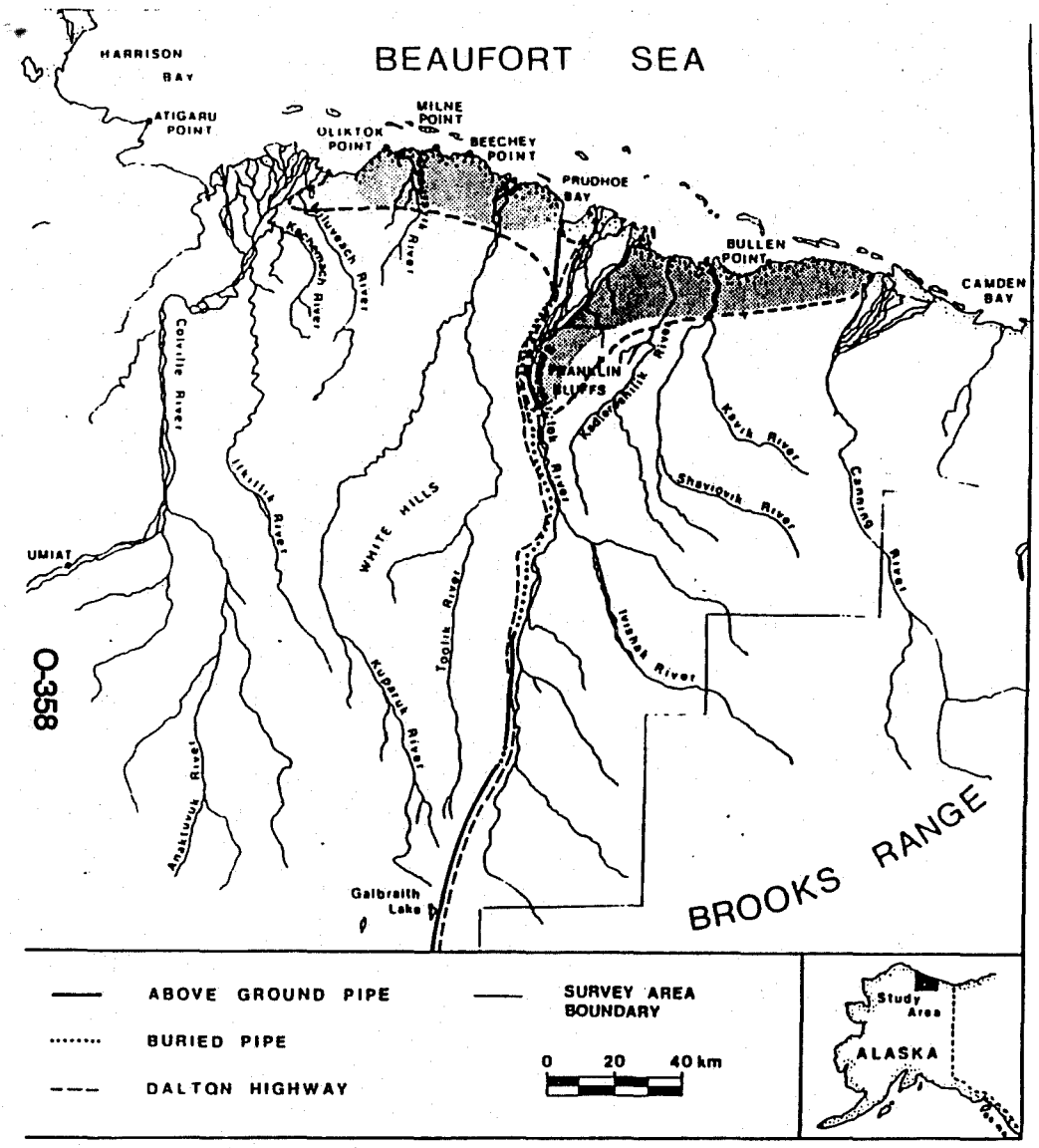

Figure 6. Major calving areas of Central Arctic caribou in 3 of 4 years (1970-1973 inclusive). Dotted line denotes calving in at least one of four years (After Gavin 1977).

virtually the same as regional values in five of seven years following the development of the corridor (Table 2).

Notwithstanding Table 2, which eliminates a major habitat bias, calf percentages alone are a poor measure of impact along the TAPS corridor when one considers seasonal variations in caribou distribution in response to environmental influences such as snow cover, insect harassment, and differential habitat use by the sexes.

The major evidence presented that calving has been displaced from the Prudhoe Bay area are the low calf percentages recorded, the low number of calving groups found there during summer and the higher incidence of calving south of Prudhoe Bay (Whitten and Cameron 1983; Smith and Cameron 1983). However, comparison of pre- and post-development calving distributions shows a similar distribution to that found in recent years (Sopuck and Jakimchuk 1986), with more calving south of Prudhoe Bay than in the Prudhoe Bay oilfield area even prior to extensive development (Figures 4 and 6). The apparent reason for this is the frequent, extensive flooding associated with sedge meadows in the Prudhoe Bay area. Late snow melt and flooding of lowland habitats in the coastal zone at calving has occurred in 7 of the past 13 years where data are available (Table 3). In years of delayed snow melt, calving farther inland has been consistently reported. This

Table 2. A comparison of regional calf percentages and calf percentages observed along the West Sak (Spine) Road during summer 1978-1984.

Year	Spine Road (West Sak) Percent Calves	Regional Calf Percentages Percent Calves	Source
1978	26	25	Cameron & Whitten 1979b
1979	25.0	25	Cameron & Whitten 1980b
1980	20.0	21	Cameron et al. 1981
1981	18.0[ab]	27	Cameron et al. 1983
1982	16.0	No Data	Smith et al. 1984
1983	17.5	21	Smith et al. 1984
1984	22.3	23.2	Smith et al. 1984

[a] Represents 14,966 total caribou seen from the road in 1981 versus 4,552 seen in 1980.

[b] Of caribou observed crossing West Sak road and Kuparuk pipeline in 1981, calves were 25% of total caribou.

Table 3. Pheonology of snowmelt and calving distributions in the central Arctic region, 1970-1986.

Year	Snowmelt Phenology During Calving	Comments on Calving Distribution	Source
1970	No data	"Usual distribution" (see Fig. 6)	Gavin 1977
1971	Deep snow coastal plain	Calving in foothills	Gavin 1977
1972	Heavy snow	Low use of Coastal Zone & Prudhoe Bay	Gavin 1977
1973	Dry year	Some inland calving	Gavin 1977
1974	No data	"Usual distribution" (Fig. 6)	Gavin 1977
1975	No data	Scattered calving, no concentration areas	
1976	Heavy snow	"Usual distribution" (Fig. 6)	Gavin 1977
1977		"Usual distribution" (Fig. 6)	Gavin 1977
1978	Late snowmelt, flooding		
1979	Dry - relatively snow-free	No data	Cameron et al. 1981
1980	Late Snowmelt - extensive flooding	More inland caribou	Whitten & Cameron 1985
1981	Dry, snow-free calving	Little inland	Cameron et al. 1983
1982	Late snowmelt - extensive flooding	More calving inland	Whitten & Cameron 1985
1983	Relatively dry	Usual (see Fig. 6)	
1984	Relatively dry	Usual (Fig. 6)	Sopuck & Jakimchuk 1986
1985	Relatively dry	Usual	Sopuck & Jakimchuk 1986
1986	Late snowmelt	Majority inland calving east of Sag River.	Sopuck & Jakimchuk 1986

seems to be a reasonable explanation for the consistent calving associated with the Franklin Bluffs area south of Prudhoe Bay which was documented prior to extensive oilfield development at Prudhoe Bay.

If we look at factors affecting pre- and post-calving distributions we find strong well-documented ecological reasons to explain observed distributions. When we test these hypotheses by looking at known calving and post-calving areas where development has occurred, such as the West Sak Road area and Prudhoe Bay, we find that the hypotheses pertaining to habitat use and their effects on distribution hold (Curatolo 1985; Jakimchuk et al., in press; this paper). The explanations for apparent discrepancies between what occurs along the TAPS corridor and regionally are in response to ecological factors. This explains the apparent contradiction of avoidance of TAPS but no avoidance of the Spine Road during summer by the same caribou on the same summer range.

I have concluded that absence does not equal displacement. I do not think that cow/calf groups avoid TAPS but the major river valley associated with TAPS - a relationship which also holds regionally for other comparable major rivers such as the Canning and Colville. Similarly, I think the evidence is strong that the Prudhoe Bay complex prior to development was not an important calving area. Its present

low use for calving represents an historical distribution rather than a displacement of calving to other areas.

I do not disagree that cows with neonates are sensitive to disturbance. There is ample evidence to support this sensitivity not only for caribou but for other cervids and bovids as well. This sensitivity appears to be strongly associated with a behavioral repertoire in response to predation. I do not disagree, either, that developments such as roads with traffic and human activity, are disturbing to cows with calves, or that some types of barriers can physically exclude caribou from their ranges. I do, however, distinguish between the sensory disturbances associated with the Dalton Highway which have been documented, and the notion of avoidance or displacement along the TAPS corridor which implies a permanency that is not justified by the evidence. I feel that the pipeline itself is not a source of disturbance - most of it is buried in the Sag. River floodplain. Most of the existing disturbance comes from the traffic and hunting along the Dalton Highway. But even here, except for hunting mortality, I feel that the disturbances are temporary and are not instrumental in altering either the behavior or distribution of caribou along that corridor in any fundamental or permanent way. In short, I think that caribou are frequently disturbed by activity within the corridor but they do not avoid it for this reason.

Evidence suggesting that disturbances to date are temporary and sensory in nature is available from a broader review of the growth, distribution and movements of the Central Arctic herd (previous papers). There is no indication that there has been any change in distribution, life cycle patterns or the fundamental ecology of caribou resulting from the interaction with existing oil development. On the contrary, the herd has grown in size and has continued to use and occupy habitats in the region in a manner consistent with pre-development use. The best evidence for this is where pre-development baseline data exist, such as the Kuparuk and Milne Point developments. There are no overall effects on seasonal distribution, habitat use or numbers which can currently be attributed to petroleum development. The seasonal cycles of caribou in the Central Arctic region continue despite the development which only recently includes their major pre-development calving ranges.

As development continues and expands, it is important to monitor and document interactions with caribou and to assess their significance. If decisions are taken that any habitat alteration is deleterious and this forms the basis for permitting, it will be difficult to justify management oriented research because of the a priori conclusion that all changes are equally deletrious. The most important requirement for future research, in my view, is to identify where compatibility

exists between a viable caribou population and development, to document where development activities are incompatible, to identify the nature of the problem, and to develop means of effective mitigation.

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February 5, 1987

Secretary Donald Hodel
Department of the Interior
Washington DC 20240

Dear Secretary Hodel:

The Resource Development Council respectfully submits the enclosed comments on the Draft Legislative Environmenatl Impact Statement for the Arctic National Wildlife Refuge Coastal Plain Resource Assessment.

I have also enclosed resolutions in support of the preferred alternative from a variety of cities, boroughs and other concerned parties for the official record.

We hope these comments are of use to you and your staff as you review the document and prepare a final report. Please call on me if we can be of assistance in any way.

Sincerely,

RESOURCE DEVELOPMENT COUNCIL
for Alaska, Inc.

Paula Easley

Paula P. Easley
Executive Director

cc: Governor Steve Cowper
Senator Ted Stevens
Senator Frank Murkowski
Congressman Don Young
Vern Wiggins, Alaska Land Use Council
Representative Sam Cotten, Alaska Legislature
Senator Jack Coghill, Alaska Legislature
Janie Leask, Alaska Federation of Natives
Alaska Coalition for American Energy Security

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Comments of Resource Development Council, Inc., on the Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment

February 4, 1987

INTRODUCTION:

The Resource Development Council for Alaska, Inc., (RDC) is a private statewide economic development organization committed to the orderly development of Alaska's resources. The broadly-based membership of our Council comes from a wide range of economic, social, geographic and ethnic sectors of Alaska. Our membership represents individuals, companies, trade associations, native corporations, universities, chambers of commerce and municipalities throughout the state.

The Resource Development Council strongly supports the opening of the Coastal Plain of the Arctic National Wildlife Refuge to oil and gas exploration and development. In light of the national interest, Alternative A, full leasing of the "1002" study area, is the only acceptable alternative.

Public Comment

Although there has been some concern over whether or not public comment was required for preparation of the

report, RDC believes, especially in light of the time extension for written comments, the level of public participation in the review of the draft report has been adequate and fully meets all legal requirements. RDC also believes that the public hearings in Anchorage, Kaktovik and Washington, D.C. were well publicized. Because of the advanced notification, large numbers of people attended the hearings.

The National Interest

There are many good reasons why the opening of eight percent of the refuge to oil and gas leasing is in the national interest.

Development of world-class oil deposits in the refuge proposed for leasing would promote economic development, reduce our dependence on foreign oil, foster orderly development in the absence of an energy crisis, increase revenues from taxes and royalties, strengthen national security, restrain the national trade deficit and create thousands of new jobs.

Although there is plenty of oil on the market today, domestic crude reserves are plummeting while consumption is rising. Domestic crude production from existing fields is forecast to decline from 8.9 million barrels per day in 1985 to slightly over 6 million barrels per day in 1991. Current domestic crude production has already fallen by 400,000 barrels per day. By the year 2000, production may plunge to 4 million

barrels per day unless new domestic discoveries are found and developed. If new significant discoveries are not developed, the U.S. could find itself dependent upon foreign sources for 75 percent of its consumption within 15 years, double our present level of dependency. Since it takes up to 15 years to bring major Arctic oil fields into production, the immediate opening of the ANWR Coastal Plain for exploration and development is of extreme importance.

With the free world's sources of petroleum heavily concentrated in the volatile Middle East, increased future dependency on this region threatens our national interest. Saudi Arabia itself holds about one-quarter of the world's reserves. Nearly three-quarters of all reserves are found in the Middle East, a region of great instability. Given past experience, the U.S. is very vulnerable to supply disruptions and subsequent price escalation due to its dependence on foreign sources of oil.

The best way to assure that the United States will have secure supplies of oil is to pursue exploration and development here at home. And the best chance to find a new world-class domestic supply of oil is in the Coastal Plain of ANWR.

Many Americans find it hard to believe that we have lost the advantages gained in conservation and are rapidly moving back to a future of massive energy import dependence. With the

drastic drop in oil prices, compounded with the fall in domestic production and the dramatic rise in consumption, the present oil glut will evaporate before the end of this decade. The drop in oil prices has resulted in significant reductions in U.S. exploration, production and drilling activity, and there is little that can be done to reverse this trend.

Until oil prices increase significantly, U.S. exploration will remain stagnant. Our dependence on imports will continue to increase and our vulnerability to oil price shocks and oil shortages will rise to excessively dangerous levels.

It is important that the U.S. have the foresight to develop potential ANWR oil and gas deposits soon to avoid a future energy crisis. All the geologic factors favorable for significant oil and gas discoveries exist in the 1002 area, which is the most promising area for a major discovery of oil and gas in all untested onshore areas of North America.

It is particularly important that Congress allow the siting in ANWR of oil and gas facilities needed to support offshore oil and gas development occurring north of ANWR on state-owned submerged lands and on the federal Outer Continental Shelf. None of the alternatives in the report specifically states that support facilities would be permitted. This provision would be compatible with Alternative A, B, C and D, and should be added to these alternatives.

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Economic Benefits

Development and production of substantial oil reserves in the 1002 area would promote economic development not only in Alaska, but also in the contiguous states. Thousands of new jobs would be created as the demand for goods and services developed. Positive impacts would be felt well beyond the energy industry.

In Alaska, oil production in the refuge would provide a major new source of income to underwrite important state programs and promote economic growth. Other states would also benefit since much of the production and transportation facilities would be designed and constructed prior to being shipped north.

Oil and gas development in the 1002 area would also assist the nation in reducing the national trade deficit. The deficit soared to record levels in November and appears to be totally out of control. Every barrel of oil the U.S. buys from foreign sources increases that deficit. The price that this nation pays for imported oil is the largest single factor in the deficit. As much as $90 billion is spent each year on foreign oil. With the mounting national trade deficit, any improvement in the balance of trade picture is beneficial. Since every state is partially responsible for the deficit, each must do its share or more to produce resources that can help offset foreign imports.

Oil and Gas Resources

Although there are some attractive offshore areas yet to be explored, the 1002 area is particularly promising among onshore areas because it contains extensions of other producing trends. With all the geographic factors favorable for significant oil and gas discoveries existing in the 1002 area, the Coastal Plain holds the greatest potential of containing super-gaint oil fields of all unexplored areas of the U.S.

According to the draft report, there is a 95 percent chance the 1002 area contains more than 4.8 billion barrels of oil. There is a 5 percent chance the area contains more than 29.4 billion barrels of oil. The average range of inplace estimates yields a mean estimate of 13.8 billion barrels of oil. The report also estimates that there is an average economically recoverable resource estimate of 3.2 billion barrels of oil.

However, the report said that "the estimation of recoverable resource was limited to those prospects (all structural) which can be identified and delineated with reasonable degree of certainty, and which are physically large enough that they could reasonably be expected to contain commercial quantities of oil."

Given this criteria, the Resource Development Council believes the report's reserve estimate should represent a minimum. Recoverable oil from stratigraphic traps could be

considerable since many of the plays are stratigraphic in nature. In addition, minimum economic field size would decrease as infrastruture from larger fields is developed. For example, fields considered less than economically marginal by themselves could come on line later as infrastructure is developed throughout the area to tap larger fields. Further, price fluctuations could have a tremendous impact on the economic viability of any prospect.

The report indicates that there is only a 20 percent chance of finding economically recoverable oil. This estimate is misleading to those who are not familiar with industry risk and success ratios. The 20 percent estimate actually represents a considerable increase over typical industry success ratios and in fact establishes an excellent chance for finding major oil deposits.

According to the Alaska Oil and Gas Association, only one out of ten wells drilled encounters any hydrocarbons at all, and of those that do, only one out of five ever turns into a developable oil field. Out of 100 exploratory wells drilled, only ten would encounter oil. Of those ten, only two will have discovered economically developable fields. This represents a two percent chance of success compared to 20 percent. As a result, 20 percent odds are ten times higher than the industry's success rate in Alaska, a state that provides America with over 20 percent of its domestic production.

Due to the complex geology of the 1002 area, drilling will definitely be required to define the subsurface values. Drilling should begin immediately in order to inventory and confirm the suspected resources.

North Slope Environment/Experience

The NEPA-mandated EIS process frequently forces new development projects to predict environmental consequences with little or no previous field experience to guide the predictions. For the ANWR Coastal Plain, the test case has already occurred over an 18-year period at nearby Prudhoe Bay. The experience of regulatory agencies combined with that of industry in the Arctic environment provides convincing evidence that the 1002 area can be developed with minimal environmental impacts.

The Resource Development Council agrees with the DEIS in that "the evidence generated during the 18 years of exploration and development at Prudhoe Bay indicates minimal impact on wildlife resources. Hence, it is reasonable to assume that development can proceed on the coastal plain and generate similar minimal effects."

Development of Prudhoe Bay has enabled the industry and regulatory agencies to spend millions of dollars and hundreds of man-years to research the interaction of fish and wildlife with oil field development. As a result, the North Slope is one

of the most-studied ecosystems in North America. This fact should be clearly stated in the final report in light of charges by non-development interests that very little study has occurred and that much more is needed before development is allowed.

The Council strongly concurs with the statement that "most adverse effects would be minimized or eliminated through carefully applied mitigation, using the lessons learned and technology acquired from development at Prudhoe Bay and from construction of the Trans-Alaska Pipeline System (TAPS)."

It should be pointed out that the worst-case scenarios adopted by non-development interests 15 years ago to prevent construction of TAPS and development at Prudhoe Bay have been proven false. Dire predictions pointing to the destruction of major caribou herds, waterfowl and loss of habitat have simply not occurred. Today healthy caribou herds thrive in the midst of development activities. The Central Arctic herd, whose summer range includes Prudhoe Bay and Kuparuk oil fields, has not only grown, but multiplied in size.

Most of the highly-speculative environmental concerns that we hear today by those opposing development in the 1002 area are similar to those aired in the 1970s to discourage construction of TAPS. The public should recognize that the dire predictions being made today are unwarranted and in fact have already been proven false through environmentally-sound development at Prudhoe Bay.

Development Impacts

The Resource Development Council believes that the small loss of habitat represented by development in the 1002 area will not impact growth or productivity of caribou. Habitat is not currently preventing the growth of the Porcupine herd since the herd's large population has remained far below the carrying capacity of the Coastal Plain. A small reduction in total range should not significantly alter the herd's population. Given existing technology, coupled with the potential size of any anticipated discovery, development in the refuge would comprise an extremely small portion of the 1002 area, which itself represents only eight percent of the refuge.

Since habitat is not limiting the continued growth and survival of the herd, conclusions within the report regarding displacement of maternal cows or bulls carry little significance. As a result, loss of access to small portions of available habitat due to oil field development will have minimal impact on the herd.

There has been some degree of displacement of caribou at Prudhoe Bay due to habitat alterations. However, habitat is not limiting caribou populations for any Alaskan herds. Therefore, a small degree of habitat alteration as a result of development on the Coastal Plain will have an insignificant impact on the growth and productivity of the Porcupine caribou herd.

In defining management goals for a herd, a key ingredient is the concept of habitat carrying capacity. Neither the Central Arctic Herd nor the Porcupine Herd approach the carrying capacity of their ranges based on food, calving habitat, insect relief or any other habitat basis. It is an established fact that the total habitat has never been fully occupied, and that caribou populations have maintained densities much lower than the maximum dictated by habitat.

Since habitat is not limiting growth, ample room exists to accommodate development interests in the 1002 area without impacting the size or growth of the Porcupine herd. This point should be strongly emphasized in the net conclusions of the 1002 report.

The report correctly points out in Chapter II that wide annual variations in calving distribution frequently occur due to weather patterns and the timing of spring thaw. The acknowledged effect of weather erodes the core calving area concept and points out the wide annual variability and adaptability of caribou. In 1983 and 1985, about 74 percent of the Porcupine herd calved in the 1002 area. In 1984, only 35 percent of the herd calved in the area. These figures clearly show the adaptability of the herd to yearly variations in weather conditions and point out that calving distributions do vary widely. This shows that caribou have calved in other places outside the "core calving area" without harm.

The "core calving area" for the Porcupine herd has been arbitrarily defined as an area where high density calving has occurred for at least 5 of the last 14 years. High density calving has occurred in some of this area in 9 of the 14 years, which strongly indicates that calving has occurred outside the "core calving area" anywhere from 5 to 9 years. The facts show that caribou calve anywhere on the Coastal Plain, and in large areas outside the plain.

What percentage of all calving areas does the "core calving area" represent? According to Table VI-5, the total "core calving area" is 311,000 acres, while total concentrated calving occurs over 2,117,000 acres. This shows that core calving represents 15 percent of all concentrated calving areas, and would represent an even lower percentage if peripheral calving areas were included. While the core area is important to the herd, it is not necessarily critical since the caribou have successfully calved over very large areas in the past.

However, it has been assumed that areas outside the "core calving area" have reduced habitat values or higher exposure to predators. If this assumption were true, reduced productivity should be apparent from years that the herd calved in alternative ranges. Data show no sign of reduced productivity, but does indicate that the herd has steadily grown since the early 1970s. The record also has shown that caribou have consistently shown flexibility in their habitat requirements.

Skoog (1968) and Bergerud et. al. (1984) believe that caribou are not habitat limited. Shank (1979) states that "...northern large mammals (excepting sheep) are most likely not often resource limited suggesting that at least some degree of distributional alteration could be accommodated without drastic demographic consequences."

Given the frequent variability of calving across the Coastal Plain and the flexibility of caribou in their habitat requirements, and the fact that alterations can be accommodated without drastic demograhic consequences, the Resource Development Council asks that conclusions regarding the relative importance of the Jago Highlands as a core-calving area be de-emphasized throughout the report.

The Resource Development Council believes that the "unique and irreplaceable" nature required for designating habitat as Resource Category 1 does not pertain to caribou calving habitat as indicated in the report. It has yet to be proved that the Porcupine herd has a specific "core" calving area that is unique and irreplaceable. The herd's calving concentrations vary each year, some falling within the same general areas, while in other years separated by hundreds of miles. Members of the herd calve in a range that spreads over 200 miles in an east-west distance and over an area exceeding 6,500 square miles, larger than the state of Connecticut. In 1982, the majority of the herd calved east of the Alaska border in Canada. In 1986, much of the herd calved outside the 1002 area. It is indeed a misconception that a "core" calving

area exists as a specific tract of land with fixed boundaries, used consistently and predictably.

The fact that the Porcupine herd has higher calving densities than the Central Arctic herd at Prudhoe Bay is not sufficient to argue that displacement would likely cause adverse effects. As mentioned earlier, alternative calving habitat is available in sufficient quantities. The large area used by the Porcupine herd for calving and its historical use and success in that habitat indicate this is the case.

Therefore, any arguments against extrapolation of Central Arctic herd data to the Porcupine herd are not valid when based on the fact that the Porcupine herd may occupy habitat in higher densities than the Central Arctic herd. We ask that this point be clearly made in the conclusion of the environmental impacts for Alternative A.

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In regard to insect relief, caribou demonstrate wide variation in their selection and use of insect relief habitat. Although many groups move toward the Arctic Ocean, the report correctly points out that many also move to higher elevations along the mountains. However, we are concerned that the report places undue emphasis on the coastal insect relief habitats while failing to place enough recognition on the wide variations of insect relief habitats. It should also be pointed out that the Prudhoe Bay development pads and roads have created new insect relief habitat and have not

prohibited the Central Arctic herd access to coastal areas. The favorable experience at Prudhoe Bay should be included in the report.

On page six of the report, paragraph five states that "changes in wildlife habitat and wilderness environment could include displacement and reduction in the size of the Porcupine Caribou Herd (PCH). The amount of reduction and its long-term significance for herd viability is highly speculative." (Emphasis added)

We suggest that many of the environmental consequences are overstated and highly speculative. Many of the conclusions of severe impacts and concerns for caribou populations, as presented in the report, are stated as fact, when in actuality, they are highly speculative and not supported by what has taken place at Prudhoe Bay.

It is important to note that the standard used in the 1002 report is "worst case." NEPA as now amended requires that effects be "reasonably foreseeable." The requirement to prepare a "worst case analysis" when faced with incomplete or unavailable information was rescinded last year. Since most of the environmental consequences in the report are based on a worst case analysis supported by inadequate information, a major modification is in order.

The Resource Development Council strongly urges the authors of

the report to reconsider the speculative "worst-case" statements. Due to the "worst-case" bias, RDC asks that those impacts based on a highly-speculative nature be clarified as such throughout the environmental consequences section. This will allow and hopefully ensure that those reading the report are aware of the highly-speculative nature of those conclusions.

We believe it is important to point out that the statement on page 108, paragraph 7 is a major misrepresentation of a study's conclusions. The statement reads: "Based upon the work of Dau and Cameron (1985), caribou are displaced approximately 2 miles out from development...within this 2 mile area of influence are about 357,000 acres of total core calving grounds in the 1002 area."

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In reality, the relationship between calves and distances from the road (Milne Point) is statistically insignificant. Dau and Cameron did find fewer maternal groups near the road than away from it, but the partial displacement was for 2 kilometers, not 2 miles. In addition, their data show a high degree of annual variability. Their data also show that non-maternal caribou were not displaced by the road corridor and that "partial displacement" was shown within a zone of 0-3 km.

Unfortunately, the USFWS uses these data to imply that a complete displacement of all caribou groups occurred out to 2 miles. This is grossly incorrect and we ask that this section be revised to reflect proper study results. Regardless of the

conclusions of partial displacement, it is important to point out that a significant increase in animals occurred in the study area during a period of maximum development.

Other portions of this section should also be revised. For example, Page 109, paragraph 6 states that "if caribou refuse to cross through any development areas, then 194,000 acres would be unavailable as habitat. That area encompasses 52 percent of total insect-relief and over 80 percent of Coastal insect-relief habitats." The hypothesis that the Porcupine herd would be eliminated from virtually all its coastal insect-relief is based on a "worst-case" scenario that the herd would "refuse to cross through any development areas." There are no studies to support the hypothesis that a properly designed pipeline and road would present a total barrier to caribou movements. Yet there are plenty of examples of herds throughout the world regularly crossing through not only properly developed areas, but inproperly designed pipelines.

Regarding the statements within the report on oil spills, it is important to note that while the authors correctly state that the cumulative effect of spills has not been signficant, they completely ignore the main reason for the lack of significant impact. Of the 82,216 gallons spilled in 1985, very little actually reached the environment because the spills were cleaned up very efficiently. Unfortunately, the discussion leads one to assume that all 82,216 gallons went into the tundra.

Most spills occur on snow-covered gravel production pads where they are easy to spot and cleanup. Those which occur in the summer and off the gravel pads are treated with sorbent pads and rehabilitation and revegetation procedures.

Given industry's good record and the fact that spills are routinely cleaned up before they harm the environment, we take exception to statements such as the one on page 100, paragraph 8: "The almost unavoidable minor oil leaks and spill...which would contaminate the tundra and, possibly, the aquatic environment..." Spills are easily noticed on ice and snow and rarely escape detection, even in quantities of less than one gallon. A mixture of snow and oil can be easily scooped up by a snow shovel or front end loader.

The Council urges the authors to either delete or clarify the statement within the report that reads: "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge." This statement is contrary to the wildlife population data cited in preceding parts of the report which point out the relatively low abundance of wildlife species and the relatively short period of use of the 1002 area.

In addition, we stress that the authors acknowledge that the 30-mile section of the Coastal Plain from the 1002 area east to the Canadian border and further into Canada will remain as wilderness.

The report currently fails to recognize that 500,000 acres of the ANWR Coastal Plain is designated wilderness. Even with full leasing under Alternative A, this section will remain untouched, thus preserving the complete spectrum of arctic ecosystems represented in the Arctic Refuge.

The USFWS, in assessing the environmental consequences of possible oil and gas development in the 1002 area, has focused its impact analyses on loss of habitat value and has quantified its impact conclusions in terms of acres lost. Assuming a direct correlation between acres of habitat available and the population sizes of resident species, USFWS has translated its projections of acres lost to population reductions.

The Resource Development Council does not believe that this simplistic approach to biology justified primarily on the basis of the USFWS Mitigation Policy was ever examined by the agency for its scientific validity in the arctic. The mitigation policy is built on the management of habitat as a means of managing the productivity of fish and wildlife populations.

However, we agree with the Alaska Oil and Gas Association that it is inappropriate to use a habitat-based system to manage a population when habitat availability has not been shown to be a mechanism by which that population is regulated. This policy is especially out of place in the arctic where habitat has not been shown to be a limiting factor for caribou. Data clearly supports

the finding that herd size is regulated by direct mortality due to predation.

The Resource Development Council believes that the current policy of focusing on habitat serves no biologically meaningful purpose. A biologically effective approach to assessing and mitigating effects of development on wildlife would be to first determine systematically how project activities and structures will adversely affect a population and then apply mitigation measures that would avoid or minimize disturbances to the population.

The USFWS Mitigation Policy should not be the foundation for impact analysis or mitigation requirements in the arctic. The foundation for impact analysis and mitigation requirements should be based on well-established principles of applied ecology and range science.

Some repondents have suggested that "more study" is required before Congress can make an informed decision on whether to open the Coastal Plain. The draft report contains all the data necessary for Congress to make an informed decision. The call for "more study" is primarily an attempt by those who would like to delay the project forever. Americans must understand that the Coastal Plain region is one of the most studied environments in the world.

In concluding, the Resource Development Council for Alaska,

Inc., strongly endorses Alternative A, full leasing of the 1002 study area, as the most acceptable alternative consistent with the national interest.

Submitted by: Assemblyman Kubitz

Prepared by: Assembly
Budget Analyst

For Reading: November 25, 1986

AR No. 86-288

ANCHORAGE, ALASKA

DATE 11-25-86

A RESOLUTION OF THE MUNICIPALITY OF ANCHORAGE SUPPORTING EXPLORATION IN THE ARCTIC NATIONAL WILDLIFE REFUGE (ANWR) COASTAL PLAIN

WHEREAS, most other potential Alaska basins have been tested with ~~disappointing~~ varying results, and

WHEREAS, the Arctic National Wildlife Refuge has the highest potential of any unexplored region in the onshore United States, and

WHEREAS, the development of new domestic hydrocarbon supplies is a crucial factor in the national interest, and

WHEREAS, oil and gas activities on the North Slope provide significant economic benefits to federal and state governments and to Alaskans in general, and

WHEREAS, it is a proven fact that the petroleum industry can explore and develop while protecting fragile environments.

NOW THEREFORE, the Anchorage Municipal Assembly resolves that Alaska's elected federal officials should, in all due haste, press forward with appropriate legislation to facilitate the exploration and potential development of the Arctic National Wildlife Refuge Coastal Plain.

PASSED AND APPROVED by the Anchorage Assembly this 25th day of November, 1986.

Chairman

ATTEST:

Municipal Clerk

EJG:vk
A:EJG046a.TXT

O-375

AMBLER CITY COUNCIL

RESOLUTION ON THE ANWR COASTAL PLAIN

RESOLUTION 86-07

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress reserved the discretion to decide if the 1.5 million acres will be opened for further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts, and

WHEREAS, the United States must prepare to develop domestic petroleom resources if it is to preclude overwhelming dependence on foreign petroleom sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleom resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudue Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resouces to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas reserves; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans;

THEREFORE BE IT RESOLVED THAT City Council of Ambler, Alaska strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

PASSED AND APPROVED this 11th day of December, 1986, by a majority vote of the City Council of Ambler, Alaska.

ATTEST:

Harry Brooks Sr.
Clerk

William Grant
Mayor

O-376

RECEIVED JAN 2 1 1987

Brevig Mission City Council
General Delivery
Brevig Mission, Alaska 99785
907-642-3851

RESOLUTION ON THE ANWR COASTAL PLAIN

Resolution 87-01

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts, and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to drive revenues including portions of bonuses, royalties and rents from oil and gas developement; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, developement and production will generate increased employment and business opportunities for all Alaskans and all Americans;

THEREFORE BE IT RESOLVED THAT Brevig Mission City Council strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

Walter Seetot, Mayor Walter Seetot

Leonard C. Olanna, Vice Mayor

Rita Olanna, Secretary

Elmer Seetot, Jr., Treasurer

Leonard Adam, Member

Elmer Olanna, Member

Steven Olanna, Member

Dated this 9th day of January, 1987.

Attest: Arlene Adam
City Clerk

O-377

RECEIVED [illegible] 87

CITY OF ELIM
Resolution 87-2

A Resolution on the ANWR Coastal Plain.

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts, and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development, and production; and

WHEREAS, facilities developed to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U. S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas developement; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans;

NOW THEREFORE BE IT RESOLVED THAT Elim City Council strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

PASSED AND APPROVED by a DULY CONSTITUTED QUORUM of the ELIM CITY COUNCIL this 5th day of JANUARY 1987.

Frederick Brailey

Frederick Brailey, Mayor

ATTEST: Josie Nakarak

Josie Nakarak, City Clerk

CITY OF HAINES, ALASKA

RESOLUTION NO. 86/87-9

A RESOLUTION ON THE ALASKA NATIONAL WILDLIFE REFUGE COASTAL PLAIN.

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans;

O-379

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF HAINES, ALASKA, strongly urges the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration.

PASSED AND APPROVED THIS 1ST DAY OF OCTOBER, 1986.

April S. Lapham

April S. Lapham, Mayor

ATTEST:

Karen Gilland

Karen Gilland, City Clerk

S E A L:

Introduced by: Mayor/Glick
Date: Nov. 18, 1986
Vote: 13 Yes, 1 No
Action: Adopted

KENAI PENINSULA BOROUGH

RESOLUTION 86-160

URGING CONGRESS TO OPEN THE ARCTIC NATIONAL WILDLIFE REFUGE TO OIL AND GAS EXPLORATION AND DEVELOPMENT.

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge and is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the Coastal Plain in a safe, responsible manner without significant adverse environmental impacts; and

O-380

WHEREAS, the United States must develop additional domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a congressional decision to open the Coastal Plain to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the Coastal Plain to the Trans-Alaska Pipeline may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the state of Alaska stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development on the ANWR Coastal Plain; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and Americans;

NOW THEREFORE, BE IT RESOLVED BY THE ASSEMBLY OF THE KENAI PENINSULA BOROUGH:

Section 1. That the Kenai Peninsula Borough Assembly strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

Section 2. That borough clerk shall send copies of this resolution to Donald P. Hodel, U.S. Secretary of the Interior; to Governor Cowper; U.S. Senators Frank Murkowski and Ted Stevens; and to U.S. Representative Don Young.

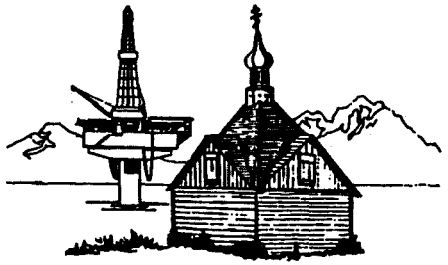
ADOPTED BY THE ASSEMBLY OF THE KENAI PENINSULA BOROUGH ON THIS 2nd DAY OF December, 1986.

Jonathan W. Sewall

Jonathan W. Sewall, Assembly President

ATTEST:

Borough Clerk



CITY OF KENAI
"Oil Capital of Alaska"
210 FIDALGO KENAI, ALASKA 99611
TELEPHONE 283-7535

December 23, 1986

TO: All Concerned

FROM: John Williams
Mayor

I felt there is an urgent need to advise you of our position concerning ANWR, and have decided to include you on a personal mailing of our resolution. We are all aware of the fact that ANWR may produce the next economic generation for Alaska and with that in mind I am sure I can depend on each of you to stay abreast of the developments affecting ANWR as they occur.

JW:jw

O-381

Suggested by Mayor Williams

RESOLUTION 86-120

A RESOLUTION OF THE COUNCIL OF THE CITY OF KENAI, ALASKA, URGING CONGRESS TO OPEN ANWR COASTAL PLAIN TO OIL AND GAS DEVELOPMENT

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 Million acres of land, amounting to approximately 5% of the entire State landmass, and

WHEREAS, the Coastal Plain is approximately 8% of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas, and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves, and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development, and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans.

THEREFORE BE IT RESOLVED BY THE COUNCIL OF THE CITY OF KENAI, ALASKA that the Council strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

PASSED BY THE COUNCIL OF THE CITY OF KENAI, ALASKA this 17th day of December, 1986.

JOHN J. WILLIAMS, MAYOR

ATTEST:

Janet Whelan, City Clerk

CITY OF KOTZEBUE

RESOLUTION 86-37

A resolution urging the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistantly demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the State, Regional and village corporations stand to derive revenues including portions of bonuses, royalties and rents from oil and gas development from potential land swaps; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans;

THEREFORE BE IT RESOLVED THAT the City Council of the City of Kotzebue strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and productiion.

Passed and approved this 18th day of December, 1986.

Willie Goodwin
Mayor, City of Kotzebue

A T T E S T:

Walter Sampson
City Clerk, City of Kotzebue

CITY COUNCIL OF MOUNTAIN VILLAGE

P.O. BOX 32085
MOUNTAIN VILLAGE, ALASKA 99632
(907) 591-2929 or (907) 591-2232

RESOLUTION 86 - 014

WHEREAS, Alaska's Arctic National Wildelife Refuge includes more than 19 millian acres of land, amounting to approximately five percent of the entire state landmass, and;

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas, and;

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production, and;

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts, and;

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century, and;

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production, and;

WHEREAS, facilities developed to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed, and;

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves, and;

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development, and;

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans;

O-383

THEREFORE BE IT RESOLVED THAT City Council of Mtn. Village strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

ATTEST: Joni Wilde
City Clerk

Edward F Beans
Mayor

RECEIVED FEB 4 1987

Resolution No. 87-01

RESOLUTION ON THE ARCTIC NATIONAL WILDLIFE REFUGE (ANWR) COASTAL PLAIN.

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans.

THEREFORE BE IT RESOLVED, that the City of Nulato strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

DATE: January 22, 1987

Mayor

Vice-Mayor

O-384

ATTEST:

Member

Member

Member

Member

Member

CITY OF OUZINKIE

RESOLUTION 86-15

RESOLUTION ON THE ANWR COASTAL PLAIN

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign pertoleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans;

RESOLUTION ON THE ANWR COASTAL PLAIN

WHEREAS, Alaska's Artic National Wildlife Refuge includes more than 19 million of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its abliity to operate in conditions similar to those found on the coastal plain in a safe, resopnsible manner without significant adverse enviromental impacts, and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st centry; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands, offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production; and

WHEREAS, facilities develop to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues to including portions of bonuses, royalties and rents from oil and gas developement; and

WHEREAS, opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans and all Americans;

THEREFORE BE IT RESOLVED THAT City of (NEW STUYOHOK) strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentlly responsible oil and gas exploration, development and production.

city clerk

CITY OF PORT HEIDEN

Resolution 86-45

RESOLUTION ON THE ANWR COASTAL PLAIN

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate incresased employment and business opportunities for all Americans:

THEREFORE BE IT RESOLVED THAT the Port Heiden City Council strongly urges the Conress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

PASSED and APPROVED by the PORT HEIDEN CITY COUNCIL this 11 day of November, 1986

Olof Matson
Mayor

Pamela Christensen
Attested by Clerk

CITY OF SOLDOTNA

RESOLUTION 86-49
(Introduced by City Manager)

A RESOLUTION URGING CONGRESS TO OPEN A PORTION OF THE ARCTIC NATIONAL WILDLIFE REFUGE TO OIL & GAS EXPLORATION AND DEVELOPMENT

WHEREAS, the the Arctic National Wildlife Refuge contains about 1.5 million acres of coastal land between Prudhoe Bay and the Canadian Border which represents the largest and, perhaps, last remaining on-shore deposit of oil in the United States; and,

WHEREAS, this land is a part of a 19 million acre parcel of the Arctic National Wildlife Refuge of which 17.4 million acres has already been closed to the development of natural resources; and,

WHEREAS, the U.S. Congress is expected to decide whether this coastal plain should be opened to oil and gas exploration or whether it should be fully pledged and set aside as a national wildlife refuge; and,

WHEREAS, the Soldotna City Council desires to let its opinions be known prior to the Congresssional debate on this issue;

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF SOLDOTNA, ALASKA AS FOLLOWS:

Section 1. A finding is made that sufficient acreage of the State of Alaska has been already been pledged to wildlife preservation and that the remainder should be opened to resource development to further enhance the economy of this state and the nation.

Section 2. Congress is urged to open the coastal plain of the Arctic National Wildlife Refuge for environmentally responsible oil and gas exporation and production.

Section 3. The City Clerk is directed to send a copy of this Resolution to Alaska's Congressional Delegation and the Resource Development Council for Alaska, Inc. to facilitate a demonstration of state wide concensus on this issue by responsible Alaska organizations.

ADOPTED this 1st day of October, 1986.

Mayor

ATTEST:

City Clerk

CITY OF WRANGELL, ALASKA

RESOLUTION NO 09-86-258

A RESOLUTION OF THE COUNCIL OF THE CITY OF WRANGELL, ALASKA, URGING THE CONGRESS OF THE UNITED STATES TO OPEN THE ARCTIC NATIONAL WILDLIFE REFUGE OIL RANGE TO ENVIRONMENTALLY RESPONSIBLE OIL AND GAS EXPLORATION, DEVELOPMENT AND PRODUCTION.

WHEREAS, Alaska's Arctic National Wildlife Refuge (ANWR) includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the oil range to further exploration, development and production; and

O-388

WHEREAS, the facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, National energy security depends on the development of domestic oil and gas resources to replace depleted U. S. Reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans;

NOW, THEREFORE BE IT RESOLVED BY THE COUNCIL OF THE CITY OF WRANGELL, ALASKA , strongly urges the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development production.

PASSED AND APPROVED SEPTEMBER 23, 1986

MAYOR

ATTEST: Janice K. Henderson
CITY CLERK

Certified a true and correct copy of the original filed in my office.

Janice K. Henderson
City Clerk 9-24-86
City of Wrangell, Alaska

CITY OF VALDEZ, ALASKA

RESOLUTION NO. 8634

A RESOLUTION URGING CONGRESS TO OPEN THE ANWR OIL RANGE TO ENVIRONMENTALLY RESPONSIBLE OIL AND GAS EXPLORATION, DEVELOPMENT AND PRODUCTION.

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 18 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, approximately eight percent of the refuge, known as the ANWR oil range, is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress must decide in the near future if the 1.5 million acre oil range will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the twenty-first century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR oil range are dependent upon a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF VALDEZ, ALASKA, that the City of Valdez strongly urges the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

CITY OF VALDEZ, ALASKA

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 18 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, approximately eight percent of the refuge, known as the ANWR oil range, is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress must decide in the near future if the 1.5 million acre oil range will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the twenty-first century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR oil range are dependent upon a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF VALDEZ, ALASKA, that the City of Valdez strongly urges the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

CITY OF VALDEZ, ALASKA

John Devens, Mayor

ATTEST:

Jim Watson, City Manager/City Clerk

O-389

ALASKA STATE CHAMBER OF COMMERCE

RESOLUTION

Adopted October 1, 1986
Fairbanks, Alaska

WHEREAS, the Arctic National Wildlife Refuge (ANWR) includes more than 18 million acres of land; and

WHEREAS, approximately 8% of the refuge known as the coastal plain is considered highly prospective for the discovery of large quantities of oil; and

WHEREAS, Alaska's petroleum industry during the past 15 years has demonstrated its ability to operate on the North Slope in a safe, responsible manner without adverse environmental impact; and

WHEREAS, development of the oil and gas resources would benefit the State of Alaska by job creation, royalty and tax income; and,

WHEREAS, the United States must develop domestic petroleum resources for national security reasons;

THEREFORE be it resolved that the Alaska State Chamber of Commerce urges the 100th Congress of the United States to open the coastal plain of the Arctic National Wildlife Refuge to environmentally responsible oil and gas exploration, development and production.

Jim Rynearson, Chairman

October 1, 1986

George Krusz, President

October 1, 1986

O-390

RESOLUTION 86-09

ANWR COASTAL PLAIN

Alaska's Arctic National Wildlife Refuge includes more than 19 million acres of land, amounting to approximately five percent of the entire state landmass, and

the Coastal Plain is approximately eight percent of the refuge, it is considered to be highly prospective for the discovery of large quantities of oil and gas, and

Congress has reserved the discretion to decide if the 1.5 million acres will be opened to further exploration, development and production, and

the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the coastal plain in a safe, responsible manner without significant adverse environmental impacts, and

the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century, and

the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR Coastal Plain would be enhanced by a Congressional decision to open the coastal plain to further exploration, development and production, and

facilities developed to transport petroleum resources on the coastal plain to Pump Station One may allow marginal discoveries between the ANWR Coastal Plain and Prudhoe Bay to be developed, and

national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves, and

the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development, and

opening the ANWR Coastal Plain to further exploration, development and production will generate increased employment and business opportunities for all Alaskans;

THEREFORE BE IT RESOLVED THAT the Anchorage Chamber of Commerce strongly urges the Congress of the United States to open the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

APPROVED BY THE Anchorage Chamber of Commerce Board of Directors this 21st day of November, 1986.

Ken Calhoon
President

Wayne K. Beckwith
Executive Vice President

O-391

415 F Street, Anchorage, Alaska 99501-2254 (907) 272-2401

COMMON SENSE FOR ALASKA
P.O. BOX 202087
ANCHORAGE, AK 99520-2087

RESOLUTION ON THE ANWR OIL RANGE

WHEREAS, Alaska's Arctic National Wildlife refuge includes more than 18 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, approximately eight percent of the refuge, known as the ANWR oil range, is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, the petroleum industry has consistently demonstrated its desire and ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

O-392

WHEREAS, Common Sense for Alaska Inc., in its February 1986 report, Coming to Grips with Runaway State Spending, recommended optimizing the state's natural resources assets by, "Maximizing land use through multiple use classifications.....eliminating road blocks, whether in permitting, regulatory control or taxation"; and

WHEREAS, the Congress of the United States must take the necessary legislative action to permit access, exploration and subsequent development of the Arctic National Wildlife Refuge.

Now, therefore, be it resolved that Common Sense for Alaska, Inc., whose goals include fiscal responsibility in government, and private sector vs. public sector emphases on economic development, strongly urges the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

Executive Director for

Jack Hayes
President
Common Sense for Alaska, Inc.

RECEIVED DEC 1 1 1986

THE GRANGE

AMERICA'S FAMILY COMMUNITY FRATERNITY

Northland Pioneer Grange No. 1
P.O. Box 2304
Palmer, Alaska

December 8, 1986

Robert M. Frederick, Legislative Director
National Grange
1616 H Street N.W.
Washington, D.C. 20006

Dear Mr. Frederick;

The Northland Pioneer Grange No. 1 discussed the need for a congressional decision regarding oil exploration in Alaska's Arctic National Wildlife Refuge at our meeting on November 20, 1986.

O-393

Our Grange agreed to support a resolution drafted by the Resource Development Council for Alaska, Inc. in regard to ANWR. It is the opinion of the Northland Pioneer Grange that additional exploration and knowledge of petroleum reserves is of great value to Alaska and the entire U.S. I don't have the latest book of the National Grange Legislative Policies but in several previous ones the National Grange has supported the development of domestic energy reserves in a manner that would minimize any impact on the environment. The enclosed ADC resolution seems consistent with the National Granges stand on energy and Alaska would appreciate any support that could be generated in regard to getting the Congress to approve further exploration in the 1.5 million acres of ANWR proposed for exploration. The Alaska congressional delegation would be helpful in supplying any information you may be interested in.

Thank you very much for any support you can generate.

Sincerely,

Sig Restad

Sigmund H. Restad, Master for 1987

Enclosure

cc: Resource Development Council for Alaska, Inc.
file

GREATER KETCHIKAN CHAMBER OF COMMERCE
Resolution on the
ANWR (ARCTIC NATIONAL WILDLIFE REFUGE)

WHEREAS: Alaska's Arctic National Wildlife Refuge includes more than 18 million acres of land, amounting to approximately 5% of the entire state land mass; and

WHEREAS: Approximately 8% of the refuge, known as the ANWR oil range, is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS: Congress must decide in the near future if the 1.5 million acre oil range will be opened to further exploration, development and production; and

WHEREAS: The petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS: The United States of America must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st Century; and

WHEREAS: The value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR oil range are dependent upon a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS: Facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

O-394

WHEREAS: National energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS: The nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS: Opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans:

THEREFORE, BE IT RESOLVED THAT the Greater Ketchikan Chamber of Commerce strongly urges the Congress of the United States of America to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

DATED at KETCHIKAN, ALASKA this 18th day of September, 1986.

Joy E. Clark

Joy Clark
President
Greater Ketchikan Chamber of Commerce
P.O. Box 5957
Ketchikan, AK 99901

MA

THE CHAMBER
GREATER SEATTLE CHAMBER OF COMMERCE

ADOPTED

by the

BOARD OF TRUSTEES

of the

GREATER SEATTLE CHAMBER OF COMMERCE

January 13, 1986

The Greater Seattle Chamber of Commerce supports opening the Arctic National Wildlife Refuge's Coastal Plain to environmentally responsible oil and gas exploration, development and production.

O-395

BACKGROUND

When Congress passed the Alaska National Interest Lands Conservation Act of 1980, it in effect "locked up" approximately 19 million acres of land now known as the Arctic National Wildlife Refuge (ANWR) by designating it a wilderness area. At the same time, Congress commissioned the Department of Interior to evaluate the 1.5 million acre Coastal Plain for its oil and gas potential and for the effect of oil and gas exploration and development on the environment. The five year study was released November 24, 1986, recommending Congress enact legislation making the Coastal Plain available for oil and gas leasing and authorize the Secretary of the Interior to impose appropriate measures to protect refuge resources. The Coastal Plain is regarded by geologists as the most promising area for major discoveries of oil and gas in North America. Published estimates indicate potential reserves which could be as great as Prudhoe Bay and the Kuparuk fields. (Prudhoe Bay oil reserves are declining. Lead times from discovery to first production are long in Alaska--at least 10-15 years.)

During the coming months, the U.S. Congress will decide whether the Coastal Plain should be opened to oil and gas exploration, development and production or preserved as a wilderness area. Opening the Arctic National Wildlife Refuge Coastal Plain to environmentally responsible oil and gas development is not just a state of Alaska issue. It is a national issue that must be decided in Washington, D.C., and the outcome could have substantial economic impact.

1200 ONE UNION SQUARE SEATTLE WASHINGTON

National Security and economic stability depend on sufficient ongoing quantities of domestic oil production. Increased domestic oil product can minimize the possibility of economic disruption due to dependence on foreign oil and help towards decreasing the nation's trade deficit. Presently, one-third of the trade deficit is caused by the purchase of foreign oil and according to the Department of the Interior's report, contributions from the Coastal Plain would save $8.1 billion in the year 2005 on the cost of imported oil.

In addition to the national interest in providing for future energy needs, the opening of the Coastal Plain could represent billions of dollars in business opportunities for the private sector.

During the past fifteen years, Alaska's petroleum industry has demonstrated its ability to operate on the North Slope in a safe, responsible manner without significant adverse environmental impact.

This decision has come after reading the material available, inviting and hearing the Resource Development Council Inc. present the case for opening the Coastal Plain to oil and gas exploration and development, inviting and hearing the Sierra Club present the case for closing the Coastal Plain to oil and gas exploration, and reading the United States Department of Interior's report concerning the Coastal Plain of ANWR.

Opening ANWR's coastal plain to oil and gas exploration and development is supported by the U.S. Department of the Interior, the U.S. Department of Fish and Wildlife, Alaska Oil and Gas Exploration, Alaska State Chamber of Commerce, Resource Development Council for Alaska, Inc., Arctic Slope Regional Native Corporation, and the Interstate Oil Compact Commission.

OPPOSITION

The decisions to be made about opening the ANWR Coastal Plain to exploratory drilling and potential petroleum development are controversial. The Sierra Club, Defenders of Wildlife, The Natural Resources Defense council, the Trustees for Alaska, and the Northern Alaska Environmental Center feel that if oil is found, pressure will build to develop the rest of the refuge. These organizations say that exploration on the 1.5 million-acre refuge would disrupt the porcupine caribou herd estimated at between 160,000 and 200,000. This area is where they breed and calve. Opponents fear the herd will diminish if their calving grounds are developed and want the Coastal Plain added to the 19 million acre wildlife refuge and preserved as an untouched area for arctic wildlife.

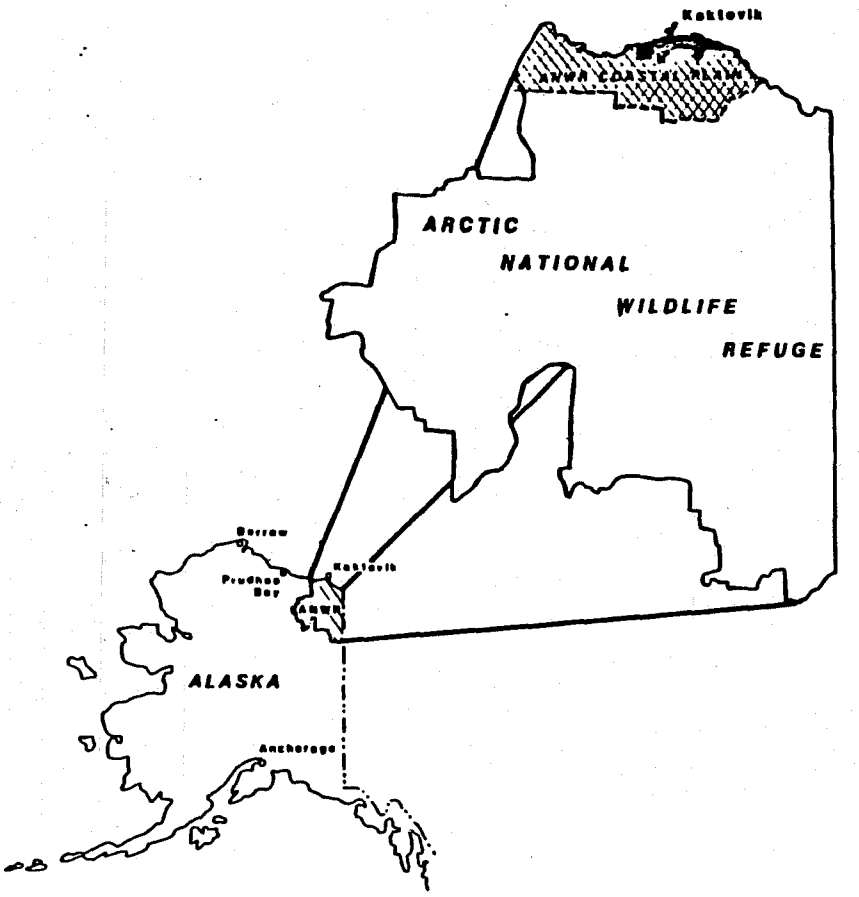
Opponents claim the situation of the central herd is different from the porcupine herd, so it is not possible to make good extrapolations about what might happen to the herd if ANWR is opened for oil and gas exploration. The secretary's reports state that the Central Arctic caribou herds have increased from 3,000 in 1972 to over 13,000 in 1986. While circumstances are somewhat different between Prudhoe Bay and the Coastal Plain, this evidence of responsible oil development concurrent with increased wildlife activity at Prudhoe Bay leads them to be quite optimistic about oil development in the Coastal Plain without significant negative effects on the wildlife resources.

IMPLEMENTATION

Upon approval of the recommendation, communication will be forwarded to each member of Washington's congressional delegation urging their support of the opening of the coastal plain of Alaska's Arctic National Wildlife Refuge to environmentally responsible oil and gas exploration, development and production.

****

ANWR's Coastal Plain



ARCTIC NATIONAL WILDLIFE REFUGE (ANWR) - 19 Million Acres

ANWR COASTAL PLAIN
Section 1002 Study Area - 1.5 Million Acres

KAKTOVIK INUPIAT CORPORATION/ARCTIC SLOPE REGIONAL CORPORATION LANDS

RECEIVED DEC 1 5 1986

BoV EC

PORT of TACOMA U.S.A.***

December 10, 1986

Throughout 1986, the Port of Tacoma has taken major steps to increase its visibility and involvement with Alaska. With both Sea-Land and Totem Ocean Trailer Express (TOTE) serving the Alaska trade from Tacoma (along with TOTE's new barge service, Alaska Barge Lines) the Port of Tacoma has become the New Gateway to Alaska, handling over 65% of all waterborne commerce to the State.

However, our interest and commitment to Alaska go far beyond our shipping lines. We realize that the economies and futures of Washington and Alaska have a great deal in common. That's why we established a "Partner Port" relationship with the Port of Anchorage in September. That's why a team of Port Commissioners and staff attended the Alaska State Chamber of Commerce Convention in Fairbanks in October. We were there to talk, and we were there to listen. And the clear message we received, time and time again, was that the Arctic National Wildlife Refuge (ANWR) issue would be a key political issue for not only Alaska, but also for the entire United States during 1987.

I am pleased to tell you that on December 1, 1986, the Port of Tacoma Commission officially adopted a resolution urging Congress to open up the coastal plain of ANWR to environmentally responsible oil and gas exploration, development and production.

We have already started working with our local media to educate them on this important matter, and we are also working to let our elected officials in Washington State know just how important this issue is for the future of our State. We will be expanding these efforts during 1987.

I believe the ANWR issue helps illustrate how closely the future of Alaska and Washington are tied together, and gives us an excellent opportunity to work together to improve that future.

Sincerely,

Rod Koon
Director, Port Relations

good job! BO

O-397

P.O. Box 1837 • Tacoma, Washington 98401 • Telephone (206) 383-5841 • TWX 910-441-2646 • Telex 32-7473

RESOLUTION ON THE ANWR OIL RANGE

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 18 million acres of land, amounting to approximately five percent (5%) of the entire state landmass; and

WHEREAS, approximately eight percent (8%) of the refuge, known as the ANWR oil range, is considered to be highly prospective for the discovery of large quantities of oil and gas; and

WHEREAS, Congress must decide in the near future if the 1.5 million acre oil range will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR oil range are dependent upon a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, the Port of Tacoma is the New Gateway to Alaska, handling over 65% of all waterborne commerce to Alaska; and

WHEREAS, the Port of Tacoma is a Partner Port of the Port of Anchorage, and is working to cooperate on areas of mutual interest; and

WHEREAS, the continued economic growth and development of Alaska is important to the continued growth and development of Tacoma and Washington State; and

WHEREAS, numerous businesses in the Tacoma-Pierce County area have major markets in Alaska; and

WHEREAS, the Port of Tacoma has ample area available for module construction work; and

WHEREAS, opening the ANWR oil range to further exploration, development and production is expected to generate construction, shipping and business opportunities for the Port of Tacoma, the entire Tacoma-Pierce County region, and the State of Washington;

BE IT THEREFORE RESOLVED THAT THE PORT OF TACOMA COMMISSIONERS strongly urge the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

ADOPTED by the Commission of the Port of Tacoma at its regular meeting held on the 1st day of December, 1986, a majority of the members of the Port Commission being present and attested by its Secretary under the official seal of said Commission in authentication of its passage this 1st day of December, 1986.

O-398

_____
President of the Port Commission,
Port of Tacoma

ATTEST:

_____
Secretary of the Port Commission,
Port of TAcoma

adopted Dec. 1, 1986 – see attached memo for confirmation

December, 1986

Resolution
to the
Board of Directors
of the
Tacoma-Pierce County Chamber of Commerce
from the
Alaska Committee

SUBJECT: Arctic National Wildlife Refuge (ANWR) Oil & Gas Exploration, etc.

POLICY: The Chamber supports opening the ANWR Coastal Plain to environmentally responsible oil and gas exploration, development and production.

BACKGROUND: Virtually every state has experienced the economic benefits of oil production from Alaska's North Slope, especially Washington and particularly Tacoma. But future jobs will depend on new discoveries of oil, since the major planned facilities are now in place. In addition to the money federal government receives from petroleum lease bonuses, rentals, royalties and excise and income taxes, the oil industry has spent more than $25 billion in North Slope development in goods and services purchased in all 50 states during the last five years.

Specific benefits to Tacoma from further oil exploration and development include:

- Increased tonnage through the Port of Tacoma, and therefore revenues to the Port. TOTE and Sea-Land together ship over 65 percent of all waterborne freight to Alaska.

- Manufacturing and construction of modules used in oil recovery would provide jobs at Parsons in Tacoma. Parsons supplied the North Slope modules during Prudhoe Bay development. The last major sealift left this summer (1986).

- Indirect benefits through employment and manufacture of secondary products used for oil recovery.

The ANWR Coastal Plain is 8 percent of more than 18 million acres of wildlife refuge.

Congress this year will decide whether it is in the national interest to open the Coastal Plain to exploration or to close off the area as wilderness. Representative Morris Udall (D-AZ) has promised to introduce legislation to designate ANWR as protected wilderness. A Department of Interior study released November 23, 1986, termed the Coastal Plain "the most outstanding frontier oil and gas area in the U.S."

O-399

The four issues identified in the early debate have these comments:

- National security and economic stability depend on sufficient ongoing quantities of domestic oil production. Remember the oil embargo? The whole oil industry has had an impact on the Port of Tacoma, in employing plumbers, pipefitters, longshoremen and others involved in shipments to Alaska.

- ANWR's oil potential is huge. The Coastal Plain is America's best prospect for new discoveries of domestic petroleum to replace dwindling supplies.

- The environmental record in Arctic Alaska provides positive proof than sensible development can coexist harmoniously with wildlife. The issues have been identified and successfully dealt with in the development of Prudhoe Bay and the construction of the Trans-Alaska pipeline.

- The caribou of the Central Arctic Herd calve and spend their summers on the coastal plain of Alaska--in the Kuparuk and Milne Point (Prudhoe Bay) oil fields. There's every reason to believe the Porcupine Caribou Herd, whose summer range includes the Coastal Plain of ANWR, would likewise adapt and prosper.

IMPLEMENTATION: Inform our Congressional delegation of the Chamber position and our reasons for that position. Work to develop media recogintion of the importance of ANWR development on the local economy. Work to develop coalitions for support of ANWR development.

RESOLUTION ON THE ANWR OIL RANGE

WHEREAS, Alaska's Arctic National Wildlife Refuge includes more than 18 million acres of land, amounting to approximately five percent of the entire state landmass; and

WHEREAS, approximately eight percent of the refuge, known as the ANWR oil range, is considered to be highly prospective for the discovery of large quantities of oil and gas: and

WHEREAS, Congress must decide in the near future if the 1.5 million acre oil range will be opened to further exploration, development and production; and

WHEREAS, the petroleum industry has consistently demonstrated its ability to operate in conditions similar to those found on the oil range in a safe, responsible manner without significant adverse environmental impacts; and

WHEREAS, the United States must prepare to develop domestic petroleum resources if it is to preclude overwhelming dependence on foreign petroleum sources in the 21st century; and

O-400

WHEREAS, the value and development potential of state-owned tidelands and federally-owned OCS lands offshore of the ANWR oil range are dependent upon a Congressional decision to open the oil range to further exploration, development and production; and

WHEREAS, facilities developed to transport petroleum resources on the oil range to Pump Station One may allow marginal discoveries between the ANWR oil range and Prudhoe Bay to be developed; and

WHEREAS, national energy security depends on the development of domestic oil and gas resources to replace depleted U.S. reserves; and

WHEREAS, the nation stands to derive revenues including portions of bonuses, royalties and rents from oil and gas development; and

WHEREAS, opening the ANWR oil range to further exploration, development and production will generate increased employment and business opportunities for all Americans;

THEREFORE BE IT RESOLVED THAT Seward Chamber of Commerce strongly urges the Congress of the United States to open the ANWR oil range to environmentally responsible oil and gas exploration, development and production.

U.S. Chamber of Commerce
1615 H St., NW
Washington, DC 20062

News Department (202) 463-5682

NEWS

FOR IMMEDIATE RELASE

Contact: Frank Benson

U.S. CHAMBER'S BOARD URGES CONGRESS TO PERMIT EXPLORATION OF ALASKAN ARCTIC WILDLIFE REFUGE

WASHINGTON, Nov. 13 -- Publicly owned lands that may be among the nation's richest sources of oil and natural gas should receive Congressional exploration approval, and efforts to close off the area permanently to future exploration and development should be rebuffed, the U.S. Chamber of Commerce stated today.

The Chamber's policy-setting board of directors, at its regularly scheduled fall meeting here this week, called for Congress to enact legislation to determine the extent of reserves in Alaska's Arctic National Wildlife Refuge (ANWR). Such lands were withdrawn from exploration and development with enactment of the 1980 Alaska National Interest Lands Conservation Act, which provided that Congress must specifically authorize any drilling in ANWR's coastal plains.

That area may contain more oil and gas reserves than Alaska's Prudhoe Bay area, and many consider the coastal plain as containing one of the nation's most promising areas for new domestic reserves of crude oil. In light of such a potential, the Chamber's board decided, Congress should authorize exploratory efforts to ascertain the extent of the reserves and should reject efforts to declare the entire coastal plain as wilderness and permanently off-limits for any exploratory or producing efforts.

Acting on recommendation of the business federation's 22-member Natural Resources Committee, the Chamber's board declared that finding new domestic reserves of oil and natural gas is critical to reducing the nation's dependency on imports -- up 37 percent from last year -- and to curbing the country's foreign trade deficit of which one-third represents payments for foreign oil products.

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86-204

O-401

. cc RDiamond

EC

MA for resolution file OIL-19

Alaska State Legislature

Senate

SENATOR
ROBERT H. ZIEGLER, SR.
307 BAWDEN STREET
KETCHIKAN, ALASKA 99901

WHILE IN JUNEAU
PO BOX V
JUNEAU, ALASKA 99811

MEMBER
SENATE JUDICIARY COMMITTEE

SELECT COMMITTEE ON LEGISLATIVE ETHICS

WESTERN STATES LEGISLATIVE
FORESTRY TASK FORCE

EXECUTIVE COMMITTEE
WESTERN LEGISLATIVE CONFERENCE
COUNCIL OF STATE GOVERNMENTS

ALTERNATE MEMBER
NATIONAL CONFERENCE OF STATE LEGISLATURES
STATE AND FEDERAL ASSEMBLY
COMMITTEE ON
FEDERAL TAXATION, TRADE AND ECONOMIC DEVELOPMENT

September 30, 1986

O-402

Ms. Joy Clark, President
Greater Ketchikan Chamber of Commerce
Box 5957
Ketchikan, Alaska 99901

Dear Joy:

When Paula and I returned from a legislative conference the latter part of last week, I found your ANWR resolution. Coincidentally, at the Western Legislative Conference meeting, I cosponsored a similar resolution which passed the conference rather handily at its business meeting.

You might consider having me (or Lloyd Jones, as the case may be), try to pass a similar resolution through the State Legislature comes January.

Regards,

Bob

Robert H. Ziegler, Sr.

10/7/86
Paula -
thought you might like a copy of this for your info.
Jan

DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print BOYD J. BROWNFIELD, PRES.

Name RESOURCE DEVELOPMENT COUNCIL OF AK

Mailing Address 807 "G" STREET SUITE 200

ANCHORAGE AK 99501

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☒ I am speaking for RESOURCE DEVELOPMENT COUNCIL
(please enter name of organization you represent)

O-403

Resource Development Council for Alaska, Inc.

807 "G" Street, Suite 200, Anchorage, Alaska 99501-3440
Box 100516, Anchorage, Alaska 99510-0516 - 907/276-0700

DRAFT TESTIMONY OF THE RESOURCE DEVELOPMENT COUNCIL

ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"

ANCHORAGE, ALASKA
JANUARY 5, 1987

GOOD MORNING. I AM BOYD BROWNFIELD, PRESIDENT OF THE RESOURCE DEVELOPMENT COUNCIL FOR ALASKA, INC. (RDC). RDC IS A PRIVATE STATEWIDE ECONOMIC DEVELOPMENT ORGANIZATION COMMITTED TO THE ORDERLY DEVELOPMENT OF ALASKA'S RESOURCES. THE BROADLY BASED MEMBERSHIP OF OUR COUNCIL COMES FROM A WIDE RANGE OF ECONOMIC, SOCIAL, GEOGRAPHIC AND ETHNIC SECTORS OF ALASKA. OUR MEMBERSHIP REPRESENTS INDIVIDUALS, COMPANIES TRADE ASSOCIATIONS, NATIVE CORPORATIONS, UNIVERSITIES, CHAMBERS OF COMMERCE, AND MUNICIPALITIES THROUGHOUT THE STATE.

THE RESOURCE DEVELOPMENT COUNCIL STRONGLY SUPPORTS THE OPENING OF THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE TO OIL AND GAS EXPLORATION AND PRDOUCTION. THERE ARE MANY GOOD REASONS WHY THE OPENING OF EIGHT PERCENT OF THE REFUGE TO OIL AND GAS LEASING IS IN THE NATIONAL INTEREST

DEVELOPMENT OF WORLD-CLASS OIL DEPOSITS IN THE REFUGE PROPOSED FOR LEASING WOULD PROMOTE ECONOMIC DEVELOPMENT, REDUCE OUR DEPENDENCE ON FOREIGN OIL, PROMOTE ORDERLY DEVELOPMENT IN THE ABSENCE OF AN ENERGY CRISIS, INCREASE REVENUES FROM TAXES AND ROYALTIES,

STRENGTHEN NATIONAL SECURITY INTERESTS, RESTRAIN THE NATIONAL TRADE DEFICIT AND CREATE THOUSANDS OF NEW JOBS.

WE MUST NOT BE BLINDED BY A TEMPORARY OIL GLUT. BEFORE TOO LONG, AMERICA COULD BE FACING AN ENERGY CRISIS OF UNMATCHED PROPORTIONS.

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Resource Development Council
for Alaska, Inc.
807 "G" Street, Suite 200, Anchorage, Alaska 99501-3448
Box 100510, Anchorage, Alaska 99510-0510 - 907/276-0700

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ORAL TESTIMONY OF THE RESOURCE DEVELOPMENT COUNCIL

ENVIRONMENTAL IMPACT STATEMENT
"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"

WASHINGTON, D.C.
JANUARY 9, 1987

THE RESOURCE DEVELOPMENT COUNCIL FOR ALASKA, INC. (RDC) IS A PRIVATE STATEWIDE ECONOMIC DEVELOPMENT ORGANIZATION COMMITTED TO THE ORDERLY DEVELOPMENT OF ALASKA'S RESOURCES. THE BROADLY BASEI MEMBERSHIP OF OUR COUNCIL COMES FROM A WIDE RANGE OF ECONOMIC, SOCIAL, GEOGRAPHIC AND ETHNIC SECTORS OF ALASKA. OUR MEMBERSHIP REPRESENTS INDIVIDUALS, COMPANIES, TRADE ASSOCIATIONS, NATIVE CORPORATIONS, UNIVERSITIES, CHAMBERS OF COMMERCE, AND MUNICIPALITIES THROUGHOUT THE STATE.

THE RESOURCE DEVELOPMENT COUNCIL STRONGLY SUPPORTS THE OPENING OI THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE TO OIL AND GAS EXPLORATION AND PRDOUCTION. THERE ARE MANY GOOD REASONS WHY THE OPENING OF EIGHT PERCENT OF THE REFUGE TO OIL AND GAS LEASING IS IN THE NATIONAL INTEREST.

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22 January 1987
[BY FEDERAL EXPRESS]

US Fish & Wildlife Service
Att'n: Division of Refuge Management
2343 Main Interior Building
18th & C Streets NW
Washington DC 20240

Dear Sir or Madam:

This letter comments on the Department of the Interior's Draft *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment*, which recommends opening to full oil and gas leasing the coastal plain of the Arctic National Wildlife Refuge (the "1001 area"--a reference to §1002 of the Alaska National Interest Lands Conservation Act).

These comments deal with the Draft's grossly inadequate and misleading treatment of two issues: national energy needs and policies, and the economic evaluation of the 1002 area. Other issues are no doubt being dealt with by other reviewers. A summary of my qualifications is attached.

Omission of energy-efficiency alternative

The most fundamental flaw in the Draft--one which in my opinion renders it useless as a basis for informed decisionmaking--is that it does not even mention, let alone analyze, the most attractive alternative to increased oil extraction[1], whether in the 1002 area or elsewhere. That alternative is *the more efficient use* of energy in general and of petroleum products in particular. As the *1985 National Energy Policy Plan*--on which the Draft relies for its energy projections and supply-side goals--states at pp. 5 and 13:

> Energy conservation: an integral part of the energy triad. [Energy conservation] has proven to be the most expeditious way to reduce the need for new or imported energy resources, and in fact it now contributes more to balancing our national energy ledger than does any single fuel source. Despite a 21% increase in the number of U.S. households since 1973, for example, current total energy consumption in the U.S. household energy sector is almost the same as it was twelve years ago. Savings in the industrial, commercial, and transportation sectors are similarly impressive. Even if current energy prices remained stable or declined moderately, it would appear to be economically feasible to continue efficiency gains at a substantial pace for the next 25 years.
>
> Conservation--our largest single resource. Conservation contributes more to balancing the national energy ledger today than any single fuel source. If pre-1973 trends in energy use had continued, DOE calculates that Americans would have consumed about 29 quads[2] more of primary energy than they actually did in 1984. This compares with approximately 21 quads supplied that year by domestic petroleum, 20 quads of U.S. coal produced, and 18 quads of domestic natural gas. Conservation has come chiefly from increased efficiency in the use of energy, and from a shift in the nation's mix of goods and services toward less energy intensiveness. The energy productivity of the U.S. economy...has increased 28% during the decade from 1974 to 1984, and rose 14% in the last four years of that period alone.

[1] I use this term rather than the traditional "production" because it more accurately describes the process. Oil was produced geological ages ago; all we know how to do is dig it up and burn it.

[2] One quad (quadrillion or 10^{15} BTU) is equivalent to 0.47 million barrels of oil per day.

The Draft irrationally ignores all demand-side options, even as its Chapter VII cites the same DOE document as the authoritative official statement of the need for and benefits to be derived from additional *supplies* of domestic oil.

The case for primary attention to the demand side can be stated even more strongly. Since 1979, the United States, according to Energy Information Administration statistics, has gotten more than 50 times as much new energy from more efficient use as from *all* net increases of energy combined. (Moreover, of those increases, more new energy has come from sun, wind, water, and wood than from oil, gas, coal, and uranium: renewable sources now total at least a tenth of the Nation's total primary supply, and the fastest-growing part, outpaced only by savings.). Yet the Draft assumes that only more oil itself--not more efficient use of the oil we already have--can meet national needs.

The functional equivalence of oil and oil efficiency is well established. For example, the *1983 National Energy Policy Plan* states at p. 3 that of three "particularly important" areas "of energy programs and action,"

> The first is energy conservation, which ought to be viewed by policymakers, producers, and consumers as a significantly important energy resource. That is, energy conservation should be seen as a set of actions that individuals and businesses can take that are cost-effective alternatives to new supply development. Energy conservation actions are often cheaper and easier to undertake, and they often make good business sense. Since the energy price shocks of the 1970s, energy use per dollar of gross national product has declined steadily; and important energy-efficiency improvements have occurred in a host of areas, from automobiles to homes and office buildings and manufacturing processes. These accomplishments, coupled with the stability of energy prices in general and the lowering of world oil prices within the past year, should not obscure the fact that further gains can still be made. Conservation is, and will remain, an important component of the available energy resource mix.

Since 1973, according to the Energy Information Administration's *Monthly Energy Review* (August 1986, p. 12, data to mid-1986), the United States has reduced the energy intensity of its GNP by 25% and its oil and gas intensity by 36%. OPEC's market share, too, has been cut roughly in half. Yet this was done with such straightforward measures as a 37%-more-efficient car fleet (*id.*, p. 15, preliminary 1985 data *vs.* 1973), caulk guns, and duct tape. Still untapped is the potential offered by newly commercial technologies vastly more powerful, cost-effective, and sophisticated than these. For example, an improved insulating gas used to fill spectrally selective windows--a proven technology entering the market in the first quarter of 1987--raises the potential saving of these windows, when eventually they are fully used in the Frostbelt, to *more than one Trans-Alaska Pipeline's worth* of saved oil which therefore need not be supplied. Such "negabarrels," unlike actual barrels, do not run out and do not harm the environment.

Even with 1980 technologies, the most detailed Federal assessment of the practical potential for raising energy productivity found[3] that it would be very cost-effective to fuel in the year 2000 an American economy 80% larger than that of 1977, with 22-29% *less* fuel than was actually used directly (excluding that used to make electricity) in 1977. That is, more, bigger, and more fully equipped and comfortable buildings could by 2000 be using 58% less total direct fuel than in 1977; industry could add 48% more value while using 6% less fuel; and transportation could increase by 30-70% for personal driving, 60-90% for personal air travel, and 80% for freight, while transportation fuel

[3] Solar Energy Research Institute, A New Prosperity: Building a Sustainable Energy Future, Brick House (Andover MA), 1981, 462 pp.).

needs dropped by 15-35%. Even these potential savings were quite conservative at the time[4], and have become even more so with age.

Energy-saving technologies are now entering the market so quickly that most of today's best electricity-saving devices were not on the market a year ago; the same was true a year ago; and it is now about six times as cost-effective to save electricity as it was five years ago. Very detailed analyses by this Institute have shown that full use of today's best electricity-saving technologies would deliver the same or improved services while saving half of U.S. electrical use at zero net cost, or three-quarters of U.S. electrical use at a cost below 1.5¢/kW-h--less than the cost of *operating* a fossil- or nuclear-fueled power plant, even if building it were free. Unfortunately, since 1981 the Department of Energy, on whose Energy Research Advisory Board I served in 1980-81, has lost most of its capability to analyze modern energy-saving techniques. DOE's projections of future energy needs therefore take little account of these new developments and hence substantially exaggerate likely future demand[5]. That exaggeration inflates the "need" for oil from the 1002 area, and understates the importance of demand-side alternatives to it.

A major study[6] for the Defense Civil Preparedness Agency, in which the President of this Institute and I were Principal Investigators, examined major oil-saving opportuniteis in the U.S. economy. We found, in addition to many individually smaller but collectively large opportunities, two essentially untapped supergiant "oilfields," each bigger than the biggest in Saudi Arabia, and each capable of sustainably producing (not just temporarily extracting) over five million barrels of oil per day at costs of a few dollars per barrel. One of these "oilfields" is in our attics: it is the "weatherization oilfield" of oil, and natural gas fungible for oil, which could be saved by basic insulation, reglazing, and weatherstripping of sievelike American buildings. The other "oilfield" is under Detroit: it is the "accelerated-scrappage-of-gas-guzzlers" oilfield, representing the savings available by getting Petropigs off the road faster and replacing them with efficient cars[7]. Either of these oilfields could *eliminate* U.S. oil imports--before a synfuel plant, power plant, or 1002-area oilfield ordered today could deliver any energy whatever, and at a tiny fraction of its cost. Either of these "oilfields" could produce in, say, 2005 about eight times as much oil as the Draft contemplates for a successful development program in the 1002 area. Both of these "oilfields" would achieve every national policy goal which the Draft presents as a justification for leasing in the 1002 area, but neither would have significant environmental impacts. It is thus absurd, and contrary to NEPA, to exclude these and other energy efficiency options from the Draft's, and policymakers', informed consideration. The authors of the Draft appear to have artificially restricted their choice of alternatives so as to appear to support a predetermined position, rather than to conscientiously seeking to compare the full range of choices available to achieve the same policy goals.

Energy security issues

The same DCPA analysis[8] documented in detail why frontier projects like North Slope oil extraction do not improve, and may well reduce, national energy security. The same objections, such as vulnerable tanker traffic, which apply to oil from the Mideast (Draft, p. 164) apply also to Alaskan oil, in spades. The Trans-Alaska Pipeline, for example, has been found by the U.S. Army to be utterly indefensible; it runs for nearly 600 miles over some of the roughest and least hospitable terrain in the world, yet is accessible by road or float plane over most of its length. Although its proprietors apparently do not think they have a security problem, TAPS has *already* been repeatedly shot at and bombed; fortunately, these attacks have so far been incompetent. One of the TAPS pumping stations blew itself up by accident in 1977; had it been a northern instead of a southern station, and in the winter, some nine million barrels of hot oil could probably have congealed in a few weeks into the world's largest Chapstick[9]. Even in good weather, the cost of failure in TAPS's oil delivery is measured in hundreds of dollars per *second*; yet it would take as long as seven *months*, with good weather and smooth logistics, to replace a large section of the labyrinth of 48-inch pipe at the system's north end.

Such a fragile supply link can actually interrupt a larger fraction of U.S. oil supply, for longer, with fewer alternatives, than a complete embargo of Arab oil. TAPS, according to the Draft, carries a fifth of U.S. crude oil input, whereas U.S. net imports from Arab OPEC countries accounted in 1985 for only 3% of U.S. petroleum products supplied, and all OPEC countries, for only 12%. Simple, low-technology, probably anonymous and undetectable, and certainly unpreventable sabotage to TAPS therefore presents today a *greater* threat to America's energy security than any conceivable interruption of oil imports from the Mideast. Increasing dependence on TAPS (and additional, equally vulnerable facilities to gather oil from the 1002 area and deliver it into TAPS) would therefore *de*crease, not increase, national energy security. As our DCPA analysis showed in detail, energy efficiency--coupled with the more diverse, dispersed, renewable supply system now emerging in the marketplace--is the key to true energy security.

Investing *one year's* budget for the Rapid Deployment Force (meant to seize Mideast oilfields) in a good weatherization program would about eliminate all U.S. imports of oil from the Mideast[10]. Until energy efficiency programs receive more than Federal budget cuts and benign neglect, it is hard to take seriously the kinds of handwaving "national security" rationales presented in the Draft.

Economic benefits claimed

Similar fallacies lurk in the Draft's treatment of balance-of-trade benefits (even neglecting the likelihood that area-1002 oil would be exported to Japan, under a revised

[4] See e.g. A.B. Lovins et al., Least-Cost Energy: Solving the CO_2 Problem, Brick House, 1981 (an analysis commissioned by the German Federal Environmental Agency). Copies are available from Rocky Mountain Institute.

[5] I say this from the perspective of an analyst who, unlike DOE, has correctly foreseen the major trends in energy demand for the past decade, by paying attention to the emerging competition between energy supply and improved energy efficiency, and assuming that consumers would behave rationally--as, to the discomfort of the energy industries, they largely did.

[6] Published as a book, Brittle Power: Energy Strategy for National Security, Brick House, 1981. Copies are available from Rocky Mountain Institute.

[7] For example, Brittle Power showed that rather than building synfuel plants, the U.S. would save more oil, faster and cheaper, by giving a free 40+-mpg car to anyone who would scrap his or her Brontomobile so that nobody would ever drive it again; or by paying a cash bonus of several hundred dollars for every mpg by which your new car improved on your old car which you scrapped. These kinds of numbers were agreed, in a recent meeting of the International Association of Energy Economists, to be realistic--but were said to be too sensible to affect Federal energy policy! For more such examples, see A.B. Lovins et al., Energy Unbound: A Fable for America's Future, Sierra Club (San Francisco), 1986.

[8] And a lay summary published in The Atlantic Monthly, November 1983, pp. 118-126.

[9] The operators are said to believe that their pumps are powerful enough to move even cooled-off oil, but that capability is controversial and has never been empirically verified.

[10] It is plausible that least-cost investment of the sums which would be required to find and deliver oil from area 1002 might achieve the same result, but the Draft does not present enough cost data to permit such a calculation.

statute such as the oil industry is earnestly seeking for TAPS output, rather than used in the United States). Energy efficiency produces far more benefit to the balance of trade than new domestic oil supplies can, partly because cheap efficiency, unlike costly oil, directly improves the competitiveness of U.S. industry in world markets. Efficiency investments themselves also tend to have a high labor-intensity and a relatively low capital-intensity. Frontier oil facilities have the opposite characteristics, and hence tend to reduce, not increase, net employment by starving other sectors for capital.

Efficient energy use also has a vastly larger potential for economic benefits to the Nation than all the unexplored hydrocarbon provinces combined. For example, national energy bills in 1984-85 ran about $430 billion, plus another ~$50 billion or more in direct Federal subsidies to the energy sector[11]. This total energy bill of about $480 billion a year would be about $150 billion a year higher still if the U.S. were as energy-inefficient today as it was in 1973. Yet if Americans were now as energy-efficient as their Western European competitors are--and those Europeans are still far short of cost-effective efficiency levels themselves--then U.S. energy bills would fall by an additional *$200 billion per year*--about enough to balance the Federal budget. And if we simply chose the best energy buys at each opportunity for the rest of this century, the resulting cumulative net savings by 2000 could be several *trillion* 1987 dollars--about enough to pay off the entire National Debt. The hoped-for benefits of area-1002 oil would be about 200 times smaller than that. Yet no policymaker reading the Draft could be expected to gain that essential perspective on the decision presented--to appreciate that the main alternative *omitted* can yield, over the same 30-90 years, hundreds of times as much benefit, without the proposed action's costs.

Exaggeration of benefits

Moreover, the Draft seriously exaggerates those potential economic benefits of area-1002 oil. For purposes of this review, I shall *assume* that the probabilistic analysis of the recoverable hydrocarbons likely to be found in area 1002 is correct in every respect, even though no evidence is presented for the past reliability of the methods and models used, and the main assumptions which drive the economic model are in an unpublished paper which has apparently not received the critical peer review normal in published scientific literature. I shall further *assume* that the 10% real discount rate used is consistent with the level of risk in the project, although it appears unlikely that free-market investors would be willing to invest for such returns in a project with a stated 81% probability of finding *no* oil economically recoverable even at high oil prices. Subject to these assumptions, the Draft's economic assessment of area 1002's hydrocarbon prospects includes the following major flaws:

- Only an unusually careful reader would note that *all of the stated probabilities* of finding various amounts of oil, and obtaining various economic benefits, *are fivefold too high*. This is because all those probabilities are "conditional" on there being *any* economically recoverable oil in area 1002 at all, and the probability of *that* occurrence is estimated at ~0.19 (pp. 49, 68, 72, etc.). Thus the *overall* probability of finding >1.0 billion economically recoverable barrels is only ~15%; the overall probability of a very large (9.2 billion recoverable bbl) reserve would be only 1%; and the probability that "the estimated [mean-case] 3.2 billion barrels of recoverable oil would be foregone" under Alternative E is not unity but ~0.19, there being an ~81% probability that wilderness designation would actually forego no benefit whatever, but only costs. Yet the Executive Summary *nowhere mentions* this fivefold exaggeration of the probabilities which the reader is invited to infer. Such a consistent relegation of this fivefold factor to technical fine print leaves an unfortunate impression of dishonesty.
- The ~19% stated probability of finding economically recoverable oil, the size of the reserves corresponding to various probabilities, and the economic benefits of those reserves *all depend sensitively on the future price of oil assumed*. No sensitivity test is provided for this crucial variable. Yet the $33 base-case price assumed (1984 $) for the year 2000 is a point estimate from a DOE model which is already badly outdated[12]. For example, another major model equally well regarded by mainsteam energy modellers--that of the Gas Research Institute--used in 1985 a reference-case year-2010 U.S. refiners' crude acquisition cost ($56.97 in 1984 $) virtually identical to that of the reference case of the 1985 DOE model on which the Draft relies[13] ($56.77 in 1984 $). Yet *one year later, GRI's preliminary 1986 model showed a 32% lower oil price in 2010--only $38.33*[14]. Presumably, the 1986 DOE/NEPP model will show somewhat similar behavior[15], although its 1986 runs have not yet been published and were not used or cited in the Draft.
- Such price volatility makes the Draft's conclusions *utterly meaningless*, because the minimum economically recoverable size of an oilfield in the 1002 area, and hence the probability of finding one or more such fields, will depend very sensitively on the oil price assumed. It would not be surprising, for example, if a 30-50% drop in the assumed oil price in 2010 reduced the stated 19% probability of finding any economically recoverable oil in the 1002 area to less than 5%. No data are presented from which this sensitivity can be calculated; the 5% is an illustrative guess on my part. Whatever the change actually turned out to be, not only the *probabilities* of finding various amounts of economically recoverable oil, but also the economic *value* of that oil would depend on the price assumed. It is therefore plausible that a more realistic and up-to-date estimate of long-term oil price could reduce the mean-case present-valued internal benefit of the oil (to be set against all its external costs) from the stated $14.6 billion (1984 $) to ~$5-10 billion, while greatly reducing the probability of realizing *any* benefit from the irreversible loss of the 1002 area's non-hydrocarbon resources.
- As an illustration of the uncertainty of long-term oil prices, the Gas Research Institute's draft 1986 baseline forecast includes a "consensus" of oil experts' estimates of the real oil price in 2000-2010. That "consensus" embraces a range of values spanning a range of *more than fourfold*[16]--yet the Draft nowhere even hints that future oil prices are highly uncertain or that such uncertainty can

[11] These have been exhaustively researched at RMI by H.R. Heede, whose publications are available from the Institute. For a preliminary summary, see The Wall Street Journal, 17 September 1985, p. 28. The direct energy bill of $430 billion a year probably excludes minor expenditures for certain renewable sources on which the Department of Energy does not keep statistics.

[12] Actually, the cited source does not give a base-case 1984-$ world oil price in 2000 of $33/bbl, but rather of $36.75, and a U.S. refiners' acquisition cost of ~$36.98. This discrepancy is apparently unexplained.

[13] National Energy Policy Plan Projections to 2010, DOE/PE-0029/3, December 1985, at p. 2-5.

[14] I.e., $39.61 in 1985 $, converted to 1984 $ using the GNP implicit price deflator. See D.A. Dreyfus, "Preliminary 1986 GRI Baseline Projection of U.S. Energy Supply and Demand," 4 August 1986 paper to GRI Seventh Annual Joint Board of Directors/Advisory Council Energy Seminar.

[15] It has done so before. DOE's Table 5-1, at p. 5-5, DOE/PE-0029/3, op. cit., shows that the NEPP-1985 projection of a year-2010 world oil price of $56.77 reflected a 37% drop in two years: the NEPP-1983 projection was $89.95 (both in 1984 $).

[16] DOE itself (id.) notes a year-2010 range of authoritative projections of 2.7-fold.

invalidate its conclusions[17]. Just in the four months from November 1985 to March 1986, the world oil price fell from about $28 to about $12[18]--a sobering reminder of how little confidence "consensus" forecasts merit, even those made months rather than decades into the future[19].

- The Draft reflects an apparent effort to distort readers' perspective of the benefits claimed from leasing. For example, a mean net-present-valued internal benefit of $14.6 billion (p. 165) sounds like a big number in isolation; but it is only ~3% of the Nation's *total* energy bill *for a single year* (and even a smaller fraction of the energy bill in a future year with higher prices and presumably higher consumption). In other words, the Draft recommends destroying important values of the 1002 area for a benefit equivalent, over the 30-90 y of proposed hydrocarbon exploitation (p. 6), to about 0.03% to 0.1% of today's annual national energy bill[20]. Yet it certainly doesn't leave that impression: it artfully invites the reader to suppose that in a national context, the potential benefits of the leasing are truly important.
- The Draft often uses undiscounted benefits to inflate their apparent size even more.
- Similarly, the apparent importance of the potential oil resource is seriously distorted (pp. 165-166) by comparing it with *reserves*--the much smaller quantity which the oil industry has bothered to invest in proving out for short-term extraction. The text correctly, though obliquely, suggests that this is not a fair comparison, but it does not make a fair comparison, which would be far less favorable to the Draft's conclusions.
- The Draft's comparisons of area 1002's potential oil output with national oil needs, imports, etc. similarly rest on a single DOE/NEPP model run, showing 16.5 million bbl/d of demand and 7.6 of imports in 2005. (The model actually shows that demand as declining: 16.9 Mbbl/d in 2000, 16.5 in 2005, and 16.1 in 2010--although the Draft leaves the impression of ever-*rising* demand.) But the Draft does not mention, among other sensitivity tests, a "high-efficiency" DOE/NEPP run[21], described at length in the same report, which would reduce year-2010 liquid-fuel requirements (excluding synfuels and electric utility inputs) by 10%, or 1-2/3 million bbl/d. That is equivalent to *2.5 times* the mean output projected for the 1002 area. Oil imports are likewise shown in that DOE sensitivity run to decline from the Draft's reference case by 19%, or 1½ Mbbl/d, or 2.3 times the mean output from area 1002. The year-2010 world oil price drops by

[17] For a salutary reminder, before the 1985/86 oil price crash, of the "herd instinct" of oil-price forecasters, see The Future of Oil Prices: The Perils of Prophecy, Cambridge Energy Research Associates/Arthur Anderson & Co., 1984.

[18] J.M. Griffen & C.T. Jones, The Energy Journal 7(4):37 (October 1986).

[19] There are fundamental reasons to believe that the world oil price will remain volatile and unpredictable for many decades to come, just as it is for other commodities. In my opinion, it is fallacious to try to project a future oil price as a basis for investment behavior today. If a client asked me to make such a projection, I would instead ask at what oil price the proposed project ceased to be profitable, and then ask the client how much risk he or she wished to take. For what it is worth, however, the two forecasting groups with the best track record in recent years--both correctly called the 1985/86 price crash--expect that with some fluctuations, e.g. if war or peace breaks out in the Middle East, the real oil price will probably vary within the $16-24/bbl range for at least the rest of this century. The mean of that range is about two-fifths below the Draft's point projection.

[20] Expressed differently, the mean-case output of 659kbbl/d in 2005, at the apparent assumed price of $33.7/bbl (1984 $ in 2005), would correspond to a gross output value of ~$1.46 billion (1984 $ present-valued to 1986) per year, or 0.03% of the 1986 national energy bill. The net value, after subtracting costs, would be even less.

[21] DOE/PE-0029/3, op. cit., pp. 4-32 and 4-33.

$2.50/bbl. "In fact, the impacts of these efficiency level changes on the world oil prices is marginally higher than those of [another sensitivity test assuming]...20 percent changes in the U.S. oil and gas resources levels."[22] The Draft, however, doesn't mention any sensitivity tests of or variations on the single demand forecast which it assumes[23]--not even those done by DOE itself in the same place.

- The Draft has an "optimistic" case but no corresponding "pessimistic" case, and does not discuss what plausibility it regards any variant on its base-case as meriting, or why.
- The Draft at pp. 164-5 comes perilously close to double-counting benefits. It gives 1002-area oil credit for avoiding potential disruptions of oil supply (p. 8) when those benefits have already been supposedly achieved, and paid for, by the Strategic Petroleum Reserve. It qualitatively assigns a benefit to the extended utilization of TAPS, without considering that the cost of TAPS is already sunk and is therefore irrelevant to any comparison of the marginal costs and benefits of a new decision.

More broadly, one might reasonably have expected the Department of the Interior, as the appointed steward of the Nation's resources, to discuss the policy implications of domestic oil depletion. The Draft describes the collision between supposedly growing demands and declining domestic oil output[24]. What is one to infer from that collision? That the bottom of the barrel *must* be scraped, in the Refuge and everywhere else, because there is, as the Draft leads one to suppose, simply no alternative? Or that we should instead thoughtfully consider whether postponing the ultimate depletion of the Nation's oil resources by fewer than 200 days[25] is worth the Refuge, given that depletion of the finite resource is inevitable and that whatever alternatives will be used to replace that oil will need to be adopted anyway--either sooner or, in the unlikely event that the 1020 area is fully leased and actually does contain economically recoverable oil, 190-odd days later? If alternatives are available, as presumably they are at some price (since even the Draft is not so apocalyptic as to suppose that the United States will cease to exist on the day its last barrel of oil is depleted), what are the costs and benefits of adopting them some 200 days earlier and *not* leasing the Refuge? Isn't leasing taking a gamble, against stated odds worse than 5:1, that those alternatives will need to be adopted anyway, because no economically recoverable oil will be found even with full leasing of area 1002? The Draft is silent on these central questions: it tacitly assumes that *any* extension of the Nation's oil-resource life, however improbable, damaging, or brief, is worth the price. That approach, as economist Prof. Herman Daly once remarked[26] in another context,

[22] Id., p. 4-30.

[23] For officially recognised alternatives, see e.g. SERI, op. cit., and DOE, Low Energy Futures for the United States, DOE/PE-0020, June 1980. Many independent experts, including me, would regard even these low forecasts as an understatement of how much efficiency is now available, worth buying, and practically achievable by a serious commitment to a competitive energy-service marketplace.

[24] It does not, however, describe how oil-and-gas intensity is continuing to decline even with 1986's remarkably low real prices.

[25] Mean economically recoverable oil, 3.2 billion barrels, divided by the DOE/NEPP model's projected annual consumption of 16.5 million bbl/d in 2005, equals 194 days.

[26] "On Thinking About Future Energy Requirements," typescript, Department of Economics, Louisiana State University (Baton Rouge), 1976.

...is unworthy of any organism with a central nervous system, let alone a cerebral cortex. For those of us who also have souls it is almost incomprehensible in its inversion of means and ends.

The Department of the Interior should not shame its traditions, and expose its honest analysts to ridicule, by proceeding with this mendacious Draft. It needs to be done over.

Sincerely,

Amory B. Lovins
Director of Research

encl: biographical sketch

O-414

BIOGRAPHICAL SKETCH OF AMORY B. LOVINS AND L. HUNTER LOVINS

AMORY AND HUNTER LOVINS work together as analysts, lecturers, and consultants on energy and resource policy in over fifteen countries. Their prophetic analyses have placed them among (in *Newsweek*'s phrase) "the Western world's most influential energy thinkers." They shared a 1982 Mitchell Prize and a 1983 Right Livelihood Award (often called the "alternative Nobel Prize"). A 36-minute, 16mm film on their work, *Lovins on the Soft Path*, got blue ribbons at the American and three other film festivals, and in 1985 *60 Minutes* featured their work.

MRS. LOVINS, 36, earned BA degrees from Pitzer College in political studies and sociology, a JD from Loyola University School of Law with the Alumni Award for Outstanding Service, and an honorary doctorate. For six years she was Assistant Director of the California Conservation Project ("Tree People"), which she helped to establish. A member of the California Bar, she has served on the City of Los Angeles Energy Management Advisory Board, lectured extensively, published many papers, coauthored five books on energy policy, and been 1982 Henry R. Luce Visiting Professor at Dartmouth College. Her current research focuses on resource efficiency and local economic development.

AMORY LOVINS, 39, is a consultant experimental physicist educated at Harvard and Oxford. A former Oxford don, he holds an MA by Special Resolution and five honorary doctorates. He was Regents' Lecturer in the University of California in resource policy (1978) and in economics (1981), Grauer Lecturer in the University of British Columbia, 1982 Luce Visiting Professor at Dartmouth, and 1982 Distinguished Visiting Professor in the University of Colorado. In 1980-81 he served on the Department of Energy's senior advisory board, and in 1984 was elected a Fellow of the American Association for the Advancement of Science "for his book *Soft Energy Paths* and many other noteworthy contributions to energy policy." He has briefed five heads of state, testified at hearings in eight countries and twenty-odd states, and published a dozen books and over a hundred papers. Dr. Alvin Weinberg, ex-Director of Oak Ridge National Laboratory, has called Mr. Lovins "surely the most articulate writer on energy in the whole world today."

The Lovinses' clients have included U.S. and U.N. agencies, the International Federation of Institutes for Advanced Study, OECD, Resources for the Future, the German Federal Environmental Agency, the Science Council of Canada, eleven state governments, the U.S. Navy, and the U.S. Defense Civil Preparedness Agency. As part of their work with managers of electric utilities and related industries in more than thirty states, the Lovinses have briefed, among others, the Energy Committee of Xerox Corporation and the senior managements of Westinghouse Electric Corporation, Royal Dutch/Shell Group, Phillips Petroleum, Bank of America, Allstate Insurance Co., Bonneville Power Administration, Tennessee Valley Authority, Texas Utilities, Public Service Co. of New Mexico, Snohomish PUD, and other public and private utilities. They have addressed Edison Electric Institute functions, the Electric Power Research Institute, an American Public Power Association workshop and annual meeting, the National Association of Rural Electric Cooperatives, the National Association of Regulatory Utility Commissioners, the National Association of State Utility Consumer Advocates, the National Regulatory Conference, California PUC and Brookings Institution utility colloquia, and many other industry groups.

Mrs. Lovins is Executive Director, and Mr. Lovins is Director of Research, of ROCKY MOUNTAIN INSTITUTE, a nonprofit foundation which fosters efficient resource use and global security. RMI's 23 staff explore the connections between energy, water, agriculture, security, and local economic development. Much of RMI's budget ($820,000 in 1987) is earned, mainly by consultancy.

Rural Alaska
Community Action Program, Inc.

February 6, 1987

William P. Horn
U.S. Fish and Wildlife Service
ATTN: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, DC 20240

Dear Mr. Horn:

We appreciate this opportunity to comment on the Draft Report to Congress and Legislative Environmental Impact Statement regarding the coastal plain of the Arctic National Wildlife Refuge. These comments are filed on behalf of the Rural Alaska Community Action Program (RurAL CAP), which works to aid rural Alaskans (principally Natives) bring themselves out of poverty.

O-415

RurAL CAP does not have a formal position on whether the coastal plain should be opened to oil and gas exploration and development, left as a refuge within the national wildlife refuge system, or designated as wilderness. We are concerned, however, that full information be presented to Congress and the rural people of Alaska, so that the best decision can be made. These comments are offered in the spirit of assuring as comprehensive and accurate a report as possible.

The principal concern of rural people, especially Natives, is what the impact of development or wilderness will be on subsistence. We commend you on the frank statements contained in the subsistence section in the report with regard to those impacts, which we feel are generally accurate as far as they go. But nevertheless, certain key areas do not receive sufficient coverage.

First, the report does not adequately discuss impacts of development on users of the Porcupine Caribou Herd other than residents of Kaktovik. The people of Arctic Village principally rely on the PCH for subsistence, and the herd is of great importance to other villages as well, such as Venetie, Fort Yukon, Chalkyitsik, and Old Crow in the Yukon Territory. If there are fewer caribou available for these villages, the impacts could be severe. Congress should be made aware of what might happen to other village residents before it decides whether to allow oil and gas development.

Administration • P.O. BOX 200908, ANCHORAGE, AK 99520 • (907) 279-2511

Second, the report gives very short shrift to coastal impacts. If oil and gas development does occur, then it is quite likely that there will be considerable interest in offshore prospects near the coastal plain. For example, shore-based facilities might be used by offshore rigs, and if oil is found, it might be pumped through a pipeline located on the coastal plain. This sort of associated development could have impacts on key subsistence resources, particularly fish and bowhead whales. The report should therefore focus more carefully on the impacts of associated development.

Relatedly, the report pays very little attention to cumulative impacts, focusing purely on what might happen to the coastal plain. This is insufficient to provide the necessary information to Congress or rural people in Alaska. The report should address a variety of cumulative impacts. A critical deficiency in this regard concerns the Central Arctic Herd, another important source of subsistence, especially for Kaktovik and Nuiqsut. Development of the coastal plain might have the effect of pushing the CAH into an even smaller area, given existing development at Prudhoe Bay. This is particularly important in view of the evidence that cows and calves have been avoiding the areas that have been developed in Prudhoe Bay. The report, however, only looks at impacts due to development on the coastal plain -- it should consider the overall impacts on the CAH, due to development throughout the North Slope.

The report notes that two key issues revolve around where the oil and gas facilities will obtain the needed gravel and water. But having said this, the report is totally silent on where these vital materials will be found, or what the environmental impacts of the various alternatives might be. Given the importance of this issue, and the possible negative impacts, the report should contain a detailed discussion of alternative methods of procurement, and the impacts of each alternative.

The report also is totally silent on development for gas, on the grounds that such development is unlikely. But the conclusion that it is unlikely is only part of the report, for Congress wanted information on what exploration for and development of gas would do to the environment. The report must provide this information.

Finally, we are troubled by the lack of analysis in the actual draft recommendation. That recommendation is for full leasing, and operates on the assumption that full leasing can be accomplished without adverse impacts on fish and wildlife or subsistence. But this conclusion is belied by the analysis of the report itself, which concludes that even with stipulations, effects on caribou and subsistence will be major. The recommendation also points to Prudhoe Bay as an example of how environmentally safe development can proceed, yet the report states unequivocably that the experience with caribou at Prudhoe Bay cannot be applied to the coastal plain of ANWR.

We do not feel that the Department, or Congress, can have it both ways. While as noted above, we do not take a position on what the recommendation ought to be, we feel that it is disingenuous for the Department to claim that development can occur in harmony with the wildlife, given the conclusions of the body of the report. It appears that Congress is faced with a basic choice: whether to allow oil and gas exploration and development in the coastal plain and accept the apparently severe impacts on fish and wildlife and subsistence, or to preserve the status quo, or to select wilderness. The Department's recommendation should recognize this basic choice explicitly, so that all involved know what they are getting into.

Thank you for your attention to these comments.

Sincerely,

Jeanine Kennedy
Executive Director

JK:ct

O-416

SIERRA CLUB
330 Pennsylvania Avenue, S.E., Washington D.C. 20003 (202) 547-1141

February 6, 1987

U.S. Fish and Wildlife Service
2343 Main Interior Building
18th and C Streets, N.W.
Washington, D.C. 20240

Attention: Division of Refuge Management

Dear Sirs:

The Sierra Club has completed its review of the draft Coastal Plain Resource Assessment for the Arctic National Wildlife Refuge. The Sierra Club is an environmental organization with over 400,000 members nationally, and approximately 1,800 members in Alaska.

Sierra Club strongly supports wilderness designation for the entire Arctic National Wildlife Refuge coastal plain. We submit the attached comments for your consideration.

Sincerely,

Michael McCloskey
Acting Executive Director

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The resource assessment is required by Section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980. ANILCA left unresolved the question of whether oil and gas development should be allowed to occur on the Arctic National Wildlife Refuge. The 1002 Report, as it is referred to, is to aid Congress in making its final determination on the disposition of the coastal plain, which may hold significant quantities of oil and gas reserves but also contains preeminent wildlife and wilderness resources.

The Report is therefore a very important document; however, the Department of the Interior refused to allow public review of the Report. Only after a successful lawsuit brought by several conservation organizations was the public given this opportunity. As the steward of publicly owned lands, the Department of Interior seriously breached its responsibility by initially denying citizens this very basic right.

The Department is still not living up to the spirit of the court's judgment for a complete and open review process. The Report should have been submitted to Congress in September of 1986 as required by Section 1002. Instead, the Department chose to release the Report in late November with a brief 60-day review and comment period (later extended by two weeks) that overlapped the holiday season when most people are traveling or otherwise preoccupied.

Concurrent with the review and comment period for this Report was the same period for several other public documents. These include the Beaufort Sea Sale 97 Environmental Impact Statement and an environmental impact statement for a gas pipeline from the North Slope south to the tidewater. Additionally, the Alaska Department of Natural Resources is soliciting comments on Camden Bay Sale 50, which is scheduled for leasing later this year; and the Fish and Wildlife Service is also

conducting its Comprehensive Conservation Plan process for the rest of the Arctic Refuge at this same time.

The public is currently overwhelmed with reports, environmental impact statements, or preliminary analyses. All except one call for oil and gas development in environmentally sensitive arctic coastal and off-shore regions. The impossibility of careful review of each of the proposals limits the useful involvement of concerned and affected individuals. No discussion of cumulative impacts as a result of all this development is presented in any of these documents.

Report Deficiencies

The draft Report omits some critical components that are required by the Alaska National Interest Lands Conservation Act and other applicable laws.

First, Section 1002(c)(B) of ANILCA requires a determination of the carrying capacity for fish and wildlife habitats. Alteration of wildlife habitat caused by the development of oil and gas resources would affect its carrying capacity. Without information on carrying capacity, it is even more difficult to assess potential losses of fish and wildlife resources. This may mean that many of the assessments of fish and wildlife losses contained within the Report are too conservative. Furthermore, no discussion is presented relative to the impact that full leasing would have on the natural diversity of wildlife populations. ANILCA requires the Fish and Wildlife Service to manage fish and wildlife populations and their habitats in their natural diversity.

Second, the Report has not assessed the impact from development of gas resources as required by Section 1002(h)(3). If the aforementioned proposal to construct a gas pipeline is permitted by the Bureau of Land

Management, and construction proceeds, then gas resources of the coastal plain may be judged economical to extract -- contrary to the contention of the Department in the Report that "natural gas is not expected to be economic during the time period considered." Additional industrial activity and support facilities for gas production would increase the impact to fish, wildlife and wilderness resources. The law requires that those impacts be assessed; however, they are not in this Report.

Third, Section 1002(h)(5) requires a discussion of the national need for the oil and gas resources of the coastal plain. Such a discussion is done in a cursory and biased fashion in Chapter VII of the Report. No assessment of national need for oil and gas is complete without a discussion of how alternative energy sources and energy conservation programs could cut the nations's need for oil. Existing or proposed programs in this regard should be cited as part of this examination.

Fourth, in Section 1005 of ANILCA the Department is required to consult with various entities and individuals. This has not been done in a satisfactory manner with either the Government of Candada or the people in several Canadian villages who depend heavily on the international wildlife resources of the coastal plain. This oversight in procedural matters needs to be remedied prior to the Report's finalization.

Finally, since this is an environmental impact statement, the Report must conform to the guidelines stipulated by the National Environmental Policy Act. These guidelines require that an evaluation of cumulative effects be performed. It has not been done in the Report. As mentioned above, current state and federal proposals would result in leasing of state submerged lands and federal outer continental shelf areas adjacent to the coastal plain. In addition to the development in the Prudhoe Bay area, a gas pipeline may also be proposed. The major

cumulative effect to the fish and wildlife resources from all these developments are not analyzed. The Department neglects to examine what additional legal authority would be required to minimize environmental impacts.

In our detailed comments that follow, we elaborate on these and other deficiencies in the draft Report.

Wilderness

The coastal plain is an integral part of vast arctic ecosystem encompassed in a pristine state by the Arctic National Wildlife Refuge and the adjacent Yukon National Park in Canada. The Report notes, in an extremely cursory and inadequate discussion, that "the Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems." Moreover, the coastal plain is the portion of the Arctic Refuge most prolific in wildlife.

The irregular coastline -- formed by barrier islands, ice-choked beaches, and sprawling river deltas -- gives way to an austere and rolling coastal plain. Broken only by braided waterways, the coastal plain stretches northward from the Brooks Range. The mountains here are at their closest to the Beaufort Sea of any point along the entire North Slope, making the galcier-covered peaks stunning sentinels that peer downward on the coastal expanse and outward to the ice pack.

The Department assesses impacts to wilderness solely from the perspective of damage incurred to recreationsists' experiences. Recreation is only one reason for the designation of wilderness areas.

Americans have become increasingly conscious of the need to retain some areas in an undeveloped condition for the intrinsic benefits to society. Wilderness areas provide unparalleled research opportunities. Wilderness areas maintain genetic diversity. Wilderness provides wildlife managers with their most effective management tool for conserving fish and wildlife populations. Wilderness areas epitomize our national heritage. We carved our American society out of the natural world around us. Now we finally have come to the sensible conclusion that we have carved enough, and that we need to retain some, as enacted in the Wilderness Act of 1964.

For a century, intense controversies have occurred between those who recognized wilderness' intrinsic benefits to society and those who could not understand resources as other than commodities to be tapped, harnessed, plowed or scraped: the battle over Hetch Hetchy dam in Yosemite, geothermal development adjacent to Yellowstone, efforts to construct dams in Grand Canyon National Park and Dinosaur National Monument, and attempts to log the forests of Olympic National Park.

The Arctic National Wildlife Refuge represents our country's last chance to preserve intact an arctic ecosystem unique in its natural wonder. To the west lie the Prudhoe Bay industrial area and the National Petroleum Reserve-Alaska, both of which are available for oil and gas leasing and other development. The Beaufort Sea to the north is currently scheduled for oil and gas development. Only 25 miles of coastal plain are currently designated wilderness, out of 1,100 miles of arctic coastline in Alaska. Any development on the coastal plain would not just affect those 1.5 million acres, but a significant portion of the established wilderness area in the Arctic Refuge, as well as a Canadian national park.

The Report is sadly remiss in delving into the importance of this wilderness resource. In its final Report, the Department should cite some of its former employees' writings on this subject. Murie and Calef, noted explorers and researchers, long ago recognized the need to protect this arctic world from encroaching development.

Environmental Consequences

Aside from the inevitable -- and irreparable -- loss of a magnificent wilderness treasure, the coastal plain biota would be seriously harmed by oil and gas development.

In general, the sections of the Report that describe the fish and wildlife resources and detail the environmental consequences of oil and gas development are comprehensive and informative. The executive summary, however, fails to note several critical points that were made in the body of the Report. The recommendation to allow full oil and gas leasing is apparently based without complete regard to these issues, highlighted below.

Caribou

The Porcupine Caribou Herd (PCH) is the fourth-largest herd in North America and the only herd in Alaska whose entire range is almost entirely protected from development. The Arctic National Wildlife Refuge and the adjacent Yukon National Park in Canada were both principally established as sanctuaries for this herd.

The 180,000-head herd is highly migratory in behavior and travels hundreds of miles in a never-ending cycle. The cycle begins with calving on the coastal plain of the Arctic Refuge in late spring, moves through the summer aggregation and fall rut, and ends in its wintering

grounds in the Ogilvie Mountains of Canada and in the interior of Alaska. This cycle has been repeated year after year for eons.

The far western portion of the coastal plain also provides habitat for the Central Arctic Herd (CAH), which at 13,000 animals is approximately one-fourteenth the size of the PCH. The CAH does not migrate extensively and has ample stretches of unconstricted coastal areas on which to calve. Biologists have studied the impacts of development on the CAH for only the last decade or so.

The differences between the two herds are great, and wildlife biologists note that comparisions can only be made with extreme caution. Yet, the executive summary carelessly compares the two herds, and downplays the significance of the differences. The executive summary echoes oil industry claims that experience with its extensive development has shown no adverse effects to caribou and other wildlife resources. This ignores scientific data that demonstrate otherwise.

Impacts from development include displacement from preferred calving habitat. Development also impedes movement to insect-relief areas. That the CAH has not seen a population decline to date means only that it has yet to reach the carrying capacity of available habitat, and was far from such a limit when development of the trans-Alaska pipeline and Prudhoe Bay development began. Moreover, the CAH remains in the vicinity of oil development year-round, and therefore has more time to adjust to industrial activity than would the PCH. The CAH has been further aided by a prohibition on hunting and low predation by other natural predators, which have decreased in numbers since the development at Prudhoe Bay.

More importantly, comparisons cannot be credibly drawn between the two herds because of these additional reasons:

- The absolute density of the PCH on its calving grounds is 14 times that of the CAH. This results in a ratio of more than 50 caribou per square mile for the PCH as opposed to 5 caribou or less per square mile for the CAH.
- The CAH has been displaced from only a small portion of the entire area available for calving, which is equal in size to the PCH calving area. Suitable alternative habitat exists. The PCH, however, will see over a third (38%) of its concentrated calving area list to development under full leasing. No alternative habitat for calving exists. The PCH has calved in the same area for nine of the last fourteen years in which studies have been conducted.

In general terms, the executive summary notes the consequences of oil and gas development to be "some long-term effects on caribou from the Porcupine herd," and foresees that "long-term losses in fish and wildlife resources...would be the inevitable consequences of a long-term commitment to oil and gas development, production and transportation." The executive summary, however, fails to point out just how adversely the caribou of the PCH would be impacted. Field experts predict "a major population decline and change in distribution of 20 to 40 percent." Forty percent of the herd is 72,000 animals. They note that this estimate is uncertain, due in part to lack of relevant experience. The Report, especially the executive summary, needs to clearly distinguish and interpret differences in these herds.

Muskoxen

Muskoxen were extirpated in the last of the 19th century by overhunting. The prehistoric-looking animals were reintroduced in 1969 and have been slowly making a comeback under the careful eye of wildlife managers. They number about 500 animals now.

Development of the oil and gas resources would reverse this trend by displacing muskoxen from as much as 71% of their high-use habitat. Field researchers predict a major population decline or change in distribution of up to 50%. The Report should assess what effect this will have on the statewide population of muskoxen, of which the coastal plain population constitutes one-third.

Polar Bears

The coastal plain of the Arctic Refuge is the only portion of the entire arctic coast of Alaska where researchers have found polar bears to den onshore. The Report falsely states that "the onshore area from the Colville delta to the Canadian border is within the area use by the Beaufort Sea population of polar bears for denning. However, the most consistently used land denning areas were on and adjacent to the 1002 area..."

In 1985, crews transporting materials to an exploratory well site within the coastal plain on Native-owned lands traveled too close to a known den of a pregnant female polar bear. The radio-collared animal later was found to have left her den prematurely, and when she was later tracked and sighted, she had no cubs with her. Presumably, the disturbance caused her to abort her young.

Biologists contend in the Report "that the Beaufort Sea population [of 2,000 animals] can sustain little, if any, increase in mortality." The Report concludes that full-scale development would cause only a moderate impact, "so long as similar intensive developments did not occur along the entire northern coast of Alaska and Canada." Such development is ongoing and proposed throughout the Alaska arctic coastal and outer continental shelf areas, and ongoing in portions of the Canadian outer continental shelf areas.

The polar bear population is now stable. But any additional mortality -- which has already occurred as a result of oil exploration efforts -- will be detrimental to the Beaufort Sea population. This impact will be be exacerbated by similar intensive development elsewhere in the range of polar bears. The Report should thoroughly consider these cumulative effects in making judgments on the degree to which the polar bear population will be affected.

Other Marine and Terrestrial Mammals

Very little is known about the migration and habits of the endangered bowhead and grey whales, or Beluga whales, which are all found in the waters north of the coastal plain, as are ringed, bearded and spotted seals. The assumption in the Report that impacts to these species would be minor neglects consideration of cumulative impacts.

If the coastal plain were opened to oil and gas development, the Report acknowledges that the area would be used extensively as a staging area for off-shore development. Additionally, the prevelant method of extracting oil from arctic off-shore areas is the construction of gravel causeways and islands. The gravel islands and attendant off-shore development would affect feeding areas for the bowhead whales in Demarcation Bay, and disrupt migration routes for all species. The implications need to be assessed in the Report.

Other terrestrial mammals include moose, wolves, grizzly bears, arctic foxes, wolverines and other small mammals. Though each of these species will be affected to one degree or another, no comprehensive discussion of cumulative impacts is contained in the Report. Since this is an environmental impact statement, CEQ regulations (40 CFR Sections 1502.16 and 1508.8) require a discussion of cumulative impacts be done for all wildlife species.

Birds

Of major concern here is the disruption of a major staging area for a variety of migratory waterfowl. Oil and gas development would cause a major population decline and change in distribution of 50% for lesser snow geese, and would also affect other waterfowl and bird species, including the endangered peregrine falcon. For the waterfowl species, development of oil and gas resources would be inconsistent with international migratory waterfowl treaties signed by Canada, Mexico and the U.S. Signatory nations should have been consulted, but were not; this needs to be remedied prior to release of the final Report.

Water Resources and Gravel Extraction

The potential environmental degradation resulting from water and gravel use for exploration, development and production is hardly dealt with in a comprehensive manner. This is one of the most serious shortcomings of the Report. The Report states that not enough water or gravel are available; the lack of water presents a "major engineering obstacle" for the oil industry.

Nearly all of the few lakes, rivers and streams of the coastal plain freeze solid in the winter months. Those that are deep enough not to freeze to the bottom, or that do not freeze entirely because of warm springs, are used by fish for overwintering areas. Likewise, gravel is in short supply on the coastal plain, and is a much-needed material for the construction of well pads, roads, airstrips, port facilities and causeways.

Apparently, the most feasible means of solving both shortages is to mine for gravel in stream and river channels, which would create deep

pools that would remain unfrozen during the winter. If this is the case, then it is difficult to understand how the Department can claim such development would cause only minor impacts to fish resources, especially when the Report in another section notes that taking the amount of water necessary from a water-deficient coastal plain could result in major adverse effects. The effects of this scenario are unsatisfactorily discussed in the Report. More complete discussion should be contained in the final Report.

The Report notes that "populations of slow-growing fish can be affected easily by changes in environmental factors." Some of the anticipated changes could be increased turbidity, decreased water quality, and changes in stream courses, as well as disruptions in the off-shore currents. This will present a much greater impact to anadromous and freshwater species than the Report addresses, and a reassessment of these impacts needs to be conducted in the Report.

Additionally, the effects associated with reserve pits of drilling mud fluid discharges are just now in preliminary stages of study. These investigations have only begun in the last few years on the North Slope. The findings so far are not encouraging, and the scope of study is extremely narrow in these initial stages. Still, results indicate that "along with deterioration in water quality, the quality and quantity of organisms used as food by North Slope bird species may be decreasing." Again, the cumulative effect should be addressed but is not.

Many questions are left unanswered in the discussion of water and gravel resources. Congress is left with incomplete information on which to base its decision to open the area for oil and gas leasing.

Air Quality

Discussion of likely degradation of air qualtity as a result of intensive industrial activity is essentially nonexistent in this document. Four brief paragraphs in Chapter II note that effects on air quality are localized.

Mention is made of arctic haze, an ominous phenomenon of increasing concern. Its implications to the coastal plain are not discussed even though news reports from the past year cite studies that show increased ground temperatures and associated melting of permafrost in arctic Alaska. The ramifications of these changes are unknown, but potentially serious to the arctic biota.

The extent to which emission of pollutants from North Slope industrial activities contributes to this environmental degradation should be looked at closely in the Report. Some characterizations of North Slope industrial emissions place them in the category of a Chicago-sized city. Self-monitoring by industry has made an accurate assessment virtually impossible. Funding is lacking for monitoring and enforcement agencies on the state and federal levels.

This is especially important, given that the coastal plain is prone to temperature inversions, which concentrate pollutants nearer to the ground and inhibit dispersal. No studies have been initiated to investigate such a concentration's effect on the biota. More study is needed regarding air quality before Congress has sufficient information to allow oil and gas leasing.

Natural Diversity

The opening paragraphs of Chapter I cite the purposes Congress

delineated for the Arctic Refuge when it was enlarged in 1980. The first of four purposes reads, in part:

> To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd, . . . polar bears, grizzly bears, muskox, Dall sheep wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling. (emphasis added)

A major population decline and change of distribution of 20-40% for the PCH, and a 38% reduction in its calving habitat, is not conserving this wildlife species and its habitat in its natural diversity. Similarly, a major population decline and change in distribution of 50% for muskoxen is contrary to the natural diversity mandate. The same is true for polar bears, snow geese and other wildlife species. All will see impacts Congress did not intend them to experience when it expanded the Arctic Refuge in 1980.

Another of the purposes:

> To fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats.

This refers to migratory waterfowl treaties, which will be violated if development is allowed to proceed on the coastal plain.

Mitigation Measures

The Department feels that in most instances major impacts to fish and wildlife and to the environment can be mitigated by placing stipulations on development activities. Oil industry representatives, however, have at various times expressed their displeasure with such stipulations. Industry often claims such restrictions are unnecessary

or improperly designed to produce the desired effect. Industry representatives have even gone so far as to admit publicly that they often do not abide by the Fish and Wildlife Service's mitigation policy, which is applied to the Prudhoe Bay industrial development and which would be applied to any development on the coastal plain. Moreover, stipulations can be administratively changed or tossed out.

These factors inspire little faith in the ability of the Fish and Wildlife Service to ensure protection of fish and wildlife resources. ANILCA Section 1002 requires that the Fish and Wildlife Service examine and request what additional legal authority would be necessary to ensure protection of fish and wildlife resources.

It is apparent that protection of populations and habitats in their natural diversity for most species is impossible, and pollution of air and water from noxious emissions and hazardous wastes is unavoidable. In fact, the Prudhoe Bay industrial development is not the shining example both the oil industry and the Department claim it to be. Since 1972, there have been 23,000 oil spills in the Prudhoe area. The two largest of these spills, categorized as "small," were 200,000 gallons and 658,000 gallons. Studies of 30-year-old oil spills in the arctic show absolutely no recovery. The effects of emitting 80,000 to 100,000 tons of nitrogen oxides into the air -- currently permissible for North Slope operations -- are unknown because of little or no government monitoring. Atlantic Richfield Company recently signed a consent decree allowing them to exceed carbon monoxide standards until early in the 1990s. Finally, a state report notes that discharges from 20 out of 21 waste disposal operations are in violation of government standards.

Much of the dirty work is contracted out to smaller firms. Probably the most eye-opening example of abusive practices involved a firm which in 1983 had an illegal spill of approximately 10,000 barrels

of hazardous waste. The fact that this work was contracted out does not absolve the oil industry's responsibility. The operations at Prudhoe Bay are not the idyllic model the industry would like the public to believe. A lack of government monitoring and no enforcement of mitigation measures have obscured the extent of the problems.

Additional authority is needed by the Fish and Wildlife Service and other agencies to minimize adverse environmental impacts. Yet, the Department in its Report makes no substantive requests that would enable the Fish and Wildlife Service to minimize as much as possible impact associated with development, if it is allowed. A more complete examination of the need for additional authority should be included in the final Report, along with requests for such legal measures as would be required to minimize environmental degradation.

Subsistence

The third purpose outlined for the Arctic Refuge is:

> To provide, in a manner consistent with the purposes set forth [above], the opportunity for continued subsistence uses by local residents.

The Report candidly admits that the major adverse effects to the Porcupine Caribou Herd, "in combination with adverse effects on other subsistence use species, disruption of traditional subsistence use sites, and likely psychological effects on a people accustomed to isolation, will result in a major adverse effect on subsistence uses in the 1002 area."

This ancient way of life would be completely and undeniably lost to a cash-based economy. This is contrary to the purpose quoted above.

Oil Resources

Using data collected from two years of seismic exploratory work, the Department estimates a range of possible in-place oil resources. The Department contends there is a 5% chance that 29.4 billion barrels of oil (BBO) and a 95% chance that 4.8 BBO could be found in 26 different prospects scattered across the coastal plain. The Report then assesses the economically recoverable oil resource, and estimates that at the 5% probability level there could be 9.2 BBO, and 590 MBO has a 95% chance of being recovered. The mean estimated value of in-place resources is pegged at 13.8 BBO in-place, with 3.2 BBO recoverable.

Two very critical factors included in the meat of the Report are omitted from the executive summary. First, the economically recoverable oil resources are calcuated at prices of $33 and $40 per barrel. Second, the chance of actually finding any deposits that could be considered commercial, figured at the lower price, is a mere 19%. Stated another way, at a price of $33 per barrel, there is more than an 80% chance that no oil could be recovered economically from the coastal plain of the Arctic Refuge.

The Department has misled the public in its executive summary about the likelihood of recovering oil from the coastal plain.

Furthermore, to compare any oil prospects of the coastal plain to the Prudhoe Bay fields ignores some of the Report's findings. The discussion of geology notes that "none of the sampled oils are similar to Prudhoe Bay oil." Additionally, potential oil reserves of the coastal plain would be found at depths of 26,000 feet, more than three times the depth oil reservoirs at Prudhoe Bay are found. The analysis of geological formations, moreover, finds marked differences between the "relatively simple structure that underlies" the Prudhoe Bay area and

the "complexly folded and faulted" subsurface of the Arctic Refuge coastal plain.

The Report further acknowledges that in-place oil estimates clearly include "many deposits well below any economic size limit which may currently be assumed for the Arctic, and includes deposits which have reservoir characteristics that preclude them from being economic." This is calculated at an extremely optimistic price of $33 per barrel (in 1984 dollars). The Alaska Department of Revenue price projections do not foresee oil prices reaching that level for at least the next eighteen years:

1987	$13.00/barrel (1987 dollars)
1990	14.98
1995	15.88
2000	17.38
2005	19.54

Admittedly, price projections are subject to a high degree of uncertainty; yet there are strong indications in the world oil market that conservative projections are more realistic for estimating future price trends. The price the Department uses to base economic feasibility of potential oil reserves is unquestionably too optimistic. The present and reliably predicted future oil price is the primary factor preventing several proven North Slope discoveries from being initially tapped or from continuing production. The onshore West Sak field contains 750 MBO to 1 BBO of proven reserves, yet remains untapped by the lessee, Atlantic Richfield Company. Another onshore deposit, Milne Point, began production over a year ago, but operator Conoco recently shut down production from this 60 MBO field. Three off-shore deposits in the arctic -- Seal Island, Colville Delta and Sandpiper -- collectively hold upward of 750 MBO. Oil prices would need to be $24 per barrel to cover high capital expenditures of arctic oil development for the fields noted above. The potential oil fields of the coastal plain would incur the additional expense of drilling deeper to reach the oil.

The highest probabilities for finding economically recoverable oil on the coastal plain would be in amounts that are virtually identical to the size of fields described above. The Alaska Department of Natural Resources assessment of the coastal plain's oil potential backs this statement, finding a 95% chance of only 80 MBO present, with 35% recoverable.

Unfortunately, the Department's analysis contained in the Report is not tempered with a less optimistic economic scenario. Instead, the Summary misleads the public by misrepresenting economic recoverability. Only by carefully scrutinizing the contents buried in the Report does this important facet become clear.

The Department should provide an analysis of economically recoverable resources using more realistic oil price projections. This is critical to later discussions in the Report that discuss benefits from producing oil to the national budget deficit and to state and local government revenues.

National Need

While many of the substantive discussions in the heart of the Report concerning wildlife resources, environmental consequences and geological formations are admirable in their objectivity, the chapter which examines the national need for the coastal plain's potential oil is fraught with subjectivity.

The Report lists and briefly describes the contribution to national objectives production of potential oil from the coastal plain might make. Three of the six include:

* Reducing dependence on imported oil
* Enhancing national security
* Improving international trade balance

These are substantially the same point.

As domestic oil production continues to decline, the U. S. becomes increasingly dependent on foreign sources of oil. This dependence increases the nation's trade deficit and possibly subjects the nation to an interruption of oil supplies. Both these situations jeopardize the national security.

The Department contends potential oil reserves from the coastal plain could help prevent this situation from occurring by significantly contributing to the domestic supply of oil and gas. During the field's production life, however, no more than 8% of U. S. production would be provided by this speculative field. Only 4% of U. S. need would be satisfied by potential oil of the coastal plain. The mean estimated recoverable reserve of 3.2 BBO represents only a six-month supply at current consumption rates of 16 MBO per day.

Furthermore, the aforementioned proven fields in arctic Alaska could be tapped at prices of $24 per barrel. Those fields would then contribute to domestic supplies. The Report completely ignores these prospects.

Unquestionably, the U. S. will become increasingly dependent on foreign oil supplies, namely, the two-thirds of the non-communist world's oil reserves that are found in the Middle East.

In the interest of national security, common sense argues against draining the nation's dwindling domestic supplies, which are estimated

to be 90% depleted by 2004. Oil flows from the Middle East in stable supplies currently, and at relatively low prices due to a world-wide oversupply. The Strategic Petroleum Reserve, created by Congress to provide a buffer in the event of a supply interruption, should be filled to two or three times its 1986 target level. Yet the present Administration has ceased oil deposits into this reserve at its 1985 level rather than filling it to its minimal target of 750 MBO.

The nation should aggressively pursue energy conservation programs that have proved effective in the last decade and we should continue efforts to find alternative sources of energy. This Administration has proposed discontinued funding for alternative energy and energy conservation programs. The President vetoed legislation passed last year that would have saved the equivalent of a billion barrels of oil per year by requiring energy standards for appliances. The Administration has rolled back standards for automobile fuel efficiency, and favored raising interstate highway speed limits.

Current recovery techniques of the oil industry can only recover 35% to 50% of known oil reserves. The remainder is left in the ground. There is as yet no concerted effort by the industry to enhance oil recovery rates.

While the Department currently stresses the need for the energy resource represented by the potential oil of the coastal plain, it also processes a permit for a pipeline from the North Slope of Alaska to tidewater for exportation of natural gas to the Far East — energy that ironically could be used to meet current U. S. needs.

These glaring inconsistencies in a national energy plan do not inspire confidence in the Department's assessment of national need for the coastal plain's potential oil resource.

The Department needs to present a summary or reassessment of the present Administration's current energy plan, rather than merely quoting bits and pieces of the Department of Energy's 1985 National Energy Policy Plan. The Department should explain why it believes that potential oil reserves of the coastal plan fit into this plan. As part of this discussion, the Department should provide an in-depth discussion of energy conservation measures and alternative energy sources, which could decrease energy demand and lessen the nation's dependence on oil. Finally, a detailed discussion examining the political and economic ramifications of hastened depletion of the nation's last remaining domestic oil supplies should be included.

It is safe to assume, since answers to these important questions are crucial to making a decision on the coastal plain's disposition, that Congress intended a comprehensive discussion that included these aspects of a national need determination when it required such an evaluation be incorporated in the Report. The Department has covered this component unsatisfactorily in the 5-page discussion contained in the Report.

Conclusion

Sierra Club strongly disagrees with the Secretary's recommendation that Congress should adopt legislation which would open the coastal plain of the Arctic National Wildlife Refuge to full easing of oil and gas resources.

The recommendation has been based on highly speculative information regarding potential oil reserves, and on an extremely biased and self-fulfilling analysis of national need for the potential oil underlying the coastal plain. The recommendation also fails to consider cumulative impacts to the arctic biota, despite legal requirements to do

so, and does not consider environmental consequences in relation to the statutory mandate of maintaining wildlife populations and habitats in their natural diversity.

We are compelled to urge the Department to select Alternative E -- Wilderness -- and recommend such be adopted by Congress, in order to provide the appropriate protection for preeminent wildlife and wilderness resources of the Arctic National Wildlife Refuge.

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STATEMENT OF J. MICHAEL MCCLOSKEY
SIERRA CLUB
ON THE
ARCTIC NATIONAL WILDLIFE REFUGE
DRAFT COASTAL PLAIN RESOURCE ASSESSMENT
WASHINGTON, D.C.

January 9, 1987

O-429

The Sierra Club, a national conservation organization of 400,000 members, supports statutory wilderness protection for the coastal plain of the Arctic National Wildlife Refuge. Our Alaska Chapter, which testified in Anchorage on January 5, strongly agrees.

Sierra Club's support for wildlife protection and wilderness preservation of this one remaining area of the Arctic slope, which is not devoted to petroleum production, dates from before the days of its establishment in 1960 by President Eisenhower.

The Arctic National Wildlife Refuge, together with adjacent national park lands in Canada, comprise the most extensive and diverse undeveloped landscape in the American North, including unsurpassed wildlife values and a "mountains to the sea" spectrum of high Arctic ecosystems and life forms. It is the home for the 180,000-animal Porcupine caribou herd (so named for the Porcupine River). This herd

includes half of all the caribou remaining in Alaska, and is the last large caribou herd which is intact and healthy, living in an intact and healthy wilderness range. These animals are essential to the subsistence culture of Eskimo and Indian peoples on both sides of the international border.

The Porcupine caribou herd calves and raises its young on the Arctic coastal plain within the Arctic National Wildlife Range. This area has characteristics essential to the caribou during this critical portion of their life cycle. These natural values overwhelm the conclusions reached by the 1002 report.

The Interior Department has attempted to prevent public input on this most important issue. Only through the courts have we been allowed to review the draft report, much less comment on it in a public hearing. Furthermore, the Secretary's recommendation, and in particular the brief "executive summary" of the draft report, almost completely ignore the serious environmental consequences of full oil leasing, as delineated by FWS in the EIS section. We do not feel this is in keeping with the responsibilities entrusted to government officials as stewards of our public lands.

The draft report predicts a mean of 3.2 billion barrels of recoverable oil in the 1002 area, but also notes that only a 19 per cent chance of economically recoverable oil is present. This estimate is based in part on a questionable prediction of a $33 per barrel price of crude oil at the time of production. Furthermore, under this scenario, under maximum production, the 1002 area would supply only 4% of total U.S. oil demand, and 8% of domestic production. Its projected lifespan is only about 30 years for active production.

Except for the minor portion of the ANWR coastal plain east of the 1002 area now in wilderness, all of the other lands -- state, Native, and federal -- onshore and offshore, are open to or devoted to petroleum resources. These include state-owned offshore and onshore lands between Prudhoe Bay and the Canning River, such as the Camden Bay and Demarcation Point Lease Sales of 1987 and 1988 and Federal OCS lands in the Beaufort Sea, such as proposed Lease Sale 97. There may be oil development offshore and in the Mackenzie River Delta of Canada.

Not only do these adjacent development possibilities make the protection of wilderness values in ANWR more essential, but they also may produce a cumulative impact on the region which is not analyzed in the draft report.

A major weakness of the 1002 report is its failure to explain adequately how water will be obtained for exploratory drilling. It takes about 15 million gallons of water to drill one exploratory well; yet the FWS states that there is simply not much water available in the 1002 area for oil exploration, which is usually done in the winter. Almost all of the lakes and 24 major streams in the 1002 area freeze to bottom in winter and are not available for water access. The suggestions offered in the report for obtaining water range from the use of piped-in seawater to the creation of deep streambeds by gravel mining. The Fish and Wildlife Service calls water access a major engineering problem for oil development in the 1002 area, yet does not predict the environmental consequences of the proposed schemes to obtain it.

The fish and wildlife values of the 1002 area are incomparable. According to the report, the environmental consequences of full oil leasing would be devastating. Contrary to oil industry claims, we can

only compare Prudhoe Bay oil development and its effects on wildlife to development in the 1002 area with extreme caution. For example, the magnificent 180,000-animal Porcupine caribou herd has its major calving grounds and major insect-relief habitat in the 1002 area. The absolute density of this herd on its calving grounds is 14 times that of the Prudhoe-area Central Arctic Herd of some 12,000-14,000 animals, giving the Porcupine herd little room to adapt to oil production or to escape. There has been almost no reported calving by the Central Arctic Herd in the Prudhoe Bay oil fields since oil development. Full oil production also could result in loss of much of the insect-relief habitat available to the Porcupine herd. The FWS predicts that a major population decline and change in distribution of 20 to 40 percent could occur.

Some of the other significant effects on wildlife could include a 25-50 percent population decline or change in distribution of muskoxen, which now number about 500 animals; a moderate decline in brown bear numbers; a moderate decline in golden eagle numbers, and a major change in lesser snow geese distribution of up to 50 percent.

As pointed out by the Government of the Yukon, "There is no adequate treatment of the transboundary consequences of those direct impacts [on wildlife that utilizes the coastal plain and Canadian habitats] or is an important constituent of a larger regional population." This criticism is very well taken, and again points up a major flaw of the draft report -- the attempt to isolate the coastal plain for purposes of impact analysis. This basis shortcoming must be corrected if the final Assessment is to assist Congress in its decision-making process.

The draft report also predicts that oil development will have a major adverse effect on the subsistence lifestyle of Native people.

The Sierra Club finds the above environmental consequences of oil exploration and/or production in the 1002 area totally overwhelming. We do not accept the Secretary's citing of national security as sufficient justification to drill in this area. In fact, the discussion in the draft report on the nation's need for any oil that might be found on the coastal plain is inadequate.

A detailed discussion and comparison of alternative strategies for meeting the nation's energy demands and objectives should be part of this LEIS. An analysis of alternatives is of course the essence of the environmental impact statement process. Congress is not well served by an LEIS that discusses -- and unabashedly promotes -- only one strategy.

Among other alternatives is one that permanently forgoes exploration and possible development of the coastal plain in favor of reliance on other existing and potential oil and gas reserves. For example, instead of permitting the export of North Slope natural gas (other than possible reserves in the ANWR) to Far Eastern markets, Congress could prohibit such export in the interest of domestic consumption.

More efficient use of existing energy could also help meet the national need for additional energy and at the same time avoid the permanent environmental degradation of the ANWR that the draft report acknowledges will occur if leasing is allowed and economically recoverable quantities of oil and gas are discovered.

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The omission of discussion concerning energy conservation programs and alternative energy sources completely discounts any possibility of prolonging existing supplies and lessening the perceived need for oil from the coastal plain. The underlying premise is to allow complete depletion of this country's last remaining on-shore oil supplies, without coherent plans for a future with severe shortages of domestic oil. This would be ironic if it were not for the recent Presidential veto of the National Appliance Energy Conservation Act which would save 1.47 billion barrels of fuel and $3 million to consumers over ten years. Such policies are not in the national interest.

There is no discussion of a proposed land exchange with various Alaska Native regional corporations, in which some subsurface estate in the coastal plain would be exchanged for corporation-owned inholdings within other national wildlife refuges in Alaska. This bundle of exchanges is sometimes referred to by the Department as the "megatrade."

In his introduction to the draft report, Assistant Secretary Horn observes that "Development must result in no unnecessary adverse effects and unavoidable habitat losses should be fully compensated." As the draft report acknowledges, there will be substantial adverse effects and unavoidable habitat losses associated with the proposed leasing. The megatrade is the compensation envisioned by the Department and thus is a fundamental part of the Administration's proposal to open the coastal plain to full leasing.

Already, several hundred thousand dollars of federal funds have been expended for appraisals, negotiations, and other aspects of the proposed megatrade. According to the U.S. Fish and Wildlife Service, the Service hopes to submit the proposed exchange to Congress at the

same time as the final Resource Assessment is submitted or as soon thereafter as possible.

In order that the public and Congress may have the opportunity to assess the Administration's entire proposal, the final Assessment should include a full discussion of the proposed megatrade.

Finally, we oppose any oil drilling in the 1002 area because it will destroy forever one of North America's greatest wilderness areas. No amount of reclamation would ever render this area "wilderness" again.

We are not merely trying to protect beautiful scenery in the Arctic National Wildlife Refuge, nor are we merely attempting to maintain a population of magnificent and unusual animals. We are trying to preserve the best, the largest, the most diverse migratory wildlife wilderness habitat on the continent.

Let me refer to the statement of Dr. Edgar Wayburn, chairman of the Club's Alaska Task Force, to the House Interior Committee in 1977:

> "The Sierra Club itself has a long-time interest in Alaska. The Club's founder and first president, John Muir, went to Alaska three times on extensive visits, starting in 1879. The Club's intense concern, however, dates to 1967, when the Directors of the Sierra Club made the future of Alaska's land one of our 6 priority projects. Today, with some 170,000 members all over the country, the Sierra Club has made Alaska's National Interest Lands our number one priority.

"Why is the Sierra Club so concerned about Alaska? Is it the tremendous areas of scenic magnificence in Alaska? Is it the great number and variety of its wild rivers? Is it because in Alaska there roam freely the last great herds of large wild animals in our country? Is it because in Alaska there is the last of our unspoiled wilderness remaining on a grand scale? Is it because in Alaska people can experience the wonders of nature as they can nowhere else on earth?

"It is because of all these reasons -- and much more -- that we are testifying here today. For we believe that in Alaska there are rare -- indeed unmatched -- opportunities for all the people of the United States. There is not only the superb scenic and wildlife resource and unmatched recreational potential. there is the chance for our country to make wise decisions -- to combine good development with good conservation -- and to do it right the first time. In Alaska we have an unparalleled opportunity to learn from our past mistakes. In the past, we have been all too generous with many of our country's greatest treasures. . .We have given away California's coastal redwoods, the Big Thicket in Texas, Florida's Great Cypress swamps -- to name only a few. Now we are having to buy them back for the American people and at enormous cost. In Alaska, we have this remarkable opportunity -- we can set aside superb national lands for their highest and best use at no cost to the American people -- the people to whom they now belong.

"The critical decisions in Alaska are being made at this moment. And these decisions are being made by you. Congress has already dealt generously with the State of Alaska. In the Statehood Act of 1958, Congress granted the new state 104.2 million acres of land, and approximately 45 million acres of tidelands and

submerged lands passed into the ownership of the state at the same time. Thus Alaska was granted a total of nearly 150,000,000 acres of land, more land than was granted all the 17 western states together. 150,000,000 acres, incidentally, is an area 1-1/2 times the entire state of California.

"Congress has also dealt generously and fairly with the Native peoples of Alaska, conveying to them some 43.7 million acres to be their private property to use as they choose -- along with nearly one billion dollars in cash. Congress has in the past also set aside key areas in Alaska to remain in particular Federal ownership. It now seems opportune for Congress to reserve the remainder of the unappropriated public lands of Alaska for their highest and best use for all the American people. We are convinced that the highest and best use for these lands is a status which will protect for all time their unequalled natural values."

. . . . . .

"HR 39 is based on the general principle that significant portions of the wildlands of Alaska which are now in the public domain should remain in public ownership because of their 'nationally significant natural, scenic, historic, geological, scientific, wilderness, cultural, recreational, and wildlife values.' Therefore, the policy goals include preservation of the wildlife, both the resident populations and the millions of wildfowl which migrate seasonally; protection of the habitat in Arctic and sub-Arctic ecosystems; preservation of historic and archaeological sites and cultural values of Native peoples; protection of the wilderness; and provision of wilderness recreational opportunities.

"A second, related principle behind HR 39 is that the national interest lands should be administered by the most appropriate agency. HR 39 places administration of these lands primarily under the two agencies of our government which are charged with the care of natural ecosystems: the National Park Service and the Fish and Wildlife Service. The National Park Service is charged with the objective of preserving land in its natural state, and providing for human use and enjoyment of the land consistent with that preservation. The Fish and Wildlife Service is charged with protection of habitat for wildlife in the National Refuge System. We propose that these two systems are the proper ones for the protection of most of the Federal lands in Alaska and the perpetuation of the vast wildlife populations they shelter."

The principles that led to Sierra Club's original involvement in the Alaska Lands legislation, H.R. 39, remain unbowed today for the coastal plain of the Arctic National Wildlife Refuge is the quintessence of the natural values remaining in Alaska. Chancy, environmentally destructive energy development in this one magnificent place is not in the national interest.

Trustees for ALASKA

February 5, 1987

Noreen Clough
Division of Refuge Management
U.S. Fish and Wildlife Service
18th & C Streets
Washington, D.C. 20240

Dear Ms. Clough:

Enclosed please find the comments of Trustees for Alaska on the Department of the Interior's Draft Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment. Thank you for your attention to these comments.

Very truly yours,

Robert W. Adler
Executive Director

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725 Christensen Drive, Suite 4 Anchorage, Alaska 99501 (907) 276-4244

Trustees for ALASKA

TRUSTEES FOR ALASKA'S COMMENTS
ON THE DRAFT RESOURCE ASSESSMENT
FOR THE COASTAL PLAIN OF THE
ARCTIC NATIONAL WILDLIFE REFUGE

FEBRUARY 5, 1987

I. INTRODUCTION

Trustees for Alaska submits the following comments on the U.S. Department of the Interior's Draft Resource Assessement for the Coastal Plain of the Arctic National Wildlife Refuge, prepared pursuant to section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA) and section 102 of the National Environmental Policy Act (NEPA). Trustees for Alaska is a nonprofit, public interest environmental law firm with approximately 700 members within Alaska and in other states. The opportunity to comment on this draft of the section 1002 report was provided only as a result of a lawsuit filed by Trustees for Alaska. The court ruling required Interior to provide both an opportunity for written comments and public hearings, and emphasized that Interior was required to incorporate and to respond to public comments in the final report to Congress. To comply with this mandate, Interior must address each of these comments in its final report, as well as

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the comments raised by other parties. 40 CFR 1502.9(b).

The Interior Department violated the spirit of the court order, which expressly required the Department to provide the "local population" an opportunity to comment on the report, by failing to hold public hearings in Fairbanks, Arctic Village, and other locations where significant public interest was evident. Moreover, it was unconscionable for Interior to schedule the public comment period and the public hearings over and through the Christmas and New Years holidays, particularly when the District Court decision had been rendered almost a full year before the hearings were held. Even the extended public comment period was insufficient given the complexity and importance of this issue. By scheduling public hearings in this manner, the Department continued its policy of restricting public input into this important issue as much as possible.

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However, the procedural deficiencies in the Department's process are dwarfed by the substantive problems with the draft report. Many of these deficiencies run to the heart of Interior's analysis, and render the current version of the report almost entirely inadequate as a basis for Congress to make an informed decision as to the proper management of the coastal plain of the Arctic National Wildlife Refuge. More importantly, the draft report <u>does not comply with a number of relevant laws and regulations</u>, including NEPA and section 1002 of ANILCA, rendering the report legally deficient and inadequate. As a result of these deficiencies, we believe that the proper course would be for the Department to rewrite the report completely, based on the public comments received, and

to submit a new version of the report for public review before presenting a final report to Congress. The NEPA implementing regulation of the Council on Environmental Quality state that if a draft statement is "so inadequate as to preclude meaningful analysis," a revised draft shall be prepared and circulated for additional public review. 40 CFR 1502.9(a).

Our comments are divided into two main sections. The first section will outline the broad legal and substantive deficiencies in the draft report, and will cut across a number of specific subject areas. The second section will address specific omissions and deficiencies involving particular environmental issues.

II. <u>Major Deficiencies in Interior's Analysis</u>

The draft 1002 report is not merely deficient in the details of its analysis. It contains a large number of fundamental omissions and analytical flaws that render it completely inadequate for purposes of Congressional review. First, the report does not comply with a number of applicable laws and regulations, including NEPA and ANILCA. Second, the report suffers from additional broad analytical defects. It suffers from an exceedingly narrow and obviously result-oriented perspective; it lacks an adequate evaluation of wildlife habitat and carrying capacity; and most importantly, the conclusions do not match the body of the report, as if the author of the draft Secretarial Recommendation section did not read the rest of the document. These broad deficiencies will be detailed below.

A. Legal Deficiencies

1. NEPA

In Trustees for Alaska v. Hodel, the Interior Department ultimately conceded that it was required to include, as part of the section 1002 report, a legislative environmental impact statement under section 102(2)(C) of NEPA. However, the draft report fails to comply with a number of well-accepted requirements for environmental impact statements. Most clearly, the reports fails to consider a large number of individual environmental issues addressed in part 2 of these comments, such as air quality and water quality. But the report falls short of NEPA requirements in a number of more comprehensive respects discussed below.

Cumulative Impacts Analysis

First, the report fails completely, and in many cases expressly, to consider the cumulative environmental impacts of oil and gas development in the Arctic National Wildlife Refuge with similar development elsewhere in arctic Alaska and Canada. This type of analysis is fundamental to NEPA review, particularly where a project will have regional impacts. Kleppe v. Sierra Club, 427 U.S. 390 (1976). The CEQ regulations require EISs to evaluate both direct and indirect environmental effects, 40 CFR 1502.16, which encompass cumulative environmental impacts. 40 CFR 1508.8. A "cumulative impact" is defined as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

40 CFR 1508.7.

The environmental effects of oil and gas development in the Arctic National Wildlife Refuge cannot be separated from the effects of similar development both onshore and offshore along the entire coast of Alaska and Canada. This development includes exploration and extraction from the NPRA, state leases at and around Prudhoe Bay, extensive existing and proposed state leases in coastal lagoons across the entire northern Alaskan coast, existing and proposed leases in the Beaufort Sea (Sale 97), and existing and proposed exploration and development onshore and offshore in the Canadian Beafort. Maps of this extensive development can be found in the Mineral Management Service's DEIS on Proposed Sale 97 (Beaufort Sea) (Sale 97 DEIS) and in the State of Alaska's Preliminary Best Interest Findings on Proposed Sale 50 (Camden Bay) (Sale 50 Findings). For example, the Sale 50 Findings note that the state has leased more than 3.6 million acres since 1964, and plans to lease an additional 3.9 million acres on the North Slope within the next five years.

The resources that are threatened by the leasing proposal are not, in many cases, local in nature. This is particularly true for migratory species such as marine mammals, waterfowl and other bird populations, caribou, anadromous fish, and other resources. Moreover, Interior's approach does not recognize that habitat losses within the ANWR, in combination with similar habitat losses elsewhere, may have substantial effects on regional resources.

Interior's failure to consider cumulative impacts is all the more difficult to understand in light of the fact that the development of the Arctic National Wildlife Refuge is considered a neces-

sary economic prerequisite to the development of the nearshore coastal lagoons owned by the state. (Sale 50 Findings). Indeed, development of the two areas will almost certainly share onshore support facilities, including port and loading areas. Yet the 1002 report fails to address the cumulative effects of development within the 1002 area with development of the coastal lagoons along the entire coast of the Refuge. Given the intensive use of this area by resources that migrate between onshore and offshore areas, such as birds, marine mammals, caribou, and anadromous fish, this flaw is fatal to the adequacy of Interior's review.

Similarly, the 1002 report does not address the relationship between 1002 development and proposed federal OCS leasing in the Beaufort Sea. Incredibly, at the same time that its sister agency is proposing full leasing of the ANWR coastal plain, MMS assumes in its Sale 97 DEIS that effects on the Porcupine Caribou Herd from a pipeline and road across the coastal plain are "not likely to occur ... since an onshore pipeline is not assumed to occur under the proposal" (p. IV-B-68). But if oil development occurs in both the ANWR and in the eastern portion of the Beaufort Sea, pipelines from the eastern Beaufort would logically intersect the ANWR onshore pipeline. Yet the cumulative effects of this development are not considered in either document.

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There are a large number of examples of the types of cumulative effects on biological and other resources that should have been considered in the 1002 report, but a few examples will suffice. Perhaps the most glaring example is the statement that disturbance to polar bear denning sites:

> would not likely affect the species' overall survival, so long as similar intensive development did not occur along the entire northern coast of Alaska and Canada.

1002 Report, at 118. But as noted above, similar intensive development <u>is</u> either occuring or planned throughout the northern coast of Alaska and Canada. The 1002 report notes the possible effects of losses of polar bear denning sites on the overall population (pp. 117-18). In particular, Amstrup et al. assert that the Beaufort population can withstand little if any increase in the mortality rate of females. In light of these realities, the lack of a cumulative impacts analysis of this issue is difficult to understand. Notably, the Sale 97 DEIS predicted "moderate" effects on the polar bear population without consideration of development in the ANWR or in the state coastal sales. Obviously, these effects will be further exacerbated by disturbance to denning sites in the Camden Bay and Demarcation Bay lagoons, and in the ANWR coastal plain. No agency has evaluated the total impact on the polar bear population.

Another example of an important cumulative impact ignored in the 1002 report is the effect of port and causeway development on water quality and fish migration. Interior predicts generaly minor effects on aquatic resources from causeway construction. 1002 Report, at 125-26. Yet evidence indicates that the West Dock and Endicott causeways are already resulting in adverse effects, and the Sale 97 DEIS (p. IV-B-24-25) predicts MAJOR cumulative offshore effects from additional developments, <u>without</u> including development in the ANWR and the offshore state waters. Interior not only understates the potential effects of similar developments in the ANWR alone, but fails to consider the cumulative effects.

Similar arguments can be raised with respect to a large number of additional issues. The continuation of the proposed pipeline across the coastal plain on state lands between Prudhoe Bay and the Canning River, which would occur as a direct result of the development of the coastal plain, will transect a major calving area for the Central Arctic Caribou Herd (CAH), but no analysis of the effects of this development on the CAH is given. The report discusses chronic water quality degradation due to leaking drilling muds reserve pits and other sources of waste discharge, but aside from quantifying the number of acres effected, no attempt is made to assess the long-range and cumulative effects of this chronic degradation. The Sale 97 DEIS engages in a comprehensive cumulative oil spill and fuel spill risk assessment, but expressly omits the ANWR and offshore state sales. This gap is not filled by the 1002 report, despite the need to transport large quantities of fuel through the two proposed port facilities.

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Until the 1002 report is revised radically to include a comprehensive cumulative environmental impacts analysis, it falls short of the well-accepted standards for environmental impact analysis, as required by NEPA and the CEQ regulations.

Consideration of Alternatives

Evaluation of all reasonable alternatives is another mainstay of NEPA analysis. Natural Resources Defense Council v. Morton, 458 F.2d 827 (1972). In fact, the CEQ regulations indicate that the evaluation of alternatives is the "heart of the environmental impact statement," and require the agency to "rigorously explore and objectively evaluate all reasonable alternatives" to the proposed

action. 40 CFR 1502.14.

The 1002 Report sets forth a range of alternatives for the management of the coastal plain of the Arctic National Wildlife Refuge, from wilderness designation to full-scale oil and gas leasing. However, the fundamental reasoning behind the proposed Secretarial recommendation for full leasing is the national need for energy resources from the Arctic National Wildlife Refuge. Nowhere does the document evaluate alternative means of meeting the cited energy need, as is required to give the decisionmakers (The Secretary and Congress) and the public a valid basis for a reasoned decision on this issue. In particular, there is no analysis of other energy supply sources, or more importantly, of available and anticipated methods of reducing the nation's consumption of petroleum resources rather than extracting these resources from the last great arctic wilderness in the United States. Notably, even the Sale 97 DEIS includes a consideration of alternative energy sources, including energy conservation and efficiency. While this analysis is woefully deficient (for example, it relies on 1979 information), at least it recognizes the basic NEPA requirement to evaluate alternatives to the project. Failure to consider other strategies for meeting the nation's energy needs essentially constitutes a failure to give due consideration to the wilderness or no action alternatives in the 1002 report, because these options are dismissed out of hand on the basis of national security and need for energy.

Interior's approach is particularly disturbing given this Administration's sorry record in the area of alternative energy

resources. The Administration proposes to lease the Arctic National Wildlife Refuge at the same time that it rejects programs that would save a good portion of the oil that might be extracted from the Refuge.

For example, President Reagan vetoed the National Appliance Efficiency Act, which would save approximately 1 billion barrels of oil, and the energy equivalent of 3 billion barrels of oil. The Administration also proposes to repeal fuel economy standards for automobiles, and to raise the speed limit on interstate highways, both of which will increase oil consumption for reasons that are entirely unrelated to national security and energy independence. In short, the Administration's policy is to increase the demand for oil for reasons of personal comfort or convenience, and then to justify oil and gas development in sensitive environmental areas, indeed, in national environmental treasures, on the basis of national security. The only winners are the oil companies that reap profits from petroleum product sales. The American public pays more for their energy needs, and loses a major part of their national wilderness and wildlife heritage.

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The case for using demand side energy strategies for meeting the energy demand cited in the 1002 report is far from speculative. This case was made in detail in comments submitted to Interior by Amory Lovins of the Rocky Mountain Institute on January 22, 1987, which we incorporate herein by reference. Mr. Lovins notes that since 1979, the United States has gotten 50 times as much new energy from more efficient use than from all net increases of energy supply combined, and demonstrates clearly that equivalent energy of

even the most optimistic predictions for ANWR can be reaped using available but untapped energy efficiency strategies, at far lower economic and environmental cost. The 1002 report, however, ignores this potential resource entirely (as well as all energy supply sources other than oil), and assumes that only oil extraction can meet the cited demand growth.

Interior's failure to consider alternatives to increased oil and gas extraction as a means of meeting national energy needs is all the more inappropriate given the time-frame of the analysis. Oil and gas extraction from the ANWR will not occur for at least 10-15 years. Existing energy efficiency resources could substantially reduce the demand for petroleum resources, as demonstrated in Lovins' comments, without even considering improvements in efficiency technology. By the time the 1002 oilfield could be put into place, these existing technologies could be saving far more oil than would be produced from the ANWR, at far lower cost. The only losers would be the oil companies. Moreover, given the tremendous recent advances in this area, and ongoing improvements in energy efficiency technology, there is strong reason to believe that even greater gains could be made, at lower cost, by the end of the century.

Interior's complete failure to consider alternative means of meeting the nation's energy needs is a fatal flaw in the DEIS, and constitutes a blatant violation of NEPA and the CEQ regulations. In fact, 40 CFR 1502.16(e) and (f) expressly require the consideration of the energy conservation potential of alternatives. This deficiency should be cured as part of a rewritten draft of the 1002

report.

Consideration of Long-Range Impacts

Interior inexplicably considers only the impacts of development that is expected to begin during the first 10-15 years after initial oil and gas leasing of the ANWR. Most notably, the report ignores almost entirely the effects of gas production from the ANWR, because it is beyond the time frame chosen by Interior for analysis. But no reason for the selection of this time-frame is given, and the report itself predicts that gas production would be economically feasible within 2-3 decades. Prevailing NEPA law, however, requires the Department to consider the long-range impacts of development, even if development proceeds in stages. Cady v. Morton, 527 F.2d 786 (9th Cir. 1975).

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It is interesting in this regard to note Interior's own definitions of long-term versus short-term impacts: "Effects that could likely persist 20 years or more were considered 'long-term' and those likely to persist less than 20 years were considered 'short--term.'" Based on this criterion, by excluding the effects of gas production because it is not likely to be economically feasible for 2 or more decades, Interior is considering only the "short-term" effects of leasing in ANWR.

Irreversible and Irretrievable Commitments of Resources and Comparison of Short-term Uses and Long-term Productivity

These two sections are expressly required to be included in environmental impact statements under section 102(2)(c) of NEPA, and by the CEQ regulations, as they form part of the fundamental basis for decisionmaking. Interior's treatment of these issues, however, is entirely summary and cursory in nature, and does not

include the comprehensive explication required by NEPA. In fact, it appears that these two sections, both of which combined comprise less than 3 pages, were simply tacked on to the 1002 report when it was decided that the report had to be accompanied by an EIS.

The summary nature of these two sections leaves little if anything on which the public can comment. To give an example of the deficiency in these sections, however, nowhere does Interior explain in full the significant losses to the nation as a result of the elimination of the only remaining arctic coastal wilderness in the United States.

For example, the report should note that there would be an irretrievable loss of the only baseline area for the study of a complete scope of arctic ecosystems in North America. This would constitute an irretreivable loss to the scientific community and to our civilization's ability to understand natural arctic ecosystems. The report should explain the uniqueness of this region as a wildlife and wilderness resource, rather than stating simply that long-range losses of these resources would occur. The fundamental problem with Interior's treatment of these issues, both here and elsewhere in the report, is the lack of recognition that there is a major difference between the loss of some wilderness acreage on the North Slope of Alaska and the loss of the last chance for a comprehensive arctic wilderness in North America. (Thus, the report mentions in passing that an earlier government analysis recommended wilderness designation for this area, but does not explain why the area is a significant wilderness resource.) Similarly, there is a major difference between some disturbance to a 180,000 head caribou

herd and the disturbance to and predicted decline in the last major migratory caribou herd in the United States which is substantially undisturbed by major human development. Congress and the public have the right to understand what is truly at stake before deciding whether to go along with Interior's proposal to lease this area. It must be acknowledged that this choice reduces to value judgments -- but these judgments cannot be made without a full understanding of the stakes in the debate. This is the fundamental purpose of NEPA.

2. ANILCA

The 1002 report violates both section 1002 and section 810 of ANILCA as a result of fundamental omissions in the analysis:

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a. Section 1002(c) and (h) both require an analysis of the impacts of oil and gas development. Yet the report expressly ignores the impacts of gas development due to the unexplained choice of time frame. Thus, the report on its face fails to comply with the statute.

b. Section 1002(c) requires an evaluation of the carrying capacity of fish and wildlife habitats in the coastal plain, but the 1002 report contains little or no analysis of this issue. For example, the report fails to explain or to analyze the effect of forcing a fixed caribou population into a smaller calving and post-calving habitat. Notably, MMS recognized:

> The need for caribou to migrate appears to be a behavioral adaptation that prevents destruction of forage habitat. If movements are greatly restricted, caribou are likely to overgraze their habitat, leading to perhaps a drastic, long-term population decline.

Sale 97 DEIS, at III-31. The 1002 report does not analyze or even

discuss such habitat reductions, for caribou and other species, in its evaluation of fish and wildlife resources. If such analysis underlies the report, it is neither mentioned nor explained for purposes of public critique. A "black box" evaluation does not serve the public comment goals of NEPA.

c. Section 1002(c) requires an evaluation of the effects of oil and gas development in the coastal plain on the culture and lifestyle of affected native villages. It must be recognized that, even if fish and wildlife mitigation were completely successful, the type of intensive industrial development that will accompany oil and gas leasing in this area will result in major, irreversible changes in the culture and lifestyle of the region. Yet Interior evaluates this issue solely in terms of subsistence yields of fish and game. This approach is not only unduly narrow -- it reflects a callous indifference to the integrity of the local Native culture.

d. Section 1002(h) requires Interior to identify additional legal authority necessary to protect the area's resources. This section of the 1002(h) report is entirely absent. One interpretation is that Interior believes that the existing regulatory regime is completely adequate to protect the valuable natural resources of the area. But given the conclusions elsewhere in the report that long-term losses to fish and wildlife populations and other resources will result from the proposed leasing, it is difficult to understand why Interior would not seek more stringent authority and tools to protect these resources.

e. Section 810(b) of ANILCA states clearly that where environmental impact statements are required pursuant to section 102(2)(c)

of NEPA, as Interior admits here, the notice and hearing required by section 810 of ANILCA are required to be incorporated into the NEPA process. Interior admits openly, at p. 129, that leasing could result in a significant restriction of subsistence uses under section 810 of ANILCA, but expressly refused to incorporate the section 810 analysis into the NEPA process. This omission denied residents of affected villages, including not only Kaktovik but Venetei, Old Crow, Fort Yukon, Arctic Village, and Nuiqsuit, the opportunity to understand and to comment on the proposed significant restrictions on their subsistence uses. Interior's decision conflicts not only with the plain language of ANILCA, but with prevailing Ninth Circuit case law created in the context of OCS lease sales in Alaska.

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3. Fish and Wildlife Compatibility Test

The most fundamental legal basis for the management of activities in fish and wildlife refuges is the "compatibility" test set forth in the National Wildlife Refuge Administration Act, and repeated and applied in section 304 of ANILCA. The Secretary may not permit uses in the Arctic National Wildlife Refuge that are not "compatible with the purposes of the refuge," as set forth in section 303(2) of ANILCA. Incredibly, in evaluating whether oil and gas leasing should be permitted in the coastal plain of the ANWR, Interior did not even evaluate, on the basis of its own assessment of probable impacts, whether the compatibility test would be met.

It is difficult to believe, in fact, in light of some of the predicted impacts in the 1002 report, that this test would be met under even the loosest standards. For example, is it compatible

with the purposes of the refuge to allow an activity that will result in adverse effects to 20-40% of the Porcupine Caribou Herd (36,000-72,000 caribou), 25-50% of the muskoxen population, 5-10% of the Banks Island Snow Geese population (30,000-50,000 geese) and half or more of the wolverine population? The only way to arrive at the conclusion in the proposed Secretarial recommendation is to consider the oil and gas values of the refuge to be paramount to the fish and wildlife purposes for which the refuge was created. This approach is illegal under existing law.

4. Other Environmental Laws

The draft 1002 report fails to consider a wide range of environmental protection laws that could be violated by oil and gas leasing in the Arctic National Wildlife Refuge. In particular, there is no consideration whatsoever of compliance with federal and state air quality, water quality, solid waste, and hazardous waste laws and regulations. This major flaw in the report was noted in the Alaska Department of Environmental Conservation's (DEC's) comments on the 1002 report, at 1-3. Consideration of these laws and regulations would require major revisions to the draft report.

Individual environmental pollution issues will be addressed in greater detail in the second part of these comments. The fundamental assumption used in ignoring these environmental issues, however, appears to be Interior's assumption, as part of its environmental assessment, of full compliance with all relevant laws and regulations (p. 98). However, despite the oil industry's unsubstantiated claim to a perfect environmental compliance record at Prudhoe Bay, assuming 100% compliance with applicable laws and

regulations for purposes of weighing environmental impacts is completely inappropiate.

For example, a printout of state enforcement actions in progress identifies 24 open items, including Notices of Violation, compliance orders, and criminal and civil actions. Violations have ranged from air quality to water quality, solid and hazardous waste. For example, ARCO signed a Consent Decree in 1986 for violations of carbon monoxide air emissions. According to DEC, discharges from 20 out of 21 drilling muds reserve pits violate applicable effluent standards, with violations involving toxic metals such as arsenic, manganese, chromium, lead, and copper, as well as aromatic hydrocarbons. A single brine spill at one location destroyed 5 acres of tundra vegetation, and there has been at least one major hazardous waste incident. In 1983, North Slope Salvage spilled thousands of gallons of chemicals generated by North Slope oil companies as a result of the improper storage of over 10,000 drums of waste material. The owners were convicted of criminal charges. In light of this compliance history, Interior's failure to consider the likelihood of compliance with environmental laws and regulations is completely unwarranted.

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Finally, both Interior and the oil companies treat the "inevitable minor oil spills" as if they were not violations of environmental laws, so long as prompt cleanup action is undertaken. This is simply not the case. Moreover, there is a widespread tendency to understate the magnitude of this problem. According to DEC, there were 521 oil spills on the North Slope in 1985 alone, with a total of more than 82,000 gallons spilled. According to these figures,

the mean volume of oil spilled per incident is approximatley 150 gallons, a conservative estimate given that individual spills over the life of the Prudhoe Bay complex have exceeded 200,000 gallons. Interior states that there have been more than 23,000 separate oil spills since 1973. Multiplying this figure by the conservative average of 150 gallons per spill, more than 3.5 million gallons of oil have been spilled at Prudhoe Bay since 1973. It is difficult to understand how Interior can refer to this major environmental compliance problem as "inevitable small oil spills."

B. Other Major Flaws in Interior's Analysis

In addition to the report's failure to meet the requirements of a large number of applicable laws and regulations, the report suffers from additional major flaws in its analytical approach. The report suffers from an exceedingly narrow perspective, particularly in its evaluation of national need and national security issues. It is immediately apparent from reading the report that the authors, at least of the Executive Summary and Chapters III, VII and VIII, worked backwards from a forgone conclusion that reflects the general bias of the current Administration to a rationalization of the recommended action. This is reflected in a large number of specific biases within the body of the report. These biases are reflected in overstatements of the oil and gas and economic potential of the coastal plain, and in tremendous understatements of the value of the coastal plain to the nation as a wildlife and wilderness resource.

Second, the slanted approach in the report is reflected in the relationship between the recommendations and the report itself.

In fact, the conclusions simply do not match the report, as if the author of Chapter VIII did not even read many of the specific conclusions in the rest of the analysis.

1. Major Biases

It was noted earlier that Interior understates tremendously the losses to the nation of allowing oil and gas leasing in the coastal plain of the Arctic National Wildlife Refuge. These arguments will not be repeated here. Interior matches this bias with its optimistic and unbalanced evaluation of the economic value of the region.

For example, Interior's oil and gas estimates chronically overstate the potential of the region by burying the relationship between the 19% marginal probability of any economically recoverable oil and gas in the ANWR and the probability curve of potential recoverable resources if there is recoverable oil. It is particularly misleading of Interior not to include this fact in the Executive Summary of the Report, particularly when busy members of Congress (and interested members of the public) are not likely to sift through the entire report.

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Even the 19% figure is questionable, however, in light of the economic assumptions used by Interior in determining the minimum economic field size (MEFS), and in calculating the economic benefits of production. Most disturbing is Interior's use of a "most likely" oil price of $33 per barrel (1984 $), and their accompanying failure to employ a sensitivity analysis reflecting a more likely average figure as well as a low-price scenario. In fact, the failure to include a low-price scenario entirely prejudices any

evaluation of the no action and wilderness options in the report.

In fact, the $33/bbl price estimate lacks credibility given current and predicted market conditions. Most oil economists have drastically reduced their predicted oil price estimates given recent dramatic declines in world oil prices. Economist Arlon Tussing commented that Interior's $33/bbl estimate is twice what is currently expected through the turn of the century. Instead, Tussing predicts that oil prices will more likely center around the mid-teens for the foreseeable future, and rise at most to the mid-20's. Seattle Times, January 11, 1987, at B4. The current Alaska Department of Revenue forecast is that oil prices will not rise above $20/bbl into the late 1990's. Notably, oil production in the Arctic National Wildlife Refuge is not even economically feasible at a price of $15/bbl. Other economic assumptions used by Interior, such as a 10.0% real discount rate, are similarly nonconservative, and should be tempered by a sensitivity analysis.

Interior's geologic predictions also appear to be unduly optimistic, in order to make a stronger case for allowing full leasing of the coastal plain. For example, Interior admits that the probability of large oil finds in the coastal plain would be reduced drastically if there were no Ellesmerian rocks below the region, but there is no clear evidence on this point (p.54). The report also admits that the complex, folded structure below much of the coastal plain is far different from the geology in the Prudhoe Bay region, which increases the risk factor (p.70). These uncertainties do not appear to have affected Interior's full leasing recommendation.

A comparison between the federal and state geologic predictions is also illuminating. State geologists, using the same data available to USGS as well as additional data from state lands, were far less optimistic than their federal counterparts. While the low probability (5%) state estimates approached the federal estimates (26.52 BBO versus 29.4 BBO), the state estimates drop off sharply through the rest of the probability curve:

	STATE	FEDERAL
MEAN	7.22 BBO	13.8 BBO
.50	3.77 BBO	11.9 BBO
.95	0.08 BBO	4.8 BBO

These differences do not appear to affect the low probability of an extremely large find in the coastal plain, but render extremely low the chance of finding some oil in economically recoverable quantities. Interior was in possession of the state estimates well before the 1002 report was drafted, but completely ignored the state's predictions. This burying of significant information evidences the Department's lack of objectivity. Congress and the public are entitled to a full understanding of the uncertainty inherent in the oil and gas estimates for the coastal plain.

Finally, Chapter VII of the report consists of unabashed scare tactics designed to frighten the American public into thinking that all possible sources of petroleum resources, wherever located, must be explored and developed. As noted above, Interior ignores completely all other strategies for meeting the nation's energy needs, including other supply side options and all demand side options.

However, the report even ignores other potential sources of

oil and gas. Most incredibly, the list of major oil fields on page 162 (and elsewhere) omits the 20 BBO West Sak field west of Prudhoe Bay. This field is more certain than the ANWR, is proximate to existing pipelines and support facilities, and would serve the same goal of replacing oil for transport through TAPS. While it was initially thought that extraction from the West Sak sands was not feasible, ARCO recently completed a test well demonstrating that extraction from this field is technically feasible, but not economical given current oil prices. The same economic factors, however, would prevent development in the ANWR, if oil is dicovered in the coastal plain. Moreover, since development in ANWR cannot be expected for a minimum of 10-15 years, ARCO has at least that amount of time to improve extraction technology in the West Sak area. Development of West Sak, which is in a currently developed area rather than the most sensitive portion of one of the nation's most valuable wildlife refuges, is a clear alternative to ANWR development, but is not even mentioned in passing in the draft 1002 report.

2. Variance Between Report and Recommendations

Perhaps the most insidious flaw in the draft 1002 report is the gross variance between information in the body of the report and the proposed Secretarial Recommendations. We believe that a proper rewrite of the draft report would clearly support a wilderness recommendation for the coastal plain. However, even as written, the existing body of the report supports, at most, a recommendation for an extremely limited, winter-only exploration program to determine the nature of rocks beneath the coastal plain. Only

by ignoring much of the information in the report itself can a full leasing proposal be rationally justified. The following comparison of a few selected statements in the body of the report with parallel statements in the recommendations evidences the misleading proposed conclusion:

CONCLUSIONS	REPORT
The Central Arctic caribou has increased substantially during the period that development has occurred within the heart of its range.	Analogies comparing the effects of current oil development on the CAH and effects of potential 1002 area development on the PCH must be drawn with caution.
Overall ... most adverse environmental effects would be minimized or eliminated through mitigation.	Long-term losses of fish and wildlife resources, subsistence uses, and wilderness values would be the inevitable consequence of ... development....
... the coastal plain has been predicted to contain as much as 29 billion barrels of oil	Though the structures appear highly favorable, there is no assurance that they do in fact contain oil and gas.

Other key conclusions in the body of the report are completely ignored in the draft recommendations section. For example, the report states:

> Traditional subsistence life styles would be irreversibly and irretrievably lost or altered with the introduction of widespread industrial activity and greater opportunities for a cash-based economy.

Apparently, the author of the recommendation section felt that the tremendous impact of oil and gas leasing on the local population was not even significant enough to address in the recommendation section.

The generally biased approach evidenced in the report appears to be a political maneuver to begin with an extreme position in an

effort to obtain a less extreme result. This approach is inappropriate for a government agency that was directed by Congress to prepare a thorough and objective report so that Congress could reach its own conclusions from a fully informed basis. This tactic also denegrates the hard work and sound analysis obviously performed by staff level personnel in the Interior Department, as evidenced by portions of the report and by the Baseline studies prepared pursuant to section 1002(c) of ANILCA.

III. Specific Comments on Environmental Impact Analysis

In addition to the major analytical flaws identified above, we have a number of comments on specific issues addressed, and in some cases omitted entirely, in the environmental impacts section of the 1002 report. Given the large number of problems, only major issues are raised. These comments are organized topically rather than chronologically.

Caribou

The draft 1002 report admits substantial possible impacts to both the PCH and the CAH if oil and gas leasing is allowed in the coastal plain. Given these predictions alone, it is impossible to justify the proposed full leasing recommendation. In fact, the full leasing proposal contradicts the recommendations of virtually all of the caribou biologists at the caribou workshop sponsored by USFWS in 1985 for the express purpose of reviewing this issue. The result is also criticized by biologists in the Alaska Department of Fish and Game, in their comments on the 1002 report.

Historically, major industrial development has been found to be incompatible with, and highly disruptive of, caribou popula-

tions, particularly during calving and post-calving. See Shideler, Impacts of Human Developments and Land Use on Caribou, Vol. II, at 27-34 (case histories from Norway and the U.S.S.R.) In an evaluation of potential oil and gas leasing in the Teshekpuk lake Special Area, the Bureau of Land Management (which has less of a clear mandate to protect fish and wildlife populations than USFWS) stated:

> Based on the available literature ... pregnant cows and cows with calves would not be compatible with a major oil and gas development complex.

Teshekpuk Lake Special Analysis, Biological Evaluation, at 66. In short, the report's conclusions cannot be justified in light of the vast weight of scientific opinion on this issue.

Even the analysis in the report, however, is incomplete and understated. For example, the 1002 report focuses on protection of the "core" and "concentrated" calving grounds of the PCH. Core calving grounds are defined by reference to a density of 50 animals per square mile; concentrated calving grounds are areas where core calving has occurred in 5 of the last 14 years. Nowhere, however, is the derivation of these magic numbers explained. While the numbers obviously have value for comparative purposes, there is no explanation of why they are an appropriate basis for deciding which areas should be protected or not protected, particularly given the historical variation in the use of calving areas by the PCH. In some years, for example, the PCH has used none of the "core" or "concentrated" calving grounds. See ADFG, Alaska Habitat

Management Guide (AHMG), Arctic Vol. II, at 51 et seq. Since the reasons for this variation are not well understood, it is insufficient to protect only the core areas.

Nor does Interior evaluate the potential effects of restricting caribou to the same calving and post-calving area year after year as the result of permanent industrial development. For example, driving the PCH further south for calving each year will expose calves to higher predation, since predators are more common in the southern calving areas, and since predators will "learn" calving locations with greater certainty. Since predation is a major factor in calf survival, this could have a major effect on the herd. AHMG, Vol. 1 at 123, Vol. II at 69-70; 1002 Report at 28.

A second possible effect of restricting calving areas is overgrazing if calving and post-calving aggregations are forced into the same area each year. Sale 97 DEIS at III-31. Shideler noted the importance of nutrition to reproductive success and calf survival, but these effects are ignored in the 1002 report (or at least go unstated). In fact, nowhere does Interior address the issue of maximum calving densities for caribou. Is there a maximum calving density, and if so, what is the carrying capacity of the remaining undisturbed calving areas given predicted habitat losses in the 1002 area?

Finally, Interior fails to explain why insect relief areas are not considered Category I habitat, deserving of full protection. The report admits that "access to insect-relief habitat and forage resources ... may be critical to herd production." P. 28; See also p. 109; Shideler, at 23-24; ADFG comments at 7-8. For this reason,

ADFG recommended a 3-mile development-free corridor along the coast. Since "insect harassment can have a pronounced negative effect on caribou survival," these critical insect relief areas are worthy of protection.

Birds

The report recognizes some major potential impacts on the major bird populations of the coastal plain, but understates or ignores other possible impacts. For example, there is no discussion of the use of the Camden Bay area (where a port facility and state leasing are proposed) by threatened brant populations. Sale 50 Findings, at 19. Given the sensitivity of brant to disturbance, and the danger of further declines in brant populations, Teshekpuk Evaluation, at 17-23, this issue should be addressed in greater detail.

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Similarly, the report understates possible impacts to threatened peregrine falcons, because Interior states that there is no nesting in the 1002 area. But the state reports that peregrines nest immediately adjacent to the 1002 area along the Canning River, and hunt in a 5-15 mile radius. Therefore, activity in the 1002 area, including the construction and use of the area west of the Canning for road and pipeline construction and use, could adversely affect these populations.

Tundra swans are also extremely sensitive to disturbance, Teshekpuk Evaluation at 44. Camden Bay is a high density nesting area for tundra swans; in fact, graphic 3 in the Sale 97 DEIS identifies the ANWR coastal plain as the only major tundra swan concentration area on the North Slope. But the 1002 report does not

identify this conflict as a major issue.

Finally, the report does not fully analyze the possible effects of two major types of disturbance on ANWR bird populations. First, aircraft flight restrictions are one of the major mitigation methods to protect bird species (as well as other wildlife). However, the report also notes that fog restricts visibility 27% of the time from May to September, with a maximum of 31.5% in August. This is precisely when major bird activity occurs in the area. Human safety will always take precedent over environmental protection (as it should <u>if</u> leasing is allowed). Therefore, Interior must presume that flight restrictions will be avoided much of the time in weighing unavoidable impacts to bird populations.

Second, the report fails completely to conduct a risk assessment for the potentially most devastating impact to ANWR bird populations -- the risk of a major oil or fuel spill in the coastal lagoons, either from supply vessels or from related oil extraction in state lease areas. Since even a single exploratory well requires 500,000 to 800,000 gallons of fuel (refined fuel is more toxic to both plant and animal life than crude oil), the risk of a major spill should be considered even for exploratory activity. According to the Sale 97 DEIS, at IV-B-27-34, a major oil spill could kill thousands or tens of thousands of birds in a coastal lagoon. Rather than performing a risk analysis, as MMS typically does, Interior simply speculates that the risk of a major spill is minor. However, this approach is unwarranted in light of risk figures produced by MMS. For example, without even considering oil development in state coastal lagoons and in the ANWR, MMS predicted

a most likely cumulative probability of 24 spills greater than 1000 barrels in the Beaufort Sea (i.e. not unlikely events). Sale 97 DEIS, at III-A-5. This is not a low probability event. Moreover, the greatest risk of land contact is from nearshore activity that would be precipitated by ANWR leasing, and the effects of land contact could be devastating: a 10,000 barrel spill could contaminate 30 km of shoreline, and a 100,000 barrel spill could contaminate 90 km of shoreline. Id. at III-A-10. Particularly in light of the relationship between state and federal leasing in the ANWR region, Interior should have engaged in a serious oil spill and fuel spill risk evaluation, to give a true picture of the potential environmental risk of leasing in the Arctic National Wildlife Refuge. Obviously, this risk extends to other species as well as birds, particularly marine mammals and fish.

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Fish

1. Interior minimizes or does not consider effects to species that are not used for sport or commercial fishery. (p. 125) But the Refuge is not a fish hatchery; it is supposed to be managed for its natural diversity. Impacts to all fish species should be considered.

2. As noted above, other agencies have documented major water quality and fish passage problems from port and causeway developments. Interior virtually ignores these impacts, and fails to weigh the cumulative impacts of coastal development.

3. Spring-fed and other fish overwintering areas appear to be critical to the survival of many freshwater species. ADFG comments; 1002 report, at 37. Given the shortage of water in the

area, and the tremendous need for water for oil and gas production, this poses a major, unresolved resource conflict. Based on this conflict, ADFG recommends that overwintering areas be treated as a Category 1 habitat, worthy of complete protection. Yet Interior goes so far as to suggest the withdrawal of water from Saddlerochit Spring to meet water needs for oil and gas production (p.104).

4. The identification of fish only in certain watershed areas is highly misleading. According to the AHMG, Arctic Map 11, the watersheds not identified as having fish are in fact unsurveyed. In fact, the map states expressly that "the category 'not present in watershed areas' is not included because available data do not document such areas."

Polar Bears

1. Interior's complete failure to evaluate the cumulative impacts of disturbance to denning sites was addressed extensively above. It is clear, however, that human industrial activity poses a serious threat to polar bear denning. Sale 97 DEIS, at IV-B-38. In fact, one incident of apparent den abandonment resulted from winter exploratory activities on the coastal plain, and is documented in FWS records.

2. Polar bear habitat is protected by the Marine Mammal Protection Act and by International Agreement. The 1002 report does not explain how the unavoidable disturbance of denning sites (both onshore and offshore) that will result from ANWR leasing is consistent with these legal protections.

Bowhead whales

As noted above, Interior performed no oil spill risk analysis

or other extensive evaluation of environmental disturbances to nearshore and coastal areas as a result of leasing in the coastal plain. As a result, there is virtually no evaluation of potential impacts to endangered bowhead whales. However, the possible adverse effects of human activity on bowheads is well-documented. AHMG, Vol. I, at 38-46. Moreover, the Demarcation Bay region east of Barter Island, where Interior proposes a port and loading facility and where the state proposes a lease sale that is not likely to be economically feasible without ANWR development, is one of the two most vulnerable areas for the Beaufort Sea bowhead migration, as it is a critical fall feeding area. AHMG, Vol. II, at 12, 15 and Map 9; Sale 97 DEIS, at I-10, II-27, IV-B-47. Interior's failure to evaluate possible effects to this endangered population is a critical flaw in the report.

O-450

Terrestrial predators

While Interior predicts the impacts of oil leasing on caribou populations, little attempt is made to discuss the resulting effect on predator-prey cycles in the coastal plain. In particular, reductions in caribou populations could have ripple effects on populations of brown bear, wolves, and golden eagles. See AHMG, Vol. II, at 41 and Map 17. Interior's statements regarding the effects on wolves are particularly disturbing. The report indicates that only 5-10 wolves per year use the coastal plain (p. 31) but proceeds to predict only a "moderate decline" in the wolf population (p. 115). What is a "moderate decline" with respect to such a marginal population? This issue must be viewed in light of the fact that oil development near Prudhoe Bay has virtually eliminated the regional

wolf population. A similar result in the 1002 area cannot be considered unlikely.

Muskoxen

The Arctic National Wildlife Refuge contains the second largest muskox population in Alaska, with one third of the state's total population. In addition, the high growth rate of this reintroduced population evidences excellent muskox habitat. In light of the obvious importance of the 1002 area for the survival of this population, Interior's acceptance of major (20-50%) effects to muskox is inexplicable. In particular, oil development is proposed in the middle of two critical habitat areas -- traditional calving areas and important wintering areas. There appears to be no reason why muskox calving areas should be treated as any less important than caribou calving areas. In fact, since Alaska has far fewer healthy muskox herds and vastly lower total numbers of muskox than caribou, it could be argued that it is even more important to protect muskox habitats, or in the language of the mitigation policy, that muskox calving habitat is even more "unique and irreplaceable on a national basis or in the ecoregion." Yet Interior classifies caribou calving areas, but not muskox calving areas, as category I habitat. This result is anomalous and inappropriate.

Subsistence

1. As noted above, Interior treats the subsistence issue as one of pure harvest and harvest opportunity. This demonstrates a fundamental misunderstanding of the importance of subsistence to the way of life of the residents of area villages. Both under NEPA and sections 810 and 1002 of ANILCA, the report should include a

far more comprehensive evaluation of the impacts of development on Native culture and life style. Unfortunately, the unavoidable result of major oil and gas leasing in this area, unlike similar leasing at Prudhoe Bay, which is further from any village, will be a drastic change in the life style of the people of the village of Kaktovik. Similar impacts will occur in other villages that rely heavily on the PCH not only for food, but for cultural sustenance, if major changes in the size and distribution of the PCH and CAH result.

2. Interior's major focus on subsistence impacts only in Kaktovik is entirely inappropriate in light of the heavier reliance on the PCH by other villages, including Arctic Village, Old Crow, Venetie, and Fort Yukon (p. 29). Interior has exhibited an extremely callous indifference to the welfare of the people of these villages.

O-451

Water and gravel resources

Interior properly identifies the fact that oil and gas development in the coastal plain will require major amounts of water and gravel resources, and properly identifies this as a major resource conflict. However, the report falls far short of evaluating and resolving these major conflicts. For example, if the "innovative" methods of water use identified on page 76 are unsuccessful, it is likely that far more gravel roads will be constructed than are currently predicted. Alternatively, once a major commitment to oil and gas extraction from the ANWR is made, it is unlikely that the oil industry will be prevented from using available fresh water and gravel sources, despite adverse effects on fish and other popula-

tions. Therefore, the sources of water and gravel necessary to support oil development in the area should be fully identified before a decision to allow leasing is made. If environmentally acceptable sources of these materials are not present, this fact should be clearly stated in the report rather than engaging in an exercise in wishful thinking.

Environmental pollution

As noted above, Interior's evaluation of a wide range of environmental pollution effects from oil leasing in the Arctic National Wildlife Refuge is woefully inadequate. Major potential problems are identified below:

1. Air pollution. There is no evaluation whatsoever of air quality impacts from oil development in the ANWR, despite evidence of major potential problems at Prudhoe Bay, the possibility of more severe problems in the 1002 area in light of the closer proximity of mountainous terrain and frequent inversions, and the cumulative air quality effects of additional development on the North Slope. DEC and EPA currently have a very poor understanding of the effects of air pollution from Prudhoe Bay facilities, but there are a number of reasons for concern. Permitted NOx emissions at Prudhoe are 80,000 to 100,000 tons per year, and ambient monitoring to determine whether these massive emission rates result in ambient air quality violations has just begun. Moreover, it is suspected that EPA's NOx model has underpredicted ambient NOx concentrations, and no snow pH measurements have been taken to determine whether acid precipitation is a problem. But in comments submitted on the state's proposed Camden Bay sale, DEC commented that "air quality

in the proposed sale area will be a significant concern if new production facilities are developed." Another major air quality problem, particularly in a National Wildlife Refuge with proximate wilderness areas, is startup and "emergency" gas flaring, or black smoke incidents. Recent startup flaring on the North Slope continued for an entire month, with black smoke visible for up to 50 miles from the site.

3. Oil spills. The massive cumulative problem of chronic oil spills was identified above. In addition to direct spills to tundra, DEC indicates that chronic leaking of oil through gravel pads is adding to the overall amount of oil reaching the environment. The 1002 report identifies the problem, but makes no attempt to evaluate the long-range and comprehensive effects of oil pollution on the refuge.

O-452

4. Hazardous waste. As noted above, at least one major hazardous waste spill has occurred in the Prudhoe Bay area. In addition, both the state and the oil companies are currently grappling with the major problem of how to handle hazardous wastes from North Slope operations. Currently, oily wastes are taken to the North Slope Borough's Oxbow landfill, but there is no approved facility for hazardous wastes under RCRA. The 1002 report does not address how either oily wastes or other hazardous wastes generated from development in the ANWR will be handled or transported.

5. Solid waste. Similarly, the 1002 report does not address where even nonhazardous solid wastes, which are generated in tremendous quantities by North Slope operations, will be handled. Either these wastes must be transported out of the refuge for disposal, or

a landfill will have to be sited in the refuge.

6. Drilling muds. Interior's treatment of this major waste disposal problem is insufficient. Notably, DEC refers to the 1002 report's treatment of the drilling muds issue as "grossly inadequate and misleading." Each of the 500-600 wells at Prudhoe Bay generate approximately 840,000 gallons of wastes per year. In 1984 alone, 58 million gallons were discharged to tundra wetlands, but as noted above, there have been pervasive violations of applicable discharge standards. Rather than addressing the major water quality problems that could result in the ANWR, Interior suggests that the only permanent effects of drilling muds disposal practices will be the creation of "rectangular-appearing ponds" after operations cease. While mentioning pervasive leakage problems in passing, Interior does not analyze the potential long-range effects on the water supply and other resources in the refuge. Finally, no mention is made of the fact that EPA is in the process of reevaluating the regulation of all oil industry wastes, pursuant to a consent decree in Alaska Center for the Environment v. Thomas. The initial results of this study indicate that existing industry waste disposal practices, on the North Slope and elsewhere, may be inadequate to protect human health and the environment.

IV. Conclusion

Based on the above deficiencies, the draft 1002 report does not serve its intended purpose, and violates a number of applicable laws and regulations. Congress sought an independent, objective analysis so that it could have a well-informed basis for the debate

over the fate of the coastal plain of the Arctic National Wildlife Refuge. This basis simply has not been provided. The report should be rewritten, and submitted for another round of public comment before a final version is submitted to Congress, as required by the NEPA regulations.

However, even on the basis of the adverse impacts predicted in the report, it is apparent that oil and gas development in the 1002 area cannot be accomplished without major, long-term losses to internationally-significant fish and wildlife populations, the irretrievable loss of the nation's last arctic wilderness, and major damage to the culture and lifestyle of the Native villages in and around the refuge.

O-453

On the other hand, it is equally apparent that no effort whatsoever was made to evaluate the true national need for the petroleum resources that may exist in the region, i.e. whether equal amounts of energy could be generated or saved through other strategies. If such an analysis were undertaken seriously, it would be realized that the national security and energy independence goals discussed in the report could be met without the tremendous losses that will accompany oil and gas leasing in the refuge, and at a lower economic cost to the nation. We do not have to lose such precious resources in order to meet our energy goals.

No valid case has been made to allow oil development in this area. Rather, the coastal plain of the Arctic National Wildlife Refuge should receive the protection it deserves through placement in the National Wilderness Preservation System.

Washington Native Plant Society
"Preserve and Enjoy Washington's Flora!"

4611-2nd. Avenue N.E.
Seattle, WA 98105

20 January 1987

U.S. Fish and Wildlife Service
Division of Refuge Management Resources
2343 Main Interior Bldg.
18th. and C Sts. N.W.
Washington, D.C. 20240

Greetings,

This letter is written on behalf of the Washington Native Plant Society's Board of Directors to comment on the proposed alternatives for oil development on the Arctic National Wildlife Refuge (draft 1002 Report). The WNPS is an organization of over 800 professional and amateur botanists in Washington state who share an active interest in the preservation of our nation's native flora and fauna.

The WNPS would like to offer its full support to Alternative E. We wholeheartedly endorse Wilderness Area designation for the entire Arctic NWR. We strongly oppose any form of gas and/or oil development in the Arctic NWR.

We find the "Preferred Alternative" to be totally unacceptable for the following reasons:

1. You have not adequately evaluated or considered the probable impacts of the proposed action on native plant communities and on rare and sensitive plant species.

2. You have not demonstrated a convincing case for either the need for or the feasibility of the proposed extraction program.

3. You have not properly evaluated the cumulative effects of the proposed actions on the extremely fragile natural ecosystems of the high arctic. This is in clear violation of NEPA regulations.

4. You have not adequately assessed the impacts of the proposed action on caribou herds or on the native peoples dependent on these herds.

5. Proper environmental safeguards in respect to disposal of hazardous waste by-products from the proposed actions are not delineated.

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6. The proposed action and other development alternatives presented would cause severe environmental degradation of one of North America's most important and fragile wild ecosystems and would make a mockery of the very concept of the National Wildlife Refuge system. This is clearly not acceptable.

The WNPS urges the withdrawal of the proposed alternative in favor of the only ecologically and biologically justifible course of action - the adoption of Alternative E.

Sincerely,

Mark Egger

Mark Egger
President, WNPS

cc: Hon. Bennett Johnson
Hon. Stve Cowper
Hon. Dan Evans
Hon. Brock Adams

THE WILDERNESS SOCIETY

February 6, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge
Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, D.C. 20240

RE: Comments on the Draft Resource Assessment for the Arctic National Wildlife Refuge Coastal Plain

Dear Sir:

For over 50 years, The Wilderness Society has been dedicated to the wise management of the federal lands and the preservation of wilderness. The Society's history in Alaska goes back to its very founding by Robert Marshall, an early explorer of the Brooks Range.

The incomparable and indisputable wilderness and wildlife values of the Arctic National Wildlife Refuge, and specifically the coastal plain, have long made it a major focus of The Wilderness Society. The original wildlife range was established in 1960 largely as the result of the tireless efforts of Olaus and Margaret Murie. The late Olaus Murie, President of The Wilderness Society for 17 years, spent years conducting research in the refuge, and Margaret Murie still guides the organization as a member of the Governing Council. The Muries recognized the "unique

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wildlife, wilderness, and recreational values" that the refuge was established to protect.

The following comments on the draft Resource Assessment and recommendation to Congress on the Arctic National Wildlife Refuge Coastal Plain are submitted on behalf of The Wilderness Society's 160,000 members nationwide.

INTRODUCTION AND SUMMARY

In these comments, The Wilderness Society concludes that the 1002 report fails to meet the requirements of either the Alaska National Interest Lands Conservation Act (ANILCA) or the National Environmental Policy Act (NEPA).

Specifically, the report falls short in the following respects:

** Analysis of oil and economics. The Department's geologists estimated that there was just a 19 percent chance of finding economically producible oil under the coastal plain. This key finding was buried in the report and was not included in either the executive summary or the press release. Moreover, in calculating the likely revenues from oil development and the total value of development, the report fails to multiply the dollar values arrived at by that 19 percent probability.

Further inflating the projected economic gain were the exceptionally optimistic assumptions about future oil prices. The report assumes a 4.1 percent annual increase through the Year 2000. That is more than twice the most optimistic estimate being used today by the Department's

Mineral Management Service (MMS). The report's projected Year 2000 price of $33 per barrel (real 1984 dollars) is 39 percent greater than the price would be using the highest of MMS's assumptions.

** Potential role of energy conservation. In 1985 the Department of Energy issued a National Energy Plan stating that energy conservation "has proven to be the most expeditious way to reduce the need for new or imported energy resources; and in fact it now contributes more to balancing our national energy ledger than does any single fuel source." Yet the Administration has vetoed a bill setting efficiency standards for appliances, rolled back automobile fuel efficiency standards, pushed for higher speed limits, and cut the energy conservation budget. The 1002 report fails to investigate alternative energy sources, as required by the National Environmental Protection Act. The Administration should pursue such options before drilling in an area that, according to the 1002 report, would account for only four percent of U.S. oil needs in the Year 2005.

** Projected environmental consequences. The report predicts population declines of up to 50 percent for muskoxen and 40 percent for the Porcupine caribou herd. It acknowledges that wolves, polar bears, and snow geese, and other wildlife populations would suffer, as well. These projected impacts are conservative. Assuming for the moment that they are reasonable, it is disturbing that the U.S.

Fish and Wildlife Service finds them acceptable. The Wilderness Society considers such losses unacceptable.

Nor does the report show much concern about potential pollution. It does not mention that since 1972 there have been 23,000 oil spills reported at Prudhoe Bay. It does not mention that at Prudhoe Bay 20 of the 21 major reserve pits, which store toxic chemicals and heavy metals, violate EPA discharge standards. It fails to address the impact of the serious air pollution caused by Prudhoe Bay operations on the growing Arctic haze problem--or the contribution that oil activity in the 1002 area would make to that problem. These are important concerns that call for thorough investigation.

** Appropriate mitigation measures. The report acknowledges that there would be serious wildlife population declines and difficulty for those with a subsistence lifestyle, and it concedes that "[t]he wilderness character of the 1002 area would be destroyed..." But the report fails to spell out how these impacts would be mitigated.

** Analysis of area's wilderness values. Section 1004 of ANILCA required a thorough review of the coastal plain's suitability for wilderness designation. Yet the report includes only half a page on the subject; half of that is a quotation from the Wilderness Act. The report concludes that the area could meet the criteria in the Wilderness Act, an indefensibly weak statement in view of the plain's pristine condition, natural qualities and spectacular wilderness values.

** Secret land trade negotiations. The Interior Department has been conducting secret land exchange negotiations with several Native corporations despite requests from Members of Congress to desist. Negotiating to trade away the very area it was directed by statue to study for wilderness protection demonstrates the lack of objectivity that is reflected throughout the report.

** Consultation with Canada. Despite the clear mandate in ANILCA's Section 1005, the Interior Department failed to consult officially with the Canadian Government during preparation of the report. Since release of the report, both the Yukon Government and the Government of Canada have stated clearly that they disagree with its recommendations.

** Provision for public comment. Despite the importance of this issue, its complexity, and the broad interest in it, the Department provided for a relatively brief comment period and hearings in too few locations.

THE INADEQUACIES OF THE OIL AND GAS ASSESSMENT AND ANALYSIS

Many of the assertions made by the Interior Department in the report's Executive Summary, the "draft" recommendation to Congress, and many of the conclusions drawn throughout the document are not supported by the findings in the report.

In stating the oil potential, for example, the Executive Summary fails to report the marginal probability, or risk, associated with Arctic Coastal Plain development.

Only upon delving deep into the body of the 1002 report does the reader find that there is an 81 percent chance that no economically recoverable oil at all lies within the refuge. The chances of discovery reported in the Executive Summary and fact sheet are "conditional" estimates. The condition is that at least one economically recoverable field will be found. In other words, the much-touted probability that the refuge holds from 0.6 to 9.2 billion barrels of recoverable oil is valid if economically producible oil is discovered -- the chances of which are only one in five.

The Executive Summary declares the Arctic Coastal Plain to be "the most outstanding oil and gas frontier remaining in the U.S." However, though a cursory glance at the report may appear to lend credence to this statement, careful scrutiny fails to substantiate it. This peculiarity results from a combination of omission of crucial information, incomplete analysis, and the inclusion of incomparable sets of numbers in single charts.

The report presents two probability distributions to answer the following questions: (1) what is the likelihood that any hole drilled in the region will encounter economic quantities of oil and gas, and (2) if economic quantities of oil and gas are found, how much is there likely to be? These probability distributions are based on simulation modeling of data obtained from minimal outcrop investigations and reconnaissance seismic surveys.

The Wilderness Society believes that the 1002 report

should instead ask these questions: (a) what is the likelihood that oil and gas will be developed if the area is opened to leasing, and (b) what will be the resulting costs and benefits of this action to the federal and state governments, and the oil-producing corporations. The difference between questions (a) and (b) and the issues addressed in the report is that the DOI document does not go beyond the estimation of the quantities of oil and gas that may be in the refuge. The relevant question that needs to be answered is: What are the financial benefits (both magnitude and duration) that are likely to accrue from opening the coastal plain of the Arctic Refuge to oil and gas development?

If petroleum is economically-producible in the 1002 area, then lease bonus payments, corporate income taxes, severance taxes, windfall profits taxes, royalties, and perhaps other benefits would be obtained by the federal and state governments. These quantifiable benefits from petroleum production must be compared with the largely non-quantifiable costs of development of the wildlife refuge. These costs include the disruption of the caribou calving grounds and other wildlife habitat losses.

If the 1002 area is opened to full-scale oil exploration and development and commercially-exploitable quantities of oil and gas are not found, then the state and federal governments would not receive corporate income taxes, severance taxes, or royalties, and the oil companies would not earn a profit on their exploration investment. In

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addition, many of the same non-quantifiable costs that would be realized in the commercial-production scenario would also occur, including the environmental damage caused by the building of haul roads, drilling pads, airstrips, port facilities, desalination plant(s), in the midst of an otherwise pristine area.

Clearly the decision to open the wildlife refuge to petroleum development must consider the quantities of oil and gas that are likely to be present, but the net economic benefits of development must also be considered. The DOI analysis, however, skews this assessment towards development by ignoring the non-quantifiable costs of foregone wildlife and wilderness values and grossly overstating the potential benefits of development.

The estimation of the Net National Economic Benefits (NNEB) presented in Chapter VII of the report is deceivingly high. Unrealistic oil price assumptions are used in the analysis and oil and gas volumes and dollar values are oftentimes presented as if there is a 100 percent probability of finding these commodities. In reality, the probability of drilling a hole that taps an economically-viable oil pool is only 19 percent (pg. 68). Thus, any estimate of the likely oil revenues and associated benefits that could be obtained from the 1002 area should be multiplied by this marginal probability factor in order to present a true picture of the likely value of opening the refuge to petroleum production. To do otherwise ignores the

fact that 8 out of 10 wells drilled in the area will yield no net benefits.

The Net National Economic Benefits are defined in the report (pg.165) as "the expected net value of oil production, or the difference between revenues from sale of oil and the costs of exploration, development, production, and transportation." The remaining dollars go to the state and federal governments and the oil-producing corporation. State and federal benefits are obtained from the lease bonus payments, royalties, severance taxes, and corporate income and profits taxes. Any money left over from these costs is a profit to the oil companies.

According the DOI analysis, the NNEB from full-scale development of the mean potential find of 3.2 billion barrels of oil (BBO) is $14.6 billion (adjusted for the time value of money). The NNEB of limited leasing from a field size of 9.2 BBO (there is a 5% probability of this size or larger) is presented as $9.4 billion using optimistic economic assumptions. These values fail to account for the high potential that no economic oil will be discovered if leasing is allowed. To get the true expected NNEB from these field sizes, the agency should have explicitly factored this risk into the analysis by multiplying the above values by the 19% marginal probability. This would yield the much lower net national economic benefits of $2.8 and $1.8 billion respectively.

The values for the NNEB reported above are obtained

from an analysis using critical assumptions about (1) the minimum field size that is likely to be economically produced, and (2) future oil prices, among others. According to the most-likely DOI scenario, the oil price in the year 2000 is assumed to be $33 per barrel in real 1984 dollars (pg.72) (or about $36.30 in 1987 dollars). In order for this value to be reached in the year 2000, the oil price would have to grow at an average rate of 4.1 percent per year (starting from the current oil price of approximately $18 per barrel). The most recent projections of the Minerals Management Service (MMS) of the DOI assume three oil price growth scenarios: 0, 1, and 2 percent per year. The 4.1 percent growth rate -- in real prices -- is more than twice the highest growth rate assumed by the MMS. Using the optimistic assumption of an oil price of $40 per barrel (about $44 in 1987 dollars), yields a yearly growth rate of approximately 4.9 percent. Since these values are compounded annually, the effect of such a price assumption is magnified with each passing year. For example, using a growth rate of 1 percent per year, the price for a barrel of oil in the year 2000 would only be $18.62 (in 1984 dollars, $20.69 in 1987 dollars). Thus the value of $33 per barrel is 77% higher than the value of $18.62 that would be obtained from a one-percent-per-annum oil price growth rate, and 39% more than the two-percent-per-year growth rate.

The effect of these very high oil price assumptions is to project a much higher NNEB for the oil-producing

projects than would be the case for a more conservative oil price estimate. If the NNEB is calculated using an oil price estimate that is too high, the benefits of producing oil will be over-estimated, and the resulting balancing of the costs and benefits of the project will be misleading.

The incomparable sets of numbers in the two charts on page 50 of the report can also be misleading. Table III-1 fails to report the risks associated with potential oil resources in a variety of areas around the country. Since many of the areas listed are already producing, there is no longer an associated risk that economic finds will not be made. However the range of risks associated with the undiscovered resources vary widely and, by definition, are all greater than the risks associated with proven areas. If the risk were factored into the probabilities for the Arctic, the average quantity of economically recoverable oil expected to occur in the area would be 0.61 billion barrels, not the 3.2 billion barrels reported in this table and throughout the report. Based on current domestic consumption, 0.6 billion barrels would supply the nation for a mere 33 days.

The Interior Department's failure to include a column in the chart (pg. 50) showing the risked probabilities makes it impossible for the public to make any meaningful comparison of the oil potential of the 1002 area with other areas around the country. If the risk information were available, it would likely show that other areas with higher

probabilities of discovery, though of lower quantities of oil, actually have more "outstanding" oil potential than the Arctic.

The same criticism holds true for Figure III-2, also on page 50, a bar graph of the conditional production estimates for the 1002 area compared to five producing fields. Once again, the numbers do not fit because the estimates for the Arctic are contingent upon the one-in-five chance that any economic fields will be discovered, while the other numbers refer to proven reserves. To make a meaningful comparison of this sort, the estimates for the 1002 prospects should be explicitly adjusted downward to account for the differences in risk among the different areas. If the Interior Department had done this, instead of the highest bar for the Arctic outstripping Prudhoe Bay, it would only reach about as high as Kuparuk, a difference of about 7.5 billion barrels. This report is intended to guide the general public and Congress in reaching a decision on the future of the Arctic Coastal Plain. Misrepresentations such as these only serve to undermine the credibility of the entire report.

ENERGY CONSERVATION

The Secretary's recommendation states that "[d]evelopment of its potential oil and gas resources could make a significant contribution to the economy and security of this Nation..." However, even the 3.2 billion barrels of supposedly recoverable oil would supply a mere 4 percent of

U.S. oil demand in the year 2005 (page 169). This much oil could be saved through a variety of energy conservation measures, leaving the Arctic Refuge intact for the benefit of future generations.

In 1985, the Department of Energy issued a National Energy Policy Plan which stated that energy conservation "has proven to be the most expeditious way to reduce the need for new or imported energy resources; and in fact it now contributes more to balancing our national energy ledger than does any single fuel source." Despite this acknowledgement of the benefits of energy conservation, the President recently vetoed the National Appliance Energy Conservation Act, passed overwhelming by both houses of Congress. This single piece of legislation, which would have established national efficiency standards for home appliances, would have saved more than 1.5 billion barrels of oil over the life of appliances purchased during the next 14 years. How can the Administration talk about the need to develop a highly speculative area of the Arctic Refuge for national security, while vetoing a sure-fire way to conserve a very significant amount of energy?

Likewise, the Administration has rolled back automobile mileage standards and supports raising the 55-mph speed limit. Collectively these energy conservation measures and others could save more oil than the Arctic Refuge is predicted to yield under the most likely scenario.

ENVIRONMENTAL CONSEQUENCES

Not only does the Department exaggerate the oil potential of the refuge, it dramatically understates the threat oil development poses to the refuge's incomparable and irreplaceable wildlife. For example, the report concludes that full-scale oil development would have a major adverse impact on the nearly 600 muskoxen that reside on the coastal plain, resulting in the loss of up to 50% of the population. Habitat loss and direct mortality would have a major adverse affect on the snow geese population, a species that is already declining in numbers. The report predicts the average number of snow geese using the 1002 area for Fall staging could be reduced by nearly 50 percent. With an average of 105,000, and as many as 325,000 birds staging in the area, this is a reduction of 52,000 to 162,000 geese.

Polar bears, a circumpolar species also in decline, would lose two of three known concentrated denning areas within the 1002 area to development such as port facilities and desalination plants, vehicles, human intrusion, and noise during critical phases of the animal's life cycle -- hibernation, birthing and nursing. The report concludes that the Beaufort Sea population could not sustain an increase in mortality because the death rate is already equal to the birth rate, yet states that development in the refuge would have an adverse effect on the species. In reaching this conclusion, the report assumes that similar intensive development will not occur along the entire

northern coast of Alaska and Canada. This assumption ignores the fact that, outside of the refuge, the entire Arctic coastal plain shoreline and outer continental shelf in Alaska are open to development. Petroleum development is also occurring east of the refuge in the Mackenzie River delta region of the Northwest Territories. The cumulative effects of current and future oil development could virtually eliminate the polar bear in the United States.

The Interior Department report estimates that five to ten wolves (Weiler and others, 1985) seasonally use the 1002 area, while the Alaska Department of Fish and Game (ADFG) documented as many as 27 adults and seven pups in the northern portion of the Arctic Refuge in late summer, 1984. Both agencies report high mortality in North Slope packs due to hunting, aerial hunting, and disease (e.g. rabies). It is generally acknowledged that wolves have been eliminated in the area around the Prudhoe Bay complex. Yet the report concludes that full-scale petroleum leasing and development, along with 6,000 people moving onto the the coastal plain of the refuge, would result in only a moderate decline in the wolf population. What is a moderate impact on 5, 10, or 20 wolves?

Researchers report the wolf populations on the North Slope are considered low compared to their abundance prior to intensive aerial hunting and predator control (Weiler et al., 1985). The Interior Department report predicts this trend will continue due to the direct mortality (i.e.

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hunting) that can be attributed to development. It seems more reasonable to conclude that development would result in the continuation of a major adverse impact on wolves.

Porcupine Caribou Herd

The assessment concludes there could be a major negative impact on the 180,000-head Porcupine caribou herd (PCH), that mitigation is not possible in the herd's core calving area, and that full-scale leasing and development could result in up to a 40% decline in the population. Not only do we believe that such losses are unacceptable, but based on the best scientific research and information, we believe that the effects on the herd would be far greater than the report predicts.

The Wilderness Society's primary concerns are:

1) Loss of calving habitat would be the major contributing factor to population decline. Studies have shown that parturient and postpartum cows accompanied by calves are intolerant of stressful surroundings and seek areas of little or no disturbance (Cameron, 1983). Cameron believes that "intensive oilfield development may result in virtual abandonment of areas previously occupied during calving."

2) Specifically, calving and feeding habitat would be lost by covering drill pads, approximately 20 to 35 acres in size, with 5 feet of gravel. However, the visual impacts of pads with derricks would be far greater. Dau and Cameron (1985) report a two-mile sphere of influence around development -- an area that is avoided by caribou during the critical calving and post-calving period. Under the preferred alternative, the assessment estimates that 50 to 60 drill pads would be constructed on the herd's calving grounds. If the caribou do in fact avoid each of these pads as the research indicates, an enormous amount of habitat would be lost. To make matters worse, the ADFG believes that "the numbers of drill pads and material sites are greatly underestimated." This should be a serious concern for the Fish and Wildlife Service and must be

adequately addressed in the final Environmental Impact Statement.

3) The loss of insect-relief habitat, particularly in coastal areas, is also greatly understated. While the report does admit that nearly 80% of the coastal insect-relief habitat could be affected if development proves to be a barrier to movement, it ignores the fact that research indicates that linear development, such as the proposed east-west road and elevated pipeline bisecting the 1002 area, has the lowest crossing success rate (Shideler:ADFG Technical Report No.86-3, pg. xi, No. 12). Smith and Cameron (1985) found that "large, mosquito-harassed groups of caribou do not readily cross beneath elevated pipelines." They found that many animals walked or trotted parallel to the pipeline for long distances, "result[ing] in a substantial increase in energy expenditure. These authors expressed concern that if this unproductive activity is repeated several times during the summer, as it surely would be in the case of the PCH, it "would result in a net decrease in fat accumulation . . . during the [crucial] midsummer period of rapid growth and fattening." These changes in energy status and the associated stress could have serious implications for the winter survival rate for these animals and adversely affect the long-term health and viability of the herd.

While the report admits that roads/pipelines would impede the free movement of tens of thousands of animals in the PCH, little attention is given to a subsea pipeline alternative. It is stated that such a route is technically feasible but presents significantly higher environmental risks than does an onshore pipeline. This may be true in the short run, but given the irreparable damage any onshore route would have on the PCH, it certainly is not the case in the long run. The ADFG agrees. The agency points out that "although the consequences of an oil spill from a marine pipeline may be catastrophic, the probability of such a spill is very low" (Commissioner Collinsworth, ADFG comments, Enclosure F, pg 1, para.5). Further "the long-term environmental consequences of an aboveground onshore pipeline . . .are cumulatively much more adverse to fish and wildlife than a marine pipeline." This issue must be more fully developed and discussed in the final report.

4)Finally, numerous researchers have reported that vehicle and aircraft traffic, noise, people, and general activity is more disturbing to caribou than merely the presence of roads or structures. The 1002

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report asserts many of the adverse affects from development but seems to ignore the effects 6000 people are going to have on the herds, especially during such a critical phase of the life cycle.

Pollution Impacts

The assessment is seriously deficient in addressing the effects of pollution from oil development on the refuge and its sensitive wetlands, aquatic systems, and wildlife. For instance, the report fails to mention that there have been more than 23,000 reported oil spills at Prudhoe since 1972. The two largest spills were 200,000 and 658,000 gallons. Or that in 1985 alone there were 521 spills dumping more than 82,000 gallons of oil onto the tundra and into the drainages. Nor was it pointed out that studies have shown that 30-year old spill sites in Alaska show little signs of recovery.

Improper disposal of drilling waste is seriously affecting water quality in the vicinity of the Prudhoe oilfields. The report should have noted that the 900-square-mile complex contains 500-600 wells, with operations producing approximately 840,000 gallons of drilling muds per well per year. State Department of Environmental Conservation (DEC) reports indicate that discharges from 20 out of 21 major reserve pits that store these wastes violate EPA standards, discharging toxic chemicals and heavy metals such as arsenic, barium, lead, manganese, chromium, zinc, and copper, brine, and carcinogens such as aromatic hydrocarbons into aquatic and

wetland habitats. The ADFG is concerned that this practice will continue in the 1002 area and will "result in chronic and/or acute contamination of wetland organisms by heavy metals, hydrocarbons, or salts." The agency also expresses concern over industry's practice of controlling road dust by applying reserve pit supernatant, further spreading these harmful pollutants to uplands or other wetland areas.

The ADFG concludes that "although the data are strongly suggestive that impacts to fish and wildlife habitat and to lower food-chain organisms are occurring as a result of reserve pit discharges to the surrounding environment, the conclusive link, that of effects on higher food-chain organisms, remains to be proven. However, all indicators suggest that such impacts can and probably do occur -- water quality degradation around the pits has been documented, uptake of compounds known to be detrimental to organisms in laboratory conditions has been found, an important aquatic food-chain organism has been effected, and aquatic invertebrate community structure has been changed." It is therefore perfectly reasonable to conclude that oil development in the coastal plain of the refuge would compound the existing pollution problems on the North Slope and affect a greater number and variety of wildlife species. Moreover, the health of humans living in and adjacent to the refuge, as well as others in North America who consume migratory species, could be affected through consumption of contaminated animals. What is certain is that studies have

either not been undertaken or are inadequate to make these determinations. Meanwhile the industry continues to pollute unabatedly and hopes to expand the current operation into a national wildlife refuge.

There is no mention in the report of the dangers of hazardous waste spills such as ARCO's contractor, North Slope Salvage Company's 1983 spill involving more than 10,000 barrels or how this waste might be properly disposed of should oil development be authorized by Congress.

The 1002 report also fails to address the contribution that air pollution from the Prudhoe oilfields is having on a relatively little understood problem known as Arctic haze. The state permits the release of 80,000-100,000 tons of nitrous oxides (NOx), but the effects of this pollutant are unknown since there has been no air quality monitoring in the region. What is known is that the once-pristine arctic air is becoming increasingly fouled by development in this and other countries. This may have serious implications for global air quality and contribute to climatic warming, commonly known as the "greenhouse effect." Dr. Robert Schnell at the National Oceanic and Atmospheric Administration reports that this blanket of soot in the atmosphere can be as thick as 18,000 feet and may be raising temperatures in the arctic and contributing to the rise of average surface temperatures of the entire planet.

The analysis in the 1002 report of the impacts from air and water pollution are wholly inadequate. Among the many

questions that must be addressed are: What will be the effect of increased arctic haze from development in the 1002 area? Might the temperature inversions, caused or exacerbated by the air pollution that inevitably accompanies petroleum development, contribute to local climatic warming? If so, what could be the long-term effects of such a warming trend? In such a delicate and carefully balanced environment, the consequences could be devastating.

THE INADEQUACIES OF THE BIOLOGICAL DATA AND ANALYSIS

The draft report fails to address or analyze thoroughly the coastal plain's natural environment and the problems and impacts posed by exploration and development. Though the report accurately states that the "Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America," (page 45) it fails to elucidate the biological significance of this fact. The long-term effects of oil and gas development cannot be understood without an explanation of the complex ecological processes and interrelationships of these ecosystems.

The report also states that the "1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge" (page 46). The statement is an accurate, but somewhat empty, one without further elaboration of the broader consequences of exploration and development in the 1002 area.

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The most glaring omission of the report is the absence of any discussion of the cumulative impacts from development in areas adjacent to the refuge, both on and offshore. Oil and gas lease sales are scheduled for millions of acres of adjacent state lands (Camden Bay, Demarcation Point, Prudhoe Bay Uplands) and of 21.2 million federal acres (Sale 97) just offshore in the Beaufort Sea. Sale 97 is scheduled for July 1987 and will be the largest lease sale ever held in the Arctic Ocean. Activities in Canada must also be considered. The effects of all these activities considered together are surely substantially greater than if considered piecemeal.

The report acknowledges the lack of fresh water supplies in the area and the need for large quantities of water for both exploration and development. Yet it does not adequately explain how water will be obtained and what the environmental consequences will be, particularly to fish. Experience at Prudhoe Bay shows that reduction in the quantity and/or quality of water available to overwintering fish is likely to have serious impacts on fish stocks. Therefore water should not be withdrawn from spring areas.

The report should also note that surface waters in the 1002 area differ in character from those in the Prudhoe Bay area. Thus comparisons cannot be freely drawn. Also, the impact of reserve pits on flora and fauna, and their habitats, are not adequately considered. Research indicates that reserve pit discharges are making their way into the

food chain, though the full extent of the harm has yet to be documented.

Another resource essential to petroleum exploration and development is gravel which, like water, is extremely scarce in the 1002 area. The report does not adequately address the sources of gravel, the potential for rehabilitation of materials sites, and the impacts on fish and wildlife. To date, no Prudhoe Bay sites have been returned to a standard suitable for fish and wildlife use.

Throughout the report, in regard to virtually every species of wildlife associated with the refuge, the inadequacies of baseline data and information are cited. Without this critical data and understanding, the predictions of impacts have very little credibility. It seems wholly inappropriate for the agency, at one moment, to cite its own lack of understanding, and, in the next instant, to state as fact that effects will be minor or moderate. This is exactly the posture taken by the agency with regard to moose, fox, wolverines, wolves, brown bears and polar bears, among others. Regarding muskoxen, nothing is known about the effects on industrialization on the species (page 113). Muskoxen have already been eradicated once from the Arctic Refuge. There would be no excuse for repeating the error.

MITIGATION OF IMPACTS ON FISH AND WILDLIFE

The report fails woefully and inexplicably to address the question of mitigation of impacts on fish and wildlife

resources. First, there is no statement that any or all of the proposed mitigation measures would be required under a leasing scenario. Second, even if such were made, The Wilderness Society questions the effectiveness of the proposed measures.

The conclusion of the report itself leaves open the question of the Department's intent regarding mitigation. The description of the area's natural, historical and cultural resources is replete with statements recognizing the severe harm that will come to these irreplaceable values. For example, the report states if leased, "[t]he wilderness character of the 1002 area would be destroyed..." (page 139). The report also acknowledges that the Porcupine Caribou Herd, and so the people who depend on it, will suffer significant harm should the core calving area be leased. Nevertheless, the proposed recommendation to Congress is to lease the entire coastal plain, including the critical core calving area.

INADEQUATE CONSIDERATION OF WILDERNESS VALUES

The 1002 report fails to fulfill the requirements of ANILCA section 1004, requiring the review of the area for wilderness designation. Despite the determination that the area "has outstanding wilderness qualities..." (page 46), the report states merely that "the 1002 area could meet the criteria" (emphasis added, page 46) of the Wilderness Act. The Arctic Coastal Plain, without question, is eminently worthy of inclusion in the National Wilderness Preservation

System. The U.S. House of Representatives has twice passed legislation to designate the area as wilderness. In addition, two separate Fish and Wildlife Service studies (Thayer 1982; draft USFWS 1973) concluded that the area is suitable for designation.

The final report should include a detailed description, rather than a short list, of the area's wilderness qualities, including a discussion of the area's uniqueness, its international significance, and its importance to the scientific community. A half page of description, of which one-quarter consists of a quotation from the Wilderness Act, is simply indefensible in a report intended to assist Congress and the general public in determining whether the coastal plain's wilderness should be protected or foregone for oil development.

INADEQUATE CONSIDERATION OF EFFECTS ON SUBSISTENCE

The report fails to adequately describe the use of the area for subsistence and the impacts petroleum development would have on it, despite the recognition that the "adverse effects of petroleum. . .would have major adverse effects on subsistence activities" (page 138). The report acknowledges that "caribou is the most important food source" (page 41) in Arctic Village and Old Crow. Nevertheless there is only a passing discussion of these villages that are even more dependent on the Porcupine Caribou Herd than Kaktovik. Yet the effects these communities would suffer should the herd's population be reduced significantly or its migration

patterns altered are not even considered. Moreover there is no discussion of how the various mitigation measures proposed, e.g. area and seasonal hunting prohibitions, would affect the subsistence way of life. Finally cumulative impacts of development of adjacent areas must be considered specifically in assessing the effects on subsistence.

The requirements of ANILCA section 810 should be met in the 1002 report, so that Congress may consider its findings in determining the fate of the Arctic Coastal Plain. The report contains the clear implication that the Interior Department decided to postpone the section 810 analysis, until a lease sale is actually planned, in the hope of evading this important requirement. Such an inference is drawn from the statement that section 810 compliance will occur prior to a lease sale, "unless the Congress were to exempt the Secretary from that requirement" (page 129). The Department has no reasonable justification for not preparing the analysis at this critical juncture.

FAILURE TO DISCUSS LAND EXCHANGES

The Department of the Interior has entered into secret land exchange negotiations with several Native corporations and the State of Alaska. The Wilderness Society is unequivocally opposed to any land exchanges regarding the subsurface of the 1002 area and believes this approach is wholly inappropriate. An agency charged with preparing an objective study for Congress should not have simultaneously been negotiating to trade away the very area it was to

study. The lack of neutrality and objectivity proven by this effort manifests itself throughout the report. Despite numerous requests from Members of Congress to suspend the negotiations, the Department has chosen to continue them. Therefore the status and content of this process should be discussed in detail in the 1002 report.

FAILURE TO RECOGNIZE INTERNATIONAL OBLIGATIONS

The Arctic Coastal Plain is an area of almost unparalleled international significance, but the report fails to recognize this simple fact. Furthermore the report omits any meaningful discussion of how international treaty obligations regarding migratory species would be met in the face of development.

The report contains no mention of the Northern Yukon National Park adjoining the refuge or of the importance of cooperative management of shared wildlife resources, including caribou, snow geese, polar bears, and muskoxen. Four-fifths of the subsistence use of the Porcupine Caribou Herd is estimated to occur in Canada. Yet the report fails to assess the consequences to the people of Canada should the herd suffer major declines in number or alteration of its migration pattern. Even more dismaying is that the agency failed to consult Canada in preparing the report. This is inexcusable in any case, but particularly in light of the explicit mandate of ANILCA section 1005 to do so.

THE EFFORT TO EXCLUDE PUBLIC PARTICIPATION

Despite requests from conservationists, and the clear

mandate of NEPA, the Department refused to provide an opportunity for public comment. Thus The Wilderness Society, and other conservation groups, were forced to sue, at considerable expense to the U.S. taxpayer, to claim a right that should have been accorded by the agency without argument.

Even though it lost the lawsuit, the Interior Department continued to seek to prevent effective public participation. First, it provided only a 60-day comment period that fell over the Christmas holidays, effectively reducing the time concerned citizens would have to devote to the report. At any time of year, 60 days would be totally inadequate for a report of this magnitude and complexity. At least 90 days should have been provided. It should also be noted that a last minute two week extension was hardly an effective remedy to the problem as there was no way to notify the general public, outside of Alaska, of the extension.

Second, hearings were not scheduled in several places known to be centers of interest and concern about the issue. One is Fairbanks and another is Arctic Village, which could suffer even greater harm that Kaktovik if the Porcupine Caribou Herd is splintered or diminished in size. Where hearings were held, they were scheduled to exclude broad public participation. The Anchorage hearing, for example, was held the day after most people returned from the Christmas holidays and was scheduled during the day. The

evening session was not announced until the very day of the hearing, providing no notice to the many people who were unable to take a day from work to attend the hearing, but who could have attended in the evening.

CONCLUSION

Among the many unknowns, one certainty remains: development of the Arctic Coastal Plain would devastate the sensitive and unique wilderness environment and would prove highly detrimental to the wildlife that thrives in the area. In light of the known high degree of harm threatened by development and the low probability of petroleum, there is no reasonable justification for the Interior Department's full-scale leasing recommendation.

The Wilderness Society urges the Department of the Interior to reverse the draft recommendation of full-scale leasing and development. The Arctic Coastal Plain is irreplaceable and far too precious to be squandered for what may, at best, be a few months worth of petroleum. It should be given the protection it so richly deserves as a unit of the National Wilderness Preservation System.

Respectfully,

George T. Frampton

George T. Frampton, Jr.
President

Randall D. Snodgrass

Randall D. Snodgrass
Alaska Program Director

GTF:rds

THE WILDERNESS SOCIETY

STATEMENT OF RANDALL D. SNODGRASS, ALASKA PROGRAM DIRECTOR, THE WILDERNESS SOCIETY BEFORE THE U.S. DEPARTMENT OF THE INTERIOR HEARING ON THE DRAFT ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCE ASSESSMENT, JANUARY 9, 1987.

My name is Randall Snodgrass and I am the Alaska Program Director for The Wilderness Society, a national conservation organization of 160,000 members dedicated to the wise use and preservation of the nation's public lands.

It should be pointed out at the outset that this hearing is being held today because The Wilderness Society, along with other national and Alaska conservation organizations, filed a lawsuit forcing the Interior Department to solicit public comment on the draft report and recommendation. At great expense to the taxpayers, the Department is currently appealing the decisions of a federal district court judge in Alaska and a panel of judges from the 9th Circuit Court of Appeals in California ordering them to comply with the Alaska National Interest Lands Conservation Act and other laws. This is inexcusable and illustrates an arrogant disregard for the public process. The 60-day comment period scheduled during the holidays (November 24 - January 23), today's hearing, and two hearings held earlier this week in Alaska, still do not provide the general populace adequate opportunity for analysis or comment.

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The Wilderness Society believes that the Assistant Secretary's recommendation for full-scale leasing and development of oil resources that may lie within the 1002 area is totally unsubstantiated by the findings in this report.

- The report concludes that full-scale oil development would have a major adverse impact on the 180,000-head Porcupine caribou herd and could cause a population decline of up to 40%. It also admits that mitigation of the loss of calving habitat is impossible.

- Muskoxen habitat values could be lost or greatly reduced throughout one-third of their range, with losses of nearly 75% of the herd's calving habitat. The U.S. Fish and Wildlife Service concludes that "[s]uch a high percentage of loss in valuable calving habitat could have a major negative influence on herd productivity . . . and would cause the population to decrease."

- Many other wildlife species -- polar bears, grizzly bears, small mammals, and the millions of birds that utilize the coastal plain for summer nesting and feeding -- would be adversely affected by the development.

- Internationally significant wilderness values will be foregone to accommodate the level of development that has been recommended in the 1.5 million acre coastal plain.

- The report fails to address the effects of air and water pollution, oil spills, and hazardous waste (such as drilling muds) on the human and wildlife populations of the refuge. The Alaska Department of Environmental Conservation has documented that this environmental pollution is considerable in the Prudhoe Bay/Kuparuk/Milne Point oilfields. The agency is discovering dangerous chemicals (e.g. arsenic, lead, etc.) and carcinogens appearing in the food chain.

- The report admits that there is only a one in five chance that any economic fields will be discovered in the 1002 area. Yet the Department's recommendation seems to ignore this probability. In public announcements the agency cites the area's mean

conditional potential of 3.2 billion barrels, an estimate that fails to incorporate the risk that no economic finds will be made. If this 19% marginal probability is incorporated, the potential falls to 600 million barrels, a 33 day supply of oil at the current rate of consumption. Finally, the study assumes an oil price of $33 per barrel, but most industry analysts predict that prices will not be that high until after the year 2000.

- The hypocrisy of this Administration is evident when you consider that the development-at-all-cost decision was made as President Reagan was vetoing the National Appliance Energy Conservation Act -- legislation that passed overwhelmingly in both houses of Congress that would have saved more oil than would be produced under the most optimistic scenario in the coastal plain of the refuge.

The risk of oil development to this priceless national wildlife refuge and wilderness area is unquantifiable. The Wilderness Society believes that the sacrifice the American people are being asked to make is too great. The Arctic Wildlife Refuge was established in 1960 to protect unique and pristine arctic ecosystems. It is a part of our national heritage and is of inestimable value to future generations. We cannot allow it to be destroyed for a one in five chance at a 33 day supply of oil. The Wilderness Society urges the Secretary of the Interior to recommend wilderness protection for the entire 1.5 million acre 1002 area.

O-471

DO YOU WANT TO MAKE PUBLIC COMMENTS?

If you would like to speak at the hearing today, please fill in the blanks below and turn it in to one of the Fish and Wildlife Staff members present. You need not complete this sheet to submit written comments. Thank you.

Please print

Name SUSAN ALEXANDER

Mailing Address 519 W 8th

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Check appropriate box below:

☐ I am here to offer my own views.

—or—

☐ I am speaking for THE WILDERNESS SOCIETY
(please enter name of organization you represent)

O-472

THE WILDERNESS SOCIETY

STATEMENT OF [redacted] ALASKA REGIONAL DIRECTOR, THE WILDERNESS SOCIETY, BEFORE THE FISH AND WILDLIFE SERVICE, ON THE ARCTIC NATIONAL WILDLIFE REFUGE COASTAL PLAIN RESOURCE ASSESSMENT, JANUARY 5, 1987.

For over 50 years, The Wilderness Society has been dedicated to the wise management of the federal lands and the preservation of wilderness. The Society's history in Alaska goes back to its very founding by Robert Marshall, an early explorer of the Brooks Range.

The incomparable and indisputable wilderness and wildlife values of the Arctic National Wildlife Refuge, and specifically the coastal plain, have long made it a major focus of The Wilderness Society. The original wildlife range was established in 1960 thanks, in large part, to the efforts of Olaus and Mardy Murie. The late Olaus Murie, President of the organization for 17 years, spent years conducting research in the refuge, and Mardy Murie still guides the organization as a member of our Governing Council.

On behalf of our 160,000 members nationwide, including 1,400 in Alaska, I would like to present The Wilderness Society's comments on the section 1002 report and recommendation to Congress on the coastal plain of the Arctic National Wildlife Refuge. The problems and shortcomings of the report are far too numerous to elucidate at this hearing and will be discussed at length in written comments to be submitted later. Therefore I will focus on just one of those problems: the gross misrepresentation perpetrated by the Interior Department upon release of the report on November 24th and found throughout the report.

Many of the assertions made by the Interior Department in the materials distributed on November 24th -- the Executive Summary of the report, the news release, and the fact sheet -- are simply not supported by the report itself. All evidence points to the conclusion that the agency set out intentionally to mislead the public, knowing full well the media would have no choice but to rely on the findings set forth in the abbreviated documents supplied at the press conference. For the record, the 1002 report, itself, was not available on that day, except by special request.

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In stating the oil potential, these documents fail to report the marginal probability, or risk, associated with Arctic Coastal Plain development. Only upon delving deep into the 1002 report itself does the reader find that there is an 81 percent chance that no economically recoverable oil at all lies within the refuge. The chances of discovery reported in the Executive Summary and fact sheet are "conditional" estimates. The condition is that at least one economically recoverable field will be found. In other words, the much touted odds that the refuge holds from .6 to 9.2 billion barrels of recoverable oil only come into play if economically producible oil is discovered. Again, there is only a 19 percent chance of that occurrence. To put this 19 percent risk figure in context, the odds of finding an economic field at Mukluk Island were greater than 70 percent. The drilling at Mukluk Island resulted in a dry hole.

The news release and Executive Summary declare the Arctic Coastal Plain to be "the most outstanding oil and gas frontier remaining in the U.S." However, though a cursory glance at the report may appear to support this statement, careful scrutiny fails to substantiate it. This peculiarity results from a combination of the omission of crucial information and the inclusion of incomparable sets of numbers in single charts. In effect, the agency has mixed apples and oranges in reporting their analysis.

This misleading outcome occurs specifically in the two charts on page 50 of the report. Table III-1 fails to report the risks associated with potential oil resources in a variety of areas around the country. Since many of the areas listed are already producing, there is no longer an associated risk. However the range of risks associated with the undiscovered resources vary widely and are all greater than the risks associated with proven areas. If the risk were factored into the probabilities for the Arctic, the average quantity of economically recoverable oil expected to occur in the area would be .61 billion barrels, not the 3.2 billion barrels reported in this table and throughout the report. .61 billion barrels would supply the nation for just over one month.

The Interior Department's failure to include a column listing the risks in the chart makes it impossible for the public to make any meaningful comparison of the oil potential of the 1002 area with other areas around the country. If the risk information were available, it would likely show that other areas with higher probabilities of discovery, though of lower quantities of oil, actually have more "outstanding" oil potential than the Arctic.

The same criticism holds true for Figure III-2, also on page 50, a bar graph of the conditional estimates for the Arctic compared to five producing fields. Once again, the

numbers do not fit because the estimates for the Arctic are contingent upon the one-in-five chance that any economic fields will be discovered, while the other numbers refer to proven reserves. To make a meaningful comparison of this sort, the estimates for the 1002 prospects should be explicitly adjusted downward to account for the differences in risk among the different areas. If the Interior Department had done this, instead of the highest bar for the Arctic outstripping Prudhoe Bay, it would only reach about as high as Kuparuk. That's a difference of about 7.5 billion barrels. This report is intended to guide the general public and Congress in reaching a decision on the future of the Arctic Coastal Plain. But it requires an economist to detect the misrepresentations made by the Interior Department.

What this explanation means is that the probability of finding oil in the Arctic Refuge is far smaller than all the agency hype leads the public to believe. Moreover the anticipated harm to the wildlife, particularly the Porcupine Caribou Herd, is far greater than the agency admits. For example, careful reading of the report reveals such conclusions as "[m]itigation of the loss of caribou habitat in [the core calving area] is not possible" (page 111). Furthermore the report repeatedly cites the lack of information and experience required for an accurate assessment of the impacts.

Among the many unknowns, one certainty remains: development of the Arctic Coastal Plain would devastate the sensitive and unique wilderness environment and would prove highly detrimental to the wildlife that thrives in the area. In light of the known high degree of harm threatened by development and the low probability of oil, there is no reasonable justification for the Interior Department's full-scale leasing recommendation.

The Wilderness Society urges the Department of the Interior to draw the only conclusion demanded by the report and thus, to reverse the draft recommendation. The Arctic Coastal Plain is irreplaceable and far too precious to be squandered for what may, at best, be a few months worth of oil. It should given the protection it so richly deserves as a unit of the National Wilderness Preservation System.

WILDLIFE FEDERATION OF ALASKA
The Alaska Affiliate of the National Wildlife Federation

February 6, 1987

U.S. Fish and Wildlife Service
ATTN: Division of Refuge Management
2343 Main Interior Building
18th and C Streets NW
Washington, D.C. 20240

Re: Comments and Recommendations Pertaining to Draft "Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment", November 1986

O-474

The Wildlife Federation of Alaska (WFA) is the state affiliate of the National Wildlife Federation, an organization with 4 1/2 million members nationwide, 8,000 of whom are Alaskans. We have reviewed the above referenced report and recommendation to the Congress of the United States and the legislative environmental impact statement prepared in accordance with Section 1002(h) of the Alaska National Interest Lands Conservation Act (ANILCA) and the National Environmental Policy Act (NEPA). The Wildlife Federation of Alaska recommends that no oil and gas leasing or development activities be allowed on the Coastal Plain of the Arctic National Wildlife Refuge until the issues and deficiencies identified in our comments and recommendations are adequately addressed.

The Wildlife Federation of Alaska offers the following comments on the 1002 process, the Coastal Plain Resource Assessment, and the recommendation of the Department of Interior proposing full leasing of the coastal plain. We have previously offered testimony at a public hearing on the Coastal Plain Resource Assessment held in Anchorage, Alaska, on January 5, 1987. We wish to expand upon selected concerns and issues identified in that testimony by addressing the following topics:

- o 1002 Evaluation Process
- o Coastal Plain Resource Assessment
- o Mitigation
- o Recommendations

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1002 EVALUATION PROCESS

As stated previously in our public testimony, the coastal plain of the Arctic National Wildlife Refuge must always be viewed first as a wildlife refuge. The assessment report recognizes the value of this conservation unit when it states (p. 45) "...The Arctic Refuge is the only conservation system unit that protects, in an undisturbed condition, a complete spectrum of the various arctic ecosystems in North America." The important values of the coastal plain are also acknowledged by the report's observation that "...The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge" (p. 46).

The establishment of the refuge in 1960 to preserve its unique wildlife, wilderness, and recreation values resulted in the remainder of Alaska's North Slope and adjacent offshore waters being made available for petroleum exploration and development. Passage of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980 created a requirement under Section 1002(h) of the Act to prepare the Arctic National Wildlife Refuge Coastal Plain Resource Assessment. The analyses and evaluations required for the Section 1002(h) Report to Congress are clearly intended to provide an assessment of the biotic resources, oil and gas production potential, and compatibility of exploration and development in view of impacts to fish, wildlife, and habitats of the area.

The Department of the Interior, and the Draft Resource Assessment before us at this time, would have benefitted significantly from a more open public process that included conservation groups, industry, the State of Alaska, and Canada. Lacking this input, the report exhibits critical deficiencies in adequately addressing the requirements of Section 1002(h)(1-6). We are particularly concerned that the Secretary's recommendation to pursue full leasing of the 1002 area (Alternative A) is not supported by the information and analyses presented in the report. To the contrary, our examination of the baseline information, recognized values of fish and wildlife habitats, and environmental consequences of oil and gas development as presented in the Resource Assessment clearly identifies a level of adverse impact to national and international wildlife populations which is unaccepatable and clearly not compatible with the purposes for which the refuge was established. We find it incongruous that this report, recognizing the anticipated loss of unique wildlife use areas and irreplaceable habitats, still concludes that this significant level of adverse impacts is justified. While espousing adherence to the Fish and Wildlife Service Mitigation Policy (46 F.R. 7644-7663, January 23, 1981) in the report's assessment process, the Department of Interior has failed to comply with the criteria for treatment of unmitigable impacts to Resource Category 1 habitats. For those

habitats, the policy direction is clear; "...all losses of existing habitat be prevented as these one-of-a-kind areas cannot be replaced..." (46 F.R. 7657, January 23, 1981). If the Mitigation Policy is truly an integral part of the 1002 area evaluation process and not just a placebo, Resource Category 1 habitats must not be impacted, and the ecological function and access to these areas must be maintained.

As an organization principally concerned with maintenance of fish and wildlife resources and the habitats upon which they depend, the Wildlife Federation of Alaska will attempt to focus their comments in this area of primary interest. However, we feel compelled to briefly express our concerns relating to the economic and social issues addressed in the report.

The Department of Interior predictions of oil and gas potential, estimates of contribution to domestic energy supplies, and projections of net national economic benefits are subjective and highly speculative. Lacking exploration confirmation of oil or gas discoveries, location and size of reservoirs, and a highly optimistic assumption of $33 per barrel for oil, the economic benefits and national need for exploration and production of petroleum from the 1002 Area is not well supported.

This is particularly true in light of the fact that President Reagan recently vetoed the National Appliance Energy Act of 1986. Passed overwhelmingly by both houses of Congress, this act would have saved the nation millions of barrels of oil and billions of dollars on utility bills by the year 2000. In addition, the Reagan Administration has opposed establishment of fuel efficiency standards for automobiles and continuance of the 55 mile/hour speed limit.

No development in the Coastal Plain should be allowed until the concept of national energy security is more clearly defined, including a full discussion of economic forecasts, domestic oil consumption, the projected need for domestic oil reserves in the 1990's, and national strategies for energy conservation such as efficiency standards for home appliances and fuel economy standards for automobiles.

COASTAL PLAIN RESOURCE ASSESSMENT

The Description of the Existing Environment (Chapter II) provides a reasonably good summary of available information and research results for fish and wildlife distributions, populations, and seasonal use of terrestrial and aquatic habitats within the 1002 area. However, discussions of the coastal habitats, their occurrence within and outside the 1002 area, and ecological relationships to fish and wildlife populations are generally not adequate to define specific habitat affinities and habitat

characteristics. This short-coming is particularly important when evaluating opportunities for maintaining no net loss of in-kind habitat values, an important consideration in the mitigation process.

The Evaluation of Environmental Consequences (Chapter VI) is seriously limited since its assessment is dependent on hypothetical development scenarios derived from insufficient geological information. The general locations of oil and gas development activities may be reasonably accurate, but the scenarios are dependent on additional information which is not currently available, including the depth of structures containing oil or gas, the type of recovery methods, well spacing, the need for water injection or gas lift, and other factors specific to the petroleum field. Lacking more dependable geological information which may only be attainable through selected exploratory drilling, the locations, routing, and density of development facilities as shown in the proposed scenarios are meaningless.

The evaluation process and analysis of anticipated impacts to fish, wildlife, and habitats as presented in this report is highly influenced by the presence and precise siting of facilities in relation to important habitats and use areas, including migration corridors. Relatively minor relocation of facilities in the scenario could physically impact comparable acreages, but have drastically differing effects on fish and wildlife populations, their use of habitats, and access to those habitats. The Evaluation of Environmental Consequences should identify facilities and structures which are not site-dependent and which could potentially be relocated as part of the mitigation process. The evaluation must acknowledge that a significant portion of the oil and gas development facilities are site-dependent and do not have the flexibilty of relocation to minimize adverse impacts to important habitats.

The Evaluation of Environmental Consequences also suffers from an excessive dependence on mitigation techiques utilized in the Prudhoe Bay development area (which may not be applicable to resources and habitats in the 1002 area) and the assumption that mitigation technology to be developed in the future will reduce anticipated impacts to an acceptable level. When considering the irreplaceable values of some of the fish and wildlife resources at stake, we are not confident that "...performance standards ...developed for safety and environmental requirements rather than adherence to highly specific design or operational procedures..." (p. 97) is an appropriate approach to mitigation. It is perhaps more important to recognize that a Prudhoe Bay scale development may not be acceptable within a national wildlife refuge.

Consideration of cumulative impacts of oil and gas development in the 1002 area with other existing and proposed onshore and

offshore developments has not been adquately addressed in the Evaluation of Environmental Consequences. In addition, the national and international range and human use of migratory wildlife resources which are highly dependent on habitats available in the 1002 area has not been adequately recognized for the Porcupine Caribou Herd (PCH) or snow geese. Some of our concerns regarding the treatment of these key species are presented below:

PORCUPINE CARIBOU HERD:

A great deal has been learned about the effects of oil and gas exploration and production on caribou in the Prudhoe Bay area, e.g. levels of road traffic that can occur without adversely affecting free passage of caribou or the minimum distances required to separate roads and pipelines to cause minimal disturbance to caribou. However, we must be careful not to extrapolate from all of the Prudhoe Bay conclusions when estimating impacts in the Arctic National Wildlife Refuge because the refuge must accommodate a very large number of animals in a small space. In comparison, Prudhoe Bay supports a relatively small caribou herd in an area of very extensive suitable habitat.

The available literature concerning the Central Arctic Caribou Herd suggests that portions of the herd have been displaced from the Prudhoe Bay and Kuparuk areas during part of their annual cycle with no obvious effect on herd growth. However, within the Arctic National Wildlife Refuge the Coastal Plain is extremely narrow when compared with the Prudhoe - Kuparuk area. The Arctic Refuge Coastal Plain is 6 times larger than the Prudhoe Bay field, but there are approximately 12 times more caribou in the Porcupine Caribou Herd than the Central Arctic Herd. In addition, the PCH appears to be reaching maximum herd size. Most large mammal biologists would conclude that a herd approaching a peak population within its range would occupy essentially all suitable habitat available. Therefore, the opportunity for displacement of the PCH during calving is probably limited, and such displacement could result in a net loss to the caribou population. Although the projected 20-40% decline in PCH population estimated by FWS under a full development scenario (p. 112) is impossible to verify considering all the variables associated with preferred calving and insect relief habitats and migration movement areas, it strongly indicates that displacement of the PCH could cause a significant decline in population.

We heartily concur with the designation of approximately 242,000 acres of the PCH core calving area as Resource Category 1 habitats, recognizing that the 1002 core calving area represents approximately 80% of the total core calving area used by the Porcupine Caribou Herd (p. 106). The assessment also notes (p. 108) that "...measuring the probable population decline from complete loss of habitat values in calving areas is impossible

and the ultimate effects of displacement are unknown...". Under the full development scenario, the FWS has appropriately recognized that "...mitigation of the loss of caribou habitat in Resource Category 1 ... is not possible..." (p. 111). Following the premise (p. 98) that "... the FWS normally recommends that all losses of Resource Category 1 habitat be prevented, as these one-of-a-kind areas cannot be replaced...", the logical conclusion is that the PCH core calving habitats within the 1002 area should be justifiably excluded in the Secretary's recommendation for oil and gas development.

As spring progresses on the coastal plain and the weather warms following completion of calving activity, conditions are ripe for the emergence of swarms of mosquitos. As harassment by these insects increases, caribou form dense aggregations and move rapidly toward the coast to seek relief in cooler, windswept areas such as river deltas, mudflats, aufeis, large gravel bars, barrier islands, and in the shallows of lagoons (p. 29). At this time, parturient cows are particularly stressed from the rigors of pregnancy, migration, birth, lactation, hair molt, antler growth, and the the ever-present insect harassment.

The Resource Assessment noted that "...the entire 180,000-member PCH may use the area in some years, mainly during the late June/early July insect-relief period..." (p. 105). The FWS observation that "...access to insect relief habitat and forage resources during this period may be critical to herd productivity..." (p. 29) recognizes the significant importance of insect relief areas to the post-calving aggregations of the PCH. The availability of forage resources and the physical features which make up insect relief areas comprise a specialized habitat that may not be replaceable. We recommend designation of primary insect relief habitats in the Coastal Plain of the 1002 area as Resource Category 1 habitats which are unique and irreplaceable components of the Porcupine Caribou Herd use area. In addition to maintaining the function of insect relief areas, access to these habitats from the core calving area must be assured.

Contrary to the facts and analyses presented in the Environmental Consequences and Mitigation discussions, the Secretary's Recommendation (Chapter VIII) to make the entire 1002 area available for oil and gas leasing, even with the caveat that "...leasing would be phased so the core calving area of the PCH would be last to be explored and developed..." (p. 170), is in direct conflict with the findings of the Resource Assessment and the procedures of the FWS Mitigation Policy which "...guided the assessment team in identifying appropriate measures for mitigating avoidable adverse impacts so there would be no unnecessary adverse effects" (p. 97). In this light, we can only conclude that the Secretary has determined "avoidable adverse impacts" to the Porcupine Caribou Herd are the "necessary adverse effects" of oil and gas development.

SNOW GEESE:

Critical fall staging habitats of snow geese from the Banks Island population have not received adequate attention in the report discussions and evaluation of environmental consequences. The Resource Assessment should be expanded to include greater detail on the importance of fall staging activities to the welfare of migrating snow geese, the characteristics of preferred staging habitats, and the human use values of this resource outside the boundary of the 1002 area. An average of 105,000 snow geese, and as many as 325,000 snow geese, have historically staged on the 1002 area in the fall to feed intensively and build energy reserves prior to their southward migration. These fat reserves are considered by waterfowl biologists to be necessary energy reserves to successfully complete migration, particularly for female snow geese recovering from the stress of reproduction activities.

Chapter VI recognizes that "...reduced time spent feeding and lost habitat in which to feed would result from petroleum development, adversely affecting the accumulation of energy reserves essential for migration" (p. 121). In addition, "...a major reduction or change in distribution of snow geese using the 1002 area could occur through the cumulative effects of direct habitat loss, indirect habitat loss due to disturbance, and direct mortality" (p. 122). Based on the report's assumed displacement of snow geese from 45% of their preferred staging habitat, a reduction in the Banks Island snow goose population of 5-10% could occur and the number of snow geese annually staging in the 1002 area could be reduced by almost 50 percent (p. 122). We are not impressed by the statement that "...staging snow geese are highly mobile..." (p. 121) as it indicates a lack of insight into the concepts of preferred habitat and carrying capacity.

The potential reduction in numbers of Banks Island snow geese would be 15-30,000 birds. Approximately 60-70,000 snow geese are harvested annually in the Pacific Flyway with 80-90% of this harvest occurring in California. An additional 30-50,000 snow geese are harvested annually in Alberta and western Saskatchewan. A draft management plan for the Pacific Flyway identifies protection of the Arctic National Wildife Refuge and Yukon staging areas as an important need. The potential reduction in Banks Island snow geese numbers from loss or disturbance of fall staging habitats in the 1002 area could be equivalent to 50% of the total Pacific Flyway harvest or essentially all of the Alberta and western Saskatchewan hunting harvest in a given year. Based on the important value of this species to national and international uses, we would not consider potential impacts of oil and gas development in the 1002 area to be insignificant.

The report does not demonstrate the availability of alternate staging habitats which could be utilized for in-kind replacement of habitat values, an important consideration for these staging

areas which are currently designated Resource Category 2. The baseline studies for snow geese conducted on the 1002 area do not define the habitat characteristics which were representative of preferred staging areas, although they noted a heavy dependence on cottongrass (Eriophorum sp.) and speculated that annual shifts in preferred staging areas may be related to heavy utilization of previously used staging areas. If this annual shift to allow recovery of staging habitat vegetation is verified, it would suggest the necessity of considering all fall staging areas used by snow geese in the 1002 area as a part of an annual habitat rotation.

The significant segment of the snow goose population which could be adversely affected or displaced by oil and gas development, the vulnerability of staging snow geese to disturbance, and the undefined unique habitat characteristics of traditional staging areas supports the WFA recommendation to include snow goose fall staging areas within the coastal plain as Resource Category 1 habitats.

PERENNIAL SPRINGS AND FRESHWATER OVERWINTERING AREAS FOR FISH:

Perennial springs and freshwater overwintering areas for resident and anadromous fish have not been adequately addressed in the Resource Assessment. Suitable overwintering habitats in freshwater systems of the refuge are concentrated at a limited number of locations where adequate flow, water quality, dissolved oxygen, and benthic food organisms are available. Perennial ground water sources (springs) are found on most of the major drainages in the 1002 area.

Within the Arctic National Wildlife Refuge, "...overwintering habitat is probably the greatest limiting factor for Arctic anadromous and freshwater fish populations..." (p. 37). The Alaska Habitat Management Guide for the Arctic Region (Alaska Department of Fish and Game, 1986) notes that in smaller North Slope drainages it is conceivable that a single spring-fed site might harbor virtually all members of a particular Arctic char population from eggs to mature adults during the winter period.

Due to the limited occurrence of spring-fed overwintering areas for fish and their importance in maintaining anadromous and freshwater fish populations in the 1002 area, the Wildlife Federation of Alaska recommends that perennial ground water sources which support overwintering fish be designated Resource Category 1 habitats. Protection of these vulnerable habitats must also include appropriate protection of the groundwater source which supplies the overwintering use areas and prohibition of water removal for domestic or industrial use during the winter period. We also request that FWS identify the location of known, spring-fed overwintering areas, suspected but unsubstantiated

overwintering areas, and necessary mitigation measures to avoid adverse impacts to these irreplaceable habitats.

MITIGATION

The WFA has previously identified serious concerns with the approach to mitigation of impacts to fish, wildlife, and their habitats in our January 5, 1987 testimony. We wish to expand upon those concerns and the mitigation process as it applies to the resources and proposed activities identified for the 1002 area.

As examples of the important fish and wildlife habitat values of the 1002 area, the report recognizes intensively used calving, postcalving, and insect-relief habitats for a significant portion of the Porcupine Caribou Herd and sensitive fall staging areas for a large segment of the Banks Island, Canada, snow goose population. The sensitivities of these species and the unique factors of the habitats they utilize are documented. Approximately 78 percent of the PCH core calving area is within the 1002 area, and disturbance of the cow-calf groups on the calving grounds may interfere with bond formation and can increase calf mortality (p. 28).

In addition, the limited availability of these habitats is acknowledged with statements such as "...Geography apparently limits the availability of suitable alternative calving or insect-relief habitats for the herd..." (p. 6) and "...Access to insect-relief habitat and forage resources...may be critical to herd productivity" (p. 28).

Summary statements also reflect the importance of the 1002 area to a wide spectrum of wildlife resources by stating "...The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity on the refuge" (p. 46).

The evaluation of Irreversible and Irretrievable Commitments of Resources for Alternatives A and B recognizes the significant impacts attributed to oil and gas development:

- o declines in population, herd vigor, and behaviorial patterns due to disturbance and displacement of PCH (p. 142)
- o long term losses in fish and wildlife resources, subsistence use, and wilderness values as the inevitable consequence of long term development

- o lack of relative experience regarding the responses or adaptability of the PCH to intensive development activities
- o unknown capacity of the PCH to utilize undisturbed areas in greater concentrations for calving
- o acknowledgement that EVEN WITH EFFECTIVE MITIGATION (emphasis added), PCH displacement or reduction could be as great as 20-40 percent
- o recognition that Alternative A development will result in a loss of, at minimum, a significant part of the PCH calving grounds and other use habitats, a limit to continued expansion of 1002 area muskoxen herds, and a loss of notable staging habitats for internationally important migratory snow geese.

A summary of biological effects of Alternative A on the 1002 area identifies major effects on caribou (PCH), muskox, and snow geese (p. 149). Major environmental effects were previously defined (p. 96) as "...Widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of species using the 1002 area".

The Secretary's Recommendation (p. 170) to make the entire 1002 area available for oil and gas leasing includes the control of development by imposition of appropriate mitigation measures to insure "...no unnecessary adverse effects on the refuge's fish and wildlife and their populations..." and with assurance "...that any unavoidable habitat losses are fully compensated" (p. 170). Additionally, the Secretary indicates that "...Development would proceed with the goal of no net loss of habitat quality...", a goal discussed in greater detail in Chapter VI, Environmental Consequences.

The Fish and Wildlife Service Mitigation Policy (46 F.R. 7644-7663, January 23, 1981) recognizes four resource categories with corresponding mitigation planning goals to insure that the level of mitigation is consistent with the fish and wildlife resource values involved. Within the 1002 area, the FWS analysis designated the PCH core calving area as Resource Category 1 based on its unique and irreplaceable values; the remainder of the 1002 area has been designated Resource Category 2 for its importance to five evaluation species used in the analysis.

Resource Category 1 is defined as habitat of high value for evaluation species which is unique and irreplaceable on a national basis or in the ecoregion. The commensurate Mitigation Planning Goal is no loss of existing habitat value. Development of the rationale for mitigation planning goals (46 F.R. 7645, January 23, 1981) included a fundamental principal "...that avoidance or compensation be recommended for the most valued

resources..." and that "...the degree of mitigation requested correspond to the value and scarcity of the habitat at risk".

The Secretary's Recommendation (Chapter VIII) proposes making the entire 1002 area available for oil and gas leasing based on the assumption that most adverse environmental effects would be minimized or eliminated through mitigation based on information from prior oilfield development at Prudhoe Bay, or through additional, ongoing studies and assessments conducted during phased leasing. The FWS Mitigation Policy Guideline for Resource Category 1 habitats states "...The Service will recommend that all losses of existing habitat be prevented as these one-of-a-kind areas cannot be replaced" (46 F.R. 7657, January 23, 1981). Where there is likely to be a significant fish and wildlife resource loss (Resource Category 1), the FWS Mitigation Policy (46 F.R. 7659, January 23, 1981) provides criteria to be addressed in evaluation of projects. Of significant importance is criteria (2) to select the least environmentally damaging reasonable alternative, and criteria (4) which states "...All important recommended means and measures have been adopted with GUARANTEED IMPLEMENTATION (emphasis added) to satisfactorily compensate for unavoidable damage or loss consistent with the appropriate mitigation goal." Since the mitigation goal for Resource Category 1 is no loss of existing habitat value and no means and measures have been identified to achieve that goal in the 1002 report, we believe that any proposal to permit oil and gas development in or adversely affecting Resource Category 1 habitats is not in compliance with the FWS Mitigation Policy.

Finally, the mitigation measures identified in Chapter VI (p. 145) are more appropriate for protection of discrete location habitats and use areas which can be addressed by development buffers, timing of activities, and performance criteria within the scope of technical concerns addressed in prior North Slope oil and gas developments. In particular, the calving, post-calving, and insect relief habitats of the PCH are more extensive, and currently available information indicates unique characteristics which may not be replaceable or available in alternate habitats. The important issue of free movement between seasonally-important use areas of the PCH has not been adequately addressed in the evaluation process. Wildlife movements and migration are recognized as a part of habitat values which must be addressed during the mitigation process (46 F.R. 7645, January 23, 1987).

RECOMMENDATIONS

The Wildlife Federation of Alaska recommends that no oil and gas leasing or development activities be allowed on the coastal plain of the Arctic National Wildlife Refuge until the issues and deficiencies identified in our comments and recommendations are

adequately addressed. In summary, these include the following:

- National energy security should be clearly defined, including a full discussion of economic forecasts, domestic oil consumption, the projected need for domestic oil reserves in the 1990's, and national strategies for energy conservation such as efficiency standards for home appliances and fuel economy standards for automobiles.

- Decisions on the use of the coastal plain should be delayed until biological research on the characteristics of the Porcupine Caribou Herd calving habitat can be clearly defined. The conclusions of our nation's leading caribou biologists at a workshop entitled "Demography and Behavior of the Central Arctic and Porcupine Caribou Herds in Relation to Oil Field Development" conducted in October 1986 was that scientists do not yet have a clear understanding of the ecological attributes of caribou calving areas on the Arctic Slope. (This workshop was sponsored by the Alaska Oil and Gas Association and the Alaska Department of Fish and Game.) Until critical calving habitat boundaries can be delineated, all land use decisions within the 1002 area should be deferred.

- Insect relief habitats used by the Porcupine Caribou Herd in the Coastal Plain of the 1002 area should be designated Resource Category 1 habitats with specific provision made for adequate access by the PCH to these use areas.

- Fall staging areas for snow geese in the Coastal Plain of the 1002 area should be designated Resource Category 1 habitats.

- The Coastal Plain Resource Assessment should clearly describe appropriate mitigation measures for each development alternative that would result in no net loss of critical fish and wildlife habitat. How will the Department of Interior determine whether appropriate technology is available to restore or revegetate plant communities which occur on the coastal plain, particularly those which comprise caribou calving habitat, caribou insect relief habitat, and snow goose staging habitat?

- The following criteria should be incorporated into the mitigation process for all oil and gas development alternatives considered:

  - no net loss of caribou calving or insect relief habitat is justified in any of the alternatives;

- free passage of caribou must be provided to all insect relief habitats;

- no net loss of snow goose fall staging habitats is justified in any of the alternatives;

o The Wildlife Federation of Alaska opposes any land trade actions that precede or circumvent completion of the 1002 process or any land trade actions that would remove Resource Category 1 habitats (including caribou calving and insect relief areas, snow goose staging areas, and fish overwintering areas) from the Arctic National Wildlife Refuge.

If these issues and deficiencies are addressed in the context of an open public process, then the Fish and Wildlife Service, conservation groups, the oil industry and Congress would have the tools necessary to make well-reasoned decisions about oil and gas development and the protection of wildlife, recreation, subsistence, and wilderness values on the Coastal Plain of the Arctic National Wildlife Refuge.

Thank you for your consideration of these comments.

Sincerely,

Ann L. Rothe, President
WILDLIFE FEDERATION OF ALASKA

cc: Senator Ted Stevens
Senator Frank Murkowski
Congressman Don Young
Jay Hair, National Wildlife Federation
Bruce Apple, National Wildlife Federation

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DANIEL A. POOLE
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L. L. WILLIAMSON
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WESLEY M. DIXON, Jr.
Board Chairman

February 5, 1987

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management
2343 Main Interior Building
18th and C Streets, N.W.
Washington, D.C. 20240

Gentlemen:

Re. the resource assessment of the coastal plan of the Arctic National Wildlife Refuge.

Institute staff has reviewed the draft assessment, which, from the standpoint of identification of the refuge's biological environment and discussion of environmental effects of development, we find reasonably well done. Our review of these aspects will continue.

Our primary concern at this point centers on the Secretary's Recommendations, Chapter VIII. We strongly urge that the Secretary incorporate the following suggestions in his final report to Congress:

1. That the preferential formula whereby the State of Alaska currently receives 90 percent of oil and gas royalties be reduced to no more than are received by other states--50 percent maximum to the state and 50 percent to the federal government.

2. That a substantial portion of the federal share be credited directly to the Migratory Bird Conservation Fund to implement the North American Waterfowl Management Plan.

3. That a lesser amount be credited to the Fish and Wildlife Service for satisfaction of the payments-in-lieu of taxes requirement.

4. That some of the money be made available for refuge operations and maintenance. We would object, however, to any significant commitment of money for O&M until after the needs of the North American Waterfowl Management Plan have been satisfied.

5. Finally, we are inclined to believe that oil companies would find favor with the imposition of a small surcharge per barrel in support of the fish and wildlife program.

We request that this letter be included in the Secretary's final report to Congress.

Sincerely,

Daniel A. Poole
President

DAP:dt