Comments from Industry (I)

ABR
ALASKA BIOLOGICAL RESEARCH

Biological and Natural
Resource Science Studies

P.O. Box 81934 • Fairbanks, Alaska 99708
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2 February 1987

U.S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior Bldg.
18th and "C" Street, N.W.
Washington, D.C. 20240

To whom it may concern:

We have reviewed the draft 1002 Report, particularly those sections dealing with terrestrial biology. Our specific comments are attached. In general, the baseline data collected in ANWR for 1002-related biological studies are of high scientific merit, summarized in a brief (understandably), but informative fashion, and should be of great value in the decision-making process and for assessing development-related impacts. In our opinion, most issues regarding potential impacts have been adequately defined, with the exception of the probability for direct loss of habitats and populations. Sections on "The Effects on the Biological Environment", especially in regard to loss of coastal insect relief for caribou and staging habitat for snow geese, need considerably more support from existing data. At a minimum, more detailed explanations of the criteria and rationale used for estimating habitat loss, amounts of displacement, and population declines are necessary. Without these elements, the impact assessments lack credibility. I-1

Thank you for the opportunity to comment. Both reviewers have field experience with many of the species described in and adjacent to the ANWR Coastal Plain. We both agree that the international wildlife values of the 1002 area warrant careful and protective strategies for any resource development and we wish you the best of luck in completing the final report to congress.

Sincerely,

Robert J. Ritchie

Robert J. Ritchie
Stephen M. Murphy

RJR:slk
Attachments

CARIBOU

1. p. 28 Paragraph 3.
It would be appropriate to explain the criteria/rationale used for delineating the core calving area based on occupancy during 5 of 14 years (36%). Concentration areas obviously exist, but 5 of 14 years seems arbitrary and the definition of core calving radically influences the projected impacts. It would be more appropriate to compile a table listing the number of acres that comprise each of the concentration areas (i.e., concentration areas used in only 1 year = ____ acres; 2 years = ____ acres, etc.). This table could then be expanded for impact analyses that would provide estimates of habitat losses for all of the years of use, not just 5 of 14 years.

2. p. 28 Paragraph 5.
This section documents shifts in calving areas due to natural factors. Do data exist on productivity and recruitment during any of these years? These data would be very important for understanding the effects of displacement.

3. p. 106 Paragraph 1.
It is debatable whether Prudhoe Bay was ever a calving area of any consequence, but undoubtedly some caribou have been displaced from this area. However, in the Kuparuk Field, where the development is more state-of-the-art (and presumably more similar to an ANWR development scenario) and where a good data base for pre- and post-construction calving densities exists, the data indicate that access to calving areas and overall densities have not been affected. As in ANWR, there is natural annual variation in calving densities, presumably due primarily to snow cover.

4. p. 107 Paragraph 2.
The secondary habitat modifications described are accurate, but their effects on caribou are not supported by data. Impounded areas are undoubtedly lost as caribou habitat, but road-side dust, for example, accelerates snow melt in spring and we have observed pregnant cows in May selecting road-side areas for foraging.

5. p. 107 Paragraph 2-4.
Very dogmatic with no citations.

6. p. 108 Paragraph 2.
In this paragraph the term "displacement" is used to imply that caribou will completely abandon the core calving area and move to suboptimal habitats. In subsequent text, the 2 mile "sphere of influence" is used to describe displacement. These are radically different concepts and we suggest using more precise terminology, such as major displacement versus localized displacement. In this context, there are no data from the CAH that demonstrate major displacement.

7. p. 108 Paragraph 6.
The ABR representative to the FWS workshop, and others we suspect, were using available evidence (Dau and Cameron 1985) and agreed that <u>localized</u> displacement would occur.

8. p. 109 Paragraph 6.
This impact analysis for the insect season requires more justification. We think that use of the 2 mile "sphere of influence" derived from data acquired during calving is probably inappropriate for insect season analyses. The authors state on p. 107, paragraph 5 that calving is the time of greatest vulnerability to disturbance, yet this worst-case situation is used to delineate insect-season impacts. We agree that the CAH and PCH are not 100% comparable, yet there are extensive insect-season data available on caribou movements, reactions to disturbance, and the effectiveness of mitigation from the CAH experience that apparently were not included in this impact analysis. In the Kuparuk Oilfield virtually no insect relief habitat has been lost to development. Access to the coast may be delayed for large mosquito-harassed groups, but these groups eventually get to the coast. Therefore, the relevant issue is energetic stress resulting from paralleling linear structures and increased exposure to mosquitoes. Recent advances in mitigation theory, such as separations of pipelines and heavily traveled roads, have only recently been implemented and should further improve the situation.

9. p. 110 Paragraph 7.
Illegal harvest of CAH caribou has been increasing in recent years and, in our opinion, there is tremendous potential for negative demographic impacts. Enforcement along the TAPS corridor would be the most effective "mitigation" for this secondary effect of industrial development. This experience should weigh heavily in decisions regarding access into an expanded road system into ANWR.

I-2

10. p. 111 Mitigation #5.
"Separate pipelines and roads as necessary" is too vague. Pipelines and roads should be separated when possible on all "haul" and "spine" roads (i.e., roads with regular traffic).

11. p. 112 Paragraphs 3 and 4.
We appreciate the need to develop quantitative estimates for the decision-making process, but the estimates generated here, whether they are high, low, or accurate, have not been adequately supported. Furthermore, a population decline and a change in distribution are very different impacts and to quote the same range of figures for both and not to distinguish between the two is at best confusing.

12. p. 132 Paragraph 2. Same as above

13. p. 134 Paragraph 2.
Once again, the 2 mile "sphere of influence" is probably inappropriate for analyses of impacts during the insect season.

14. p. 134 Paragraph 2.
"Over 80 percent of coastal-insect-relief habitats would remain unavailable under limited leasing." As stated without any qualification, this statement is misleading. This degree of habitat loss is not supported by data from the CAH experience; this should be noted.

15. p. 134 Paragraph 6.
For the CAH there is projected 5-10 percent population decline <u>or</u> distribution change. These are extremely different levels of impact and estimates should be presented for each input separately.

RAPTORS (including the threatened Peregrine Falcon)

1. p. 38 Paragraph 3.
The text states that the "arctic peregrine falcon is the only threatened or endangered species known to occur in the 1002 area." I would reword this to state that the peregrine is the only threatened species known to occur in the 1002 area. Currently, the arctic peregrine (tundrius) is classified as threatened, not endangered. Its recent reclassification (from endangered) was due to signs of a population recovery. Also, I think it is at least worth noting that the 1002 area occurs within the range of the endangered Eskimo curlew.

2. p. 38 Paragraph 4.
I do not disagree that peregrines arrive at their northern aeries between April 21 and May 7, nor that egg-laying and incubation can occur as early as 15 May. I do feel, however, that the use of the word generally is not appropriate. I think the reference used for these dates (NPR-A Task Force 1978) is not the best source of information. A better reference would be USFWS 1982. In that status report the first week of June is given as normal egg-laying for tundrius.

3. p. 38 Paragraph 6.
This section on peregrines ends by noting that several sightings of peregrines during June and July have been made in the 1002 area, and yet the significance of this is unclear. Two things come to mind. First, as peregrines increase as breeders on the North Slope, non-breeders will also. Second, peregrine identification is problematic, especially when gyrfalcons occur in the neighborhood. Although some observations have been well documented in the baseline studies, at least some observations could be of gyrfalcons, not peregrines.

I-3

4. p. 123 Paragraph 8.
The report uses two cases to depict how variable the reactions of raptors are to disturbance. I am not sure if the reports' intent was to contrast variability between species or individuals. A great deal of variation occurs in both cases. However, the examples described are not clearly related to the phenomenon of disturbance. Specifically, rough-legged hawks are cyclic in their nesting and although probably more easily sensitized during years of low prey, they often abandon sites during these lows, regardless of disturbance.

5. p. 123 Paragraph 9.
This paragraph mentions high density raptor nesting habitat used by, among others, peregrine falcons. I have been in both areas and do not feel the Saddlerochit area, at least that within the 1002 area, qualifies as high density raptor habitat. Maybe this should be clarified and note that high density habitat lies south of the 1002 area.

6. p. 124 Paragraph 7.
Golden eagles are opportunistic and are abundant at other North Slope sites. If caribou do decline in or shift from the 1002 area, eagles probably will also. However, I think the use of the terms "decline moderately" is unwarranted. "Change distribution" is more appropriate and should be the essence of the statement.

7. p. 126 Paragraph 4.

Minor point: the text states that arctic peregrines are absent from the 1002 area "through April". Elsewhere (e.g., p. 126, paragraph 8) the text mentions 15 April as arrival dates. I would use the former date (end of April, 1 May).

Also in this paragraph, the report states that loss of suitable nesting habitat as a result of facility placement would be minor, since facilities would not be permitted within 2 miles of an aerie in potential nesting habitat. Earlier (p. 124, paragraph 5) recommended restrictions use 1 mile as a buffer zone. Properly developed, at least some facilities have been constructed within 2 miles (Pump Station No. 2, TAPS; Elliott Highway, Grapefruit Rocks Aerie) of aeries.

BIRDS

1. p. 35 Paragraph 3.
Snow geese "move westward into the 1002 area as far as the Hulahula River." Maps in the text (p. 1.3B) designate use areas on the Canning River Delta and Katakturuk Plateau.

2. p. 35 Paragraph 3.
"The average number of (snow) geese using the 1002 area is 105,000, approximately 15-20 percent of the Banks Island Population." I could not find a reference in the baseline studies on how this figure was derived. Since this figure is applied to concluding remarks regarding possible reductions in the Banks Island Population (p. 122, paragraph 2), I think it deserves more of a reference.

3. p. 119 Paragraph 9.
While the general statement that "the responses of birds to human disturbance...are highly variable" is true, there is more information available on this topic than is cited. Recent research, such as "The Effects of the Lisburne Development Project on Geese and Swans" (Murphy et al. 1986), are relevant to this topic. This study, cited in the Seabirds and Shorebirds section, but not in the Swans, Geese, and Ducks section, provides data on the effects of oilfield development on nesting density, nesting success, distribution in the oilfield from June-September, and the behavior of geese and swans experiencing different types and intensities of human activity. These data, combined with findings from the 1986 field season (not available at the time the 1002 Report was finalized), indicate that there were interspecific, seasonal, and sex-related differences in reactions to disturbance.

4. p. 121 Paragraph 4.
"Disturbance...could extend up to 3 miles from the source (compressor simulator)." The assumption is made that other sources (such as structures) will displace geese as well. Snow geese may accommodate to roads and pads and their associated tangential or stationary stimuli at much closer distances than they would to a noisy compressor station.

5. p. 121 Paragraph 6.
Hampton and Joyce (1985, p. 4-7) concluded that "snow geese and Brant displayed accommodation to oilfield development and were not significantly disturbed."

MUSKOXEN

1. p. 113 Paragraph 6.
In describing mitigation for muskoxen, the authors state that "standard stipulations" will be employed. However, a question not asked is "what will muskoxen do when they confront roads and elevated pipelines?" Will they cross like caribou or will other mitigation be required.

ARCO Alaska, Inc.
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February 2, 1987

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

RE: Draft Arctic National Wildlife Refuge, Alaska
Coastal Plain Resource Assessment

Gentlemen:

ARCO has reviewed the Draft Arctic National Wildlife Refuge (ANWR), Coastal Plain Resource Assessment and has comments to offer for your review and consideration. We welcome this opportunity to participate in the further development of this document that, when finalized, will allow the Secretary of Interior to make a recommendation to the Congress based on the best available scientific and technical information. I-5

We support expeditious leasing of the ANWR Coastal Plain for oil and gas exploration, production, and development. To further this support, we are committed to the exploration of ANWR, provided we gain the access to explore through any congressionally mandated process. To delay leasing in order to conduct further studies would not be in the best interest of the Nation or the State of Alaska in our view. Currently, there is sufficient data to make a prudent decision regarding leasing.

We firmly support the Department of Interior's Section 1002(h) recommendation for the leasing, exploration, and, if oil is found, production on the ANWR Coastal Plain. Our experiences at Prudhoe Bay and Kuparuk, where oil is produced in an environmentally sound manner, convinces us that development at ANWR would accrue significant benefits to the Federal, State, and local governments. These benefits include reduced dependence on foreign oil imports (enhancing our national security and balance of payments) and more jobs (directly in Alaska on ANWR and elsewhere in the construction of facilities/modules and the manufacturing of pipe and other oil field goods).

During the period of 1980 to 1985, ARCO expenditures for manufactured goods on the North Slope totaled $3.6 billion. This expenditure was for the purchases made from companies and small businesses throughout the 50 states. Although we generally find the resource potential/estimates to be of the proper magnitude, the only way to evaluate an area's resource potential accurately is to drill wells. Sound decisions in the national interest concerning ANWR must be based on a complete picture of its subsurface resources, as well as its surface values.

Attachment I provides specific comments on the ANWR Coastal Plain Resource Assessment. Do not hesitate to call me at (907) 265-6123 if you have any questions.

Finally, ARCO supports the written commentary that is being submitted separately by the Alaska Oil and Gas Association.

Sincerely,

J. M. Posey
Manager
Issues Advocacy

JMP/RO535:sm

Attachment I - Specific Comments
Attachment II - List of Exhibits

ATTACHMENT I

ARCO

Specific Comments on the Draft
ANWR Coastal Plain Resource Assessment

Chapter 2

Page 28 - 3rd paragraph - Caribou

"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 five years during the 14 year study were identified as the core calving area." Does five out of 14 years reflect a strong fidelity? We think not. A strong fidelity would be utilization of an area greater than 50% of the time (See Exhibits 3 and 17).

Chapter 3

In general, this chapter downplays the tremendous value of potential natural gas reserves. Future need may make development of the national reserves viable. Besides conventional natural gas production, these reserves could be produced as natural gas liquids or condensate.

9-I

Chapter 4

Page 76 - 2nd paragraph - Exploratory Drilling

The statement that "The drilling rig...usually requiring 110 to 180 C-130 loads,..." should take into account that a modular wheeled rig could be barged to a beachhead in the summer and moved to the location via ice road. This would accelerate mobilization and reduce the number of multiyear wells required to evaluate the potential prospects. Secondly, a modular rig could drill more than one moderate depth well per year (See Exhibits 14, 15, and 16).

Page 77 - 1st full paragraph - Exploratory Drilling

The statement that "...the rig is placed on pilings or timbers." should consider that an alternative of a stable rig footprint is a gravel pad. This is essentially beneficial for a multiyear location for a deeper abnormal pressured prospect (See Exhibits 14, 15, and 16).

Page 77 - 4th full paragraph - Exploratory Drilling

The statement that"...the well is Arctic packed and suspended." should recognize that the well only needs to be filled with a non-freezeable material for suspension. The space between the surface casing and next casing string only needs to be sealed with Arctic pack preceded with cement when the well is completed and the pumpable fluids from the reserve pit have been injected.

Page 80 - Drilling Pads and Wells

The pad size of 20-35 acres may be exaggerated. For example, the average Kuparuk pads is in the range of 10-11 acres. Pad size will vary according to the number of wells to be drilled, as well as other pertinent field considerations.

Page 81 - 1st paragraph - Drilling Pads and Wells

The statement that indicates that liquids "...pumped into a mud disposal well. Solids must be removed..." should be expanded to demonstrate that clearly the mud should be injected into the annular channel between the surface casing and the protective casing. For example, the mud from the drilling process will be injected between the 13-3/8" and 9-5/8" casings in the previous development well.

Consideration should also be given to onsite disposal of the cuttings in an approved manner. Large drill sites with numerous wells will generate sufficient cuttings to make onsite disposal a desirable, environmentally proper alternative (see Exhibit 16).

Finally, flare stacks are not generally used at a drill site.

Page 81 - 5th paragraph - Field Roads and Pipelines

Pipeline sizes vary between 8" and 24". Also, change the sentence regarding vertical support members (VSMs) to read "They are commonly placed on elevated Vertical Support Members." This will give us flexibility and not tie us to a five foot (5') steel VSM.

Page 82 - Pipelines

In general, this discussion on the technical aspects and concepts of pipeline design and utilization is appropriate; however, certain aspects need further clarification. The discussion of the Kuparuk, Prudhoe Bay and TAPS pipelines are taken in a singular context, when in reality a pipeline that may be designed and constructed for future ANWR development would incorporate the best characteristics of each. There should not be any implications that only elevated pipelines will be acceptable, or all pipelines will utilize a common pipe support or it would be best to have the pipeline parallel the road. The terrain, as well as the field size and development criteria, will determine engineering design. In other words, there may not be any one best design for the entire project; rather, a case-by-case evaluation will determine the best design for each segment.

Page 84 - Airfields for Construction Camps

L-7

"Air development" should read "airfield development."

Page 99 - last paragraph - Consequences of Exploratory Drilling

Your reference to "traces of oils used during drilling to 'slicken' up the drill bit;" is not in keeping with current drilling technology utilized on the North Slope. Fresh water-based mud systems are currently used to drill wells on the North Slope.

Page 103 - 3rd full paragraph - Vegetation, Wetlands, and Terrain Types

Impoundment concerns can be mitigated with culverts (see Exhibit 4 and 17).

Page 103 - 4th paragraph - Vegetation, Wetlands, and Terrain Types

Impoundment concerns can be mitigated with culverts (see Exhibit 4 and 17).

Page 103 - 5th paragraph - Vegetation, Wetlands, and Terrain Types

The Meehan (1986) Report is a draft report that contains a significant number of errors; this report and

any reference to it should not be included as part of this document (see Exhibit 2).

Page 107 - 5th paragraph - Production, Transportation, and Development

The sentence "Whitten and Cameron (1985) found consistently low numbers" should be rephrased to read "Whitten and Cameron (1985) found consistently low numbers of caribou and generally low percentages of calves in the Prudhoe Bay oil field from 1978 to 1982. One of several explanations offered is possible displacement by oil field activities. Gavin (1979) also found very low percentages of calves and total caribou in the Prudhoe Bay oil field area prior to and during initial oil field development (1970-1979). White, et.al. (1975) suggests that the high percentage of wet and moist areas near Prudhoe Bay makes this area less attractive to caribou." (see Exhibit 3).

Page 108 - 2nd paragraph - Production, Transportation, and Development

The statement "Displacement of the PCH from a core calving area to a less desirable area would be expected to reduce caribou productivity" confuses the term "less desirable area" with less important. No proof exists to illustrate that the core calving area is more important, productive or valuable; it is only used more often. The entire ANWR and Canadian coastal plain is used for calving, and there is no data that shows the entire plain to be more or less important than the core areas (see Exhibit 3).

Page 108 - 6th paragraph - Production, Transportation, and Development

We consider this paragraph to be an exaggeration. It should be reworded to reflect that "the FWS was examining a hypothetical oil field development, that was three times the size of Prudhoe Bay and situated entirely within the calving areas."

Page 108 -7th paragraph - Production, Transportation, and Development

The statement "Based on the work of Dau and Cameron (1985), caribou are displaced approximately two miles out from development" misrepresents the information actually found in their report. The information from

the Dau and Cameron report for the 1982-85 period is as follows:

Within 1000M of the Road

	Total Caribou	Total Calves
May	1,568	417
June	2,965	546
July	20,132	3,986

Within 100M of the Road

	Total Caribou	Total Calves
May	78	25
June	208	33
July	3,422	757

I-8

Based on this data, it is incorrect to assume a two-mile impact/avoidance zone near roads in a calving area. An important shortcoming was its failure to account for the effect of lakes and ponds on the available calving habitat adjacent to the Milne Point Road.

Page 108-109 - Production, Transportation, and Development

In general, clarification is needed with regard to references by S. Murphy and/or J. Curatlo on ramp and crossing studies. As presented, this information is confusing (see Exhibit 6).

Page 120 - 1st paragraph - Swans, Geese, and Ducks

One study that should be referenced is the Murphy, et.al. 1986 "Lisburne Terrestrial Monitoring Program (1985). The effects of the Lisburne Development Project on Geese and Swans." The results of this study indicated that there was little effect on the nesting and area use by geese, swans and ducks in the Lisburne development area.

Page 120 - 2nd paragraph - Swans, Geese, and Ducks

Your reference to "some poaching could also occur." is contrary to oil field practices. The prohibition on firearms in the oil fields is strictly enforced.

Page 121 - last paragraph - Conclusion

A decline in waterfowl populations has not been documented in the Lisburne operational area. This fact is counter to the supposition made that a decline in waterfowl could occur as a result of development.

Page 130 - 4th full paragraph - State and Local Political and Economic Systems

The statement that"...permanent jobs would be filled by commuters...with residences outside Alaska." is absolutely erroneous. Essentially all ARCO personnel live in the greater Anchorage area.

Page 143 - Table VI - 8 - Irreversible and Irretrievable Commitments of Resources

The chart indicates under "Artifacts at Development Sites" that all would be lost in the full and partial leasing alternatives. Current law requires that an archaeological survey of an area must be performed prior to exploration. Important archaeological sites are avoided, studied or removed to prevent damage to archaeological resources. A more accurate statement would be that present survey mandates should preclude any significant loss of artifacts.

Page 145-148 - Summary of Recommended Mitigation for the 1002 Area

We recognize the need for meaningful mitigating measures, and many of those listed are presently utilized in the North Slope oil fields. During the last ten years we have found that some of the mitigation measures that were put in place, without a firm technical or scientific basis, at the onset were unnecessary, ineffective or in some cases proved to be detrimental to the environment (i.e., more tundra was covered by gravel for caribou crossings, roads, and pipeline routes that were unnecessary). We recommend a more general/flexible case-by-case option to mitigate the concerns of the present, using past experience as the guideline for mitigation, which would allow for future innovative methods that may be developed (see Exhibit 17).

ATTACHMENT II

EXHIBIT LIST

The following exhibits have been submitted to the U.S. Fish and Wildlife Service as supplementary information to our ANWR Draft Legislative Environmental Impact Statement Commentary:

Exhibit 1: Critique of draft USFW report "The Effects of Prudhoe Bay Reserve Pit Fluids on the Water Quality and Macroinvertebrates of Tundra Ponds." Correspondence from ARCO to USFW, July 22, August 24, 1985 and USFW reply on August 6, 1985.

Exhibit 2: Critique of R. Meehan's "North Slope Guidance Manual." Letter to Robert Jacobsen, Assistant Regional Director, USFW from T.R. Fink, Manager of Environmental Conservation, ARCO Alaska, October 9, 1986.

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Exhibit 3: Coastal Oil Development and its Effects on Caribou Migration and Population Patterns in the Prudhoe Bay region of Alaska's North Slope, 1969-1979, by Angus Gavin and D.W. Chamberlain, September 1980.

Exhibit 4: Prudhoe Bay Unit, Lisburne Development, Drainage and Erosion Control, Design and Criteria Manual, May 1985.

Exhibit 5: Prudhoe Bay Unit, Lisburne Development, Large-Scale Model Study of Arctic Slope Protection, Tekmarine, Inc., Sierra Madre, California, June 1984.

Exhibit 6: Department of the Army, 45th Meeting of the Coastal Engineering Research Board, Fairbanks, Alaska, May 14, 1986.

Exhibit 7: Lisburne Development, 1985 Summer Hydrology.

Exhibit 8: Lisburne Development, 1984 Summer Hydrology.

Exhibit 9: Lisburne Development, 1983 Summer Hydrology.

Exhibit 10: Breakup 1984, Sagavanirktok and Putuligayuk Rivers, Prudhoe Bay, Alaska

Exhibit 11: Pile Driving and Load Tests in Permafrost for the Kuparuk Pipeline System, Victor Manikian, 1983.

Exhibit 12: Design Evaluations in Support of Offshore Facilities and Gravel Islands in the Arctic.

Exhibit 13: Offshore Seawater Treating Plant, Waterflood Project, Prudhoe Bay Oil Field, December 1984.

Exhibit 14: Prudhoe Bay Unit, Lisburne Development, Geotechnical Investigations, Winter, 1983, Vol. 1, Engineering, Harding Lawson Associates, June 1983.

Exhibit 15: Prudhoe Bay Unit, Lisburne Development, Geotechnical Investigations, Winter, 1983, Vol. 2, Field Data and Laboratory Testing, Harding Lawson Associates, June 1983.

Exhibit 16: Prudhoe Bay Unit, Lisburne Development, Geotechnical Investigations, Winter, 1984, Vol. 3, Engineering, Field Data and Laboratory Testing, Harding Lawson Associates, August 1984.

Exhibit 17: Petroleum Development in Arctic Tundra Wetlands, Gary F. Smith, Scott B. Robertson, Delivered National Wetland Symposium, New Orleans, October 8-10, 1986.

THE ARCTIC ADVENTURERS
P.O. BOX 91107
ANCHORAGE, ALASKA 99509-1107

January 15, 1987

U.S. Fish and Wildlife Service; Division of Refuge Management
2343 Main Interior Building
18th and C Streets, Northwest
Washington, D.C. 20510

Re: Comments on Draft 1002 Report

Mr. Horn:

We are writing to comment on the draft report submitted by the U.S. Fish and Wildlife Service which concerns the Coastal Basin of the Arctic National Wildlife Refuge. We are in support of alternative E which would designate this area as wilderness. We have taken this stand primarily on the grounds that we feel the reserve of recoverable oil in this region does not justify the risk that would be incurred by developing this area. We do not feel the Coastal Basin should be permanently closed to development, but that development should be done at a time when our technology has further developed providing adequate protection for the wildlife and flora.

I-10

We have concerns with the proposed way hazardous waste would be disposed of which could greatly endanger the fragile ego system of this area. The porcupine caribou herd also poses management problems which the proposed development of this area does not address. Using the Central Alaskan herd as a prototype is not feasible. Along with these concerns is the insufficient scope that the draft focused on which, in our belief, does not identify the full impact that development would have on the Arctic region: i.e. Canadian concerns as well as impact on native subsistence.

We feel this area of our country and world is of major national importance to every American and therefore should be preserved in its natural state. After being to this area ourselves we have seen the grandeur that the coastal basin offers and the wildlife that it supports. For the sake of future generations as well as the present ones we would strongly recommend that this area be designated as wilderness thus protecting its beauty and greatness. We are not advocates of "hard line" conservation, for we are all professional men that only desire the chance for our children and grandchildren to enjoy the beauty of nature, if for no other reason than "Because it's there". Please feel free to contact us for further comment.

Sincerely Yours;

GREG HEAD --The Arctic Adventurers--

Gregory Head (Spokesman)	Tim Forsythe	Greg Scott
Larry Brown	Steve Spalding	Scott Luse
John Landry	Larry Longhurst	Steve Jackson
Fred Whipple	Pete Norseth	Pete Faber

DO YOU WANT TO MAKE PUBLIC COMMENTS?

11:52.25

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 John Miller

Mailing Address 550 W. 7th Suite 1840, Anchorage, Ak 99501
BP Alaska Exploration Inc.

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☒ I am speaking for BP Alaska Exploration Inc.
(please enter name of organization you represent)

TESTIMONY OF THE

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT"

Anchorage, Alaska

January 5, 1987

I am John Miller, Alaska area manager for BP Alaska Exploration Inc. We welcome the opportunity to offer testimony on the U.S. Department of Interior 1002 (h) report.

BP Alaska strongly support the U.S. Department of Interior's recommendation that the entire 1002 coastal plain area be authorized for oil and gas leasing, exploration and production. The national interest is best served by congressional authorization of the Department of Interior's recommendation. Only then can a factual assessment of the petroleum reserves be made by exploratory drilling of this highly prospective area. However, this cannot be done at any cost. Stipulations that increase costs without compensating benefits should, at most, be selectively applied. For example, the prohibition of all exploratory activity from May 1 to November 1 is not justified by past north slope upland exploratory experience. Conversely, it could require shut down and re-start of operations to finish the well in a second year, thereby expanding threats to well safety and the environment, and increasing costs. Another example is the stipulation that wells not exceeding 10,000 feet in depth be drilled from ice pads. This decision should be site specific based on available pad materials, timing, terrain and other current and local conditions.

BP Alaska support leasing under reasonable environmental stipulations. We agree with the DEIS comments that exploration and development experience at Prudhoe Bay indicates minimal impact on wildlife resources and hence it is

reasonable to assume coastal plain development can also proceed with similar minimal effects; and that most adverse effects would be minimized or eliminated through carefully applied mitigation, using experience and technology acquired from Prudhoe Bay development and construction of the trans-Alaska pipeline. Actually, the Prudhoe Bay and TAPS experience and technology has been further enhanced through subsequent developments of Kuparuk, Milne Point, Lisburne and Endicott Fields along with many attendant environmental studies. But exploration and development of these arctic north slope fields has been very costly. ~~So~~, leasing, exploration and development of commercial prospects can occur under currently projected economic conditions in this high cost region in an environmentally responsible manner; but only if costs are controlled by imposing only prudent stipulations that are fully justified and carefully crafted.

A great deal of emphasis has been placed on the possible detrimental effects that discovery and development of a commercial oil field in the coastal plain will have on the Porcupine Caribou Herd's calving ground and habitat. This is a legitimate concern. BP Alaska agree with the DEIS conclusion that the total available habitat has never been fully occupied, that it is not currently limiting the growth of the herd and that loss of habitat represented by likely 1002 area oil development will not impact caribou growth or productivity. Also, a major oil development would not do irrepairable damage to Porcupine Caribou calving grounds. The ANWR coastal plain is but a portion of the calving grounds of the Porcupine Caribou Herd. A discovery of world ranking size would only involve a small portion of the coastal plain. The herd's calving range extends into the Brooks Range foothills to the south of the ANWR coastal plain and eastward into Canada to the MacKenzie Bay area. Experience with the Central Arctic Herd shows that development at Prudhoe Bay, Kuparuk and Milne Point in the calving range of that herd has not had a negative effect on the herd. The herd has grown

I-12

from about 3,000 animals in 1975 to its current day size of over 13,000 animals. This experience indicates that development in the ANWR coastal plain should not have a negative effect on the calving success of the Porcupine Caribou Herd or its population.

Opening the ANWR coastal plain to leasing is crucial to our national interest. The U.S. produces 8.5 million BOPD and imports 6 million BOPD or 41% of ~~our~~ consumption. Alaska provices 20% of domestic oil production. Domestic production is forecast to decline to 4 million BOPD by the year 2000 and imports are estimated at 12 million BOPD or 75% of our consumption. Alaska north slope production will also decline from 1.9 million BOPD in 1987 to an estimated 0.7 million BOPD in the year 2000. Our dependence on foreign imports is likely to double by the year 2000 under current conditions. The down side of this is that foreign supplies to fill the gap aren't guaranteed. National fuel crises occurred in 1973 and 1979 due to events in the Middle East beyond our control. The question is not whether or not we want another crippling fuel crisis. Of course we don't. The question is how to avoid it. Obviously, developing reliable domestic petroleum producing capacity expeditiously is imperative. Looking in the most promising place to find ~~large reserves~~ is the first logical step. Few will argue that the ANWR ~~coastal plain offers this promising potent~~ial. Due to long lead times to develop ~~frontier~~ Alaska ~~oil~~ fields, ~~10 to 15 years from discovery to first production,~~ a coastal plain discovery today would not likely start production before the year 2000.

In conclusion, BP Alaska support Alternate A; full leasing of the 1002 area coastal plain under reasonable environmental stipulations. We believe that industry has the proven technology and experience to explore for and develop commercial deposits in an environmentally responsible manner, and that this endeavor is vital to our national interest.

Thank you for this opportunity to present testimony on the draft 1002 (h) report.

STATEMENT FOR PUBLIC HEARING

ARCTIC NATIONAL WILDLIFE REFUGE

U.S. FISH AND WILDLIFE SERVICE

DRAFT REPORT AND RECOMMENDATION TO CONGRESS

My name is Sally DiDomenico and I am speaking on behalf of BP Alaska Exploration Inc. BPAE strongly supports the opening of the Coastal Plain for oil exploration and development.

BP Alaska Exploration is taking a position on this issue based on its long-standing interest in Alaska. BPAE or its parent company, British Petroleum, has been actively involved in exploration activities on the North Slope since the early 1960's. BP was the original lease holder of a considerable portion of the Prudhoe Bay Field. BPAE owns a 29% interest in the Kuparuk River Oil Field, currently producing 260,000 barrels of oil per day; we also hold a number of other onshore and offshore oil and gas leases in Alaska. BPAE is proud of our involvement in the exploration of the North Slope and proud of our record of operating in an environmentally safe manner.

I-14

BP Alaska Exploration has been, is, and always will be aware of and concerned for the environmental resources of this State. We believe the environmental resources must be protected. We also believe that it is imperative that the United States assess its remaining, untapped sources of oil and gas. At present this country imports about a third of its daily oil requirements. We cannot afford to increase our reliance on imported oil. We also cannot afford to assume that a particular domestic area has potential and that it can be explored whenever national oil supply conditions make such exploration necessary. The Mukluk well in the Beaufort Sea is a prime and costly example of how disappointing a "promising" area can be. The only means by which the productivity of an area can be known is through drilling. BPAE believes

that promising areas such as the Coastal Plain should be explored, and we believe that at the same time the environmental resources in the area can be protected. It is possible to do both. The oil industry has proved it at Prudhoe Bay. BPAE has proved it at the Kuparuk Field.

BPAE supports the U.S. Fish and Wildlife Service in its Draft 1002 Report recommendation that the Coastal Plain be opened for exploration and development. However, we have some concerns regarding the general tone of the report. While we appreciate the difficulties involved in the thorough study which was required for this area, we believe there are many instances within the Report in which an environmental issue has been treated in a less than factual manner. This Report will be the basis for intensive study by the concerned public and by the Congress of the United States. It is imperative that the environmental issues be given a balanced and careful assessment. All aspects of the issue should be presented so that concerned parties can consider the importance of the resources and are also informed of the demonstrated successful protective measures which can be taken to conserve these resources.

I will cite a few specific examples of concern:

On Page 6, the report 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 size of the Porcupine caribou herd". These two statements are made in spite of the fact that the very next statement is "The amount of reduction and its long-term significance for herd viability is highly speculative." We believe that it is factual and fair to state that the effect of oil development on caribou herd is highly speculative. There is no evidence of the detrimental effect which exploration and production has had on caribou. However, we do have proven experience that 18 years of oil industry operation at Prudhoe Bay and Kuparuk River have had only minimal impact on the Wildlife resources — and no detrimental effect on the caribou herd.

3/5

Therefore, our track record shows that oil operations and caribou are compatible. We urge that a more balanced discussion of the effect of oil operations on caribou be incorporated into this Report.

Another example of our concern with the Draft Report is:

On page 80 under the topic of Production Infrastructure is the statement "The drilling pad....covers 20-35 acres....requires 160,000-285,000 cubic yards of gavel." In BP's experience these figures are not representative of drilling pads currently used in the Arctic area.

At Kuparuk, using the latest technology, a well pad comprising 24 wells and a reserve pit is located on an 11.5 acre site. Only 46,000 cubic yards of gravel were required to construct the pad. These wells are on a 25 foot spacing allotment; but even with a reduction in well spacing, which would result in a drill pad for 40 - 50 wells (the suggested development scenario in the report) only slightly larger pads than those in use at Kuparuk would be necessary. Improved industry technology not only benefits industry, it also benefits the environment in which industry operates. It is important that such beneficial aspects be presented in the Report.

I-15

One last example, and again, this is a concern regarding important information which is not presented to the public. Pages 145 - 147 list a summary of 32 recommended mitigating measures for the protection of environmental resources. The Report does not state that out of the 32 measures recommended, at least half of those measures are either standard, established industry practice, or they represent action which any reasonable North Slope operator would take as a matter of course. Many of the other items refer to environmental monitoring. Industry presently conducts similar monitoring programs for other North Slope projects. In the interest of presenting factual information, it should have been clearly stated that many of the recommended mitigating measures for the Coastal Plain are already being carried out by industry elsewhere in the Arctic.

There are, however, two mitigating measures -- Items 25 and 26 -- which we consider both unwise and unwarranted. Time and area closures in order to protect wildlife resources should not be a pre-established stipulation. Such decisions should be made as the need arises and should be based on a consideration of all aspects of the situation. A temporary closure to protect the wildlife in the area is acceptable. However, if such a closure would result in a detrimental effect to a critical operating procedure or could affect the safety of industry personnel, then a compromise solution must be found by the governmental agencies.

There are other, similar areas of concern to us regarding the manner in which the issues are discussed. We are submitting comments which will cover these concerns in detail.

In summary, BP Alaska Exploration is concerned about the protection of the environmental resources. We do believe industry has proved that we can operate on the North Slope in an environmental safe manner. We believe exploration of ANWR is in the national interest. BP Alaska Exploration supports the opening of the Coastal Plain for oil exploration and development.

5/5

STATEMENT OF FREDERICK DOREY
REPRESENTING BP ALASKA EXPLORATION INC.
REGARDING THE
DRAFT COASTAL PLAIN RESOURCE ASSESSMENT
OF THE
ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
January 9, 1987

I am Frederick Dorey, General Counsel of BP Alaska Exploration Inc. BPAE is the wholly-owned subsidiary of the British Petroleum Company which carries out oil and gas exploration and production in the United States. I am pleased to represent BPAE today to support the conclusion of the draft 1002 report that the Coastal Plain of the Arctic National Wildlife Refuge be opened for oil leasing, exploration and development.

I-16

BPAE is taking a position on this issue based on a long history of involvement on the North Slope of Alaska. Affiliated companies of BPAE began work in Alaska 27 years ago, and were the original lease holders of a major portion of the Prudhoe Bay Field. BPAE affiliates began the development of Prudhoe Bay and still own a portion of Trans Alaska Pipeline. BPAE is now the second largest owner of the Kuparuk River Unit. That field produces almost 300,000 barrels of oil per day from the area adjacent to Prudhoe Bay. BPAE is proud of its record, and the record of the rest of the industry, for clean and environmentally sensitive development on the North Slope.

During the years of our involvement in Alaska we have also participated in the debate about the benefits and problems of development on the North Slope. Several of the lessons we have learned from that debate over the past 25 years would be of value to the Secretary when he considers his final recommendation to Congress regarding development on the ANWR Coastal Plain.

First Development on the North Slope has been of enormous benefit to the people of the United States and the free world. We all know that oil production there is about 1/5 of the entire American supply. The tax revenue and jobs provided are critical to the native population on the North Slope and the entire State of Alaska. The billions of dollars of development work have also supported thousands of jobs in the Lower 48. Many other American jobs have been sustained by transportation and refining of the oil produced in Alaska. These benefits would never have existed if we had listened to the voices that said "Don't build the Trans Alaska Pipeline" or "Don't allow any change in the environment of the North Slope". If we are lucky enough to find a large reservoir of oil in the ANWR Coastal Plain the same tangible benefits will develop. If there is oil there but we can't discover or develop it - these tangible benefits - of jobs, taxes and economic improvement - will be lost to the country. We will import more oil and export more dollars.

Secondly There have always been gloom-and-doom predictions regarding the environmental and wildlife effects of North Slope oil development and pipeline construction. But in 25 years of development, with appropriate regulation, the dire predictions have been wrong time-after-time. The caribou herds were not decimated by the TAPS Pipeline. The caribou herd whose habitat includes Prudhoe Bay has tripled in size since development began there years ago. The draft recommendation is correct when it says, "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." It is now clear that oil and caribou can coexist in Alaska.

Thirdly It is surprising to learn that many of the people who object to development have little understanding of the enormous geographic extent of the North Slope and the high environmental standards of the oil companies working there. The most common reaction of first-time visitors to the area is astonishment at how vast and desolate the North Slope is and how little impact the oil operations actually make on the environment or the landscape. Many people seem to have an image of oil

drilling and development that is derived from 1930's movies about Texas wildcatters. Most visitors are surprised at how clean, well organized and compact the North Slope facilities are and how much care is given to minimizing effects on the tundra, water, and environment.

If we look at just the 1002 area we find it is larger than the State of Delaware. The need to maintain this perspective will be important when evaluating statements about the 1002 report. For example, many of the possible problems listed in the Environmental Consequences section of the report are insignificant, or very unlikely, or would occur only in isolated locations of a few acres in the 1002 area -- an area that is one and a half million acres, within a wildlife refuge that is 19 million acres.

The 1002 report has already become the object of public interest. When it is submitted to Congress the scrutiny will be intense. We firmly believe that an objective analysis of the environmental and wildlife issues and all the relevant facts will support leasing, exploration and development on the Coastal Plain. To that end we have a number of specific comments about items in the report which we will submit to the Department of Interior in writing by January 20th.

I-17

However, let me, at this point, give just a couple specific examples of inaccurate facts in the report that could lead to inaccurate conclusions:

On Page 80 under "Production Infrastructure" the report states the drilling pads will cover 20-35 acres and require 160,000-285,000 cubic yards of gravel. BP's experience in the Kuparuk field shows that these figures are excessive and not representative of current or future development in the Arctic area. Currently pads are built on only 11 1/2 acres and use only about 1/5 the gravel cited in the report. With reduced well spacing, 40-50 wells could be put on a pad this size.

Similarly, on Page 81, the report describes gravel roads with a width of 35 feet. The Kuparuk Unit standard width is 10 percent less for main

roads and over 30 percent less for other roads. Thus, more accurate facts would show that development in ANWR will use less land and displace substantially less gravel than predicted in the report.

Additionally, the authors of the report seem to ignore the fact that development of a large oil field is a phased project. Prudhoe, Kuparuk or a major ANWR field, could take 10-20 years to reach its maximum size. Consequently, the introduction of isolated drilling activities on the wildlife habitat is a gradual process. It is not a sudden, or single-season event.

This allows wildlife populations to adapt gradually to the limited changes in their habitat. This is an important point because much of the Environmental Consequences section of the report assumes that changes in the extent or characteristics of habitat will have detrimental effect on key ANWR species. There is ample scientific evidence that most species can adapt well to a change in the geographic extent of their habitat or a limited low-density intrusion into that habitat. Experience at Prudhoe and Kuparuk has proved that the orderly development of oil field operations has had little detrimental effect on wildlife.

In conclusion let me reiterate that BPAE supports the Secretary's recommendation to lease the 1002 area for exploration and development. The logic of the draft recommendation is inescapable. If the Coastal Plain is opened there is the possibility of enormous national benefits - thousands of jobs, added tax base, and additional oil supply. If it is not opened there is no chance for these benefits. About 18 million acres of the Arctic National Wildlife Refuge would remain untouched. On the Coastal Plain oil development and wildlife protection are not mutually inconsistent. Leasing and development should be recommended to Congress.

As I indicted, we will be submitting additional detailed written comments for the record.

Thank you.

BP Alaska Exploration Inc.

100 Pine Street • San Francisco, California 94111 • Telephone (415) 951-4325/6

CHRIS S. GIBSON-SMITH
President

February 6, 1987

U.S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior Bldg.
18th and C Sts. N.W.
Washington, D.C. 20240

Re: Comments on Draft Report - Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment

Gentlemen:

BP Alaska Exploration Inc. appreciates this opportunity to submit comments on the Draft Report and Recommendation regarding the Coastal Plain of the Arctic National Wildlife Refuge in Alaska.

I-18

Affiliated companies of BPAE have been active on the North Slope of Alaska for almost 30 years, and were the original lease holders of a major portion of the Prudhoe Bay Field. At present BPAE owns a 29% interest in the Kuparuk River Oil Field and holds a number of other onshore and offshore leases in Northern Alaska.

With this perspective we have read the Draft Report on the coastal plain with great interest. We commend your Agency for the intensive studies and the detailed analyses which were carried out in the preparation of this important document.

BPAE fully supports the recommendation of the Fish and Wildlife Service that the entire 1002 area be made available for oil and gas leasing.

There is justifiable concern regarding the increased dependence on imported, foreign oil, and the decreased domestic oil exploration and production. It is imperative that the United States find and develop the hydrocarbon potential which exists in this country.

The coastal plain is a highly prospective area for hydrocarbons. It also contains significant environmental resources. We believe that the industry has proven that we can explore and operate in an environmentally safe manner on the North Slope.

It was in this spirit of concern for the environment and faith in the excellent environmental record of industry that we participated in two of the public hearings held by the Department of Interior. We now submit these detailed comments on the Draft Report, for your consideration.

The final report prepared by your agency will be the basis of discussion by the Congress and by the general public. The opening of the coastal plain is a controversial issue. It is imperative that all aspects be set forth in a balanced manner. We are concerned that some statements in the Report do not reflect an appropriate balance of the interests involved.

Regarding the oil and gas potential as set forth in Chapter III, we appreciate the difficulties involved in presenting this material in a layman's language. We suggest it might be helpful to illustrate the prospectivity of the coastal plain by comparing it with a known field, such as Prudhoe Bay, i.e. - state that the coastal plain has the potential for another giant oil field comparable to Prudhoe Bay, and that 20% of this country's oil production comes from the Prudhoe Bay Field.

In light of the current oil import situation, we believe it is important to emphasize the potential of this area.

In addition there is a need for a clear perspective regarding the vastness of the area involved. The 1002 area is larger than the State of Delaware. This perspective must be maintained throughout the Report.

Furthermore, the Report seems to ignore the fact that the development of a large oil field is a phased project. Under the climatic restrictions of the North Slope, the development must be even more gradual since major components must be sea-lifted in during the open water seasons. The development of a North Slope project is not a sudden event. This slow, gradual pace allows wildlife populations to adapt to the limited changes which may occur in their habitat. It is our understanding that scientific evidence shows that wildlife species can adapt well to gradual changes in their habitat.

More detailed concerns are as follow:

Page 6

The Report states, "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 in the Report."

We disagree with this blanket assumption. Given the estimated large quantities of gas in the area, the continued pressure for construction of an Alaskan gas line, and the technological potential over the next 25 years, the economic viability of gas resources should at the least be listed as an uncertain factor.

Also on Page 6

The Report 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 size of the Porcupine caribou herd".

These two statements are not compatible with the very next statement that "The amount of reduction and its long-term significance for herd viability is highly speculative." We believe that it is factual and fair to state that the effect of oil development on the caribou herd is highly speculative. There is no evidence of a detrimental effect which exploration and production has had on caribou. However, we do have proven experience that 18 years of oil industry operation at Prudhoe Bay and Kuparuk River have had only minimal impact on the wildlife resources -- and no detrimental effect on the caribou herd.

Industry's record shows that oil operations and caribou are compatible. We urge that a more balanced discussion of the effect of oil operations on caribou be incorporated into this Report.

Page 80

I-19

"The drilling pad... covers 20-35 acres... requires 160,000-285,000 cubic yards of gravel." In BP's experience these figures are not representative of drilling pads currently used in the Arctic area.

At Kuparuk, using the latest technology, a well pad comprising 24 wells and a reserve pit is located on 11.5 acres. Only 46,000 cubic yards of gravel were required to construct the pad. These wells are on a 25 foot spacing allotment. With a reduction in well spacing, which would result in a drill pad for 40 - 50 wells (the suggested development scenario in the Report), only slightly larger pads than those in use at Kuparuk would be necessary. Improved industry technology not only benefits industry, it also benefits the environment in which industry operates. It is important that such beneficial aspects be presented in the Report.

Page 81

Similarly, the Report describes gravel roads with a width of 35 feet. The Kuparuk Unit standard width is 10 percent less for main roads and over 30 percent less for other roads. Thus, more accurate estimates would show that development in ANWR will use less land and displace substantially less gravel than predicted in the Report.

Page 81

Marine Facility - "construction of a marine facility to service development... would be necessary because long hauls... from Prudhoe Bay are impractical." This is confusing. A marine facility is required for major equipment sealifts in summer open water seasons. Transport of services year-round including drillsite facilities (truckable) would be via Prudhoe Bay.

Page 83

"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.

"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." - This is incorrect. For 150 miles of pipeline no intermediate pump station is 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; it would most likely have one station and a diameter sufficient for the anticipated maximum flow. An intermediate pump station could then be added if unexpectedly high throughput were to be required.

Communications - "Maintenance continuous control of the pipeline... would require a complex communication system". - This language is misleading, the communication control system is standard technology.

"Each remote station typically includes... a heliport". This is incorrect, only a helipad would be required.

We hope the above comments will be helpful to you as you prepare the final Report for Congress.

In conclusion, we appreciate the efforts of your agency in presenting this information. BPAE strongly supports the recommendation that the entire 1002 area be opened for exploration and development. We believe Congress will recognize the urgency and the importance of allowing this step forward.

Sincerely,

C. S. Gibson-Smith

C. S. Gibson-Smith

SD/ti
(8.6)

Chevron U.S.A. Inc.
6001 Bollinger Canyon Road, San Ramon, CA 94583-2398
Mail Address: P. O. Box 5042, San Ramon, CA 94583-0942

R. E. Kropschot
General Manager
Exploration Department
Western Region

February 4, 1987

Comments - DRAFT
Arctic National Wildlife Refuge, Alaska
Coastal Plain Resource Assessment and
Legislative Environmental Impact Statement

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

Dear Sir:

Chevron U.S.A. Inc. appreciates this opportunity to comment on the draft report/LEIS.

Chevron supports the Secretary's recommendation "Alternative A - Full Leasing of the 1002 Area." "...It is assumed that Congressional action would allow all Federal subsurface ownerships of the 1002 area to be available for exploration and development through a leasing program administered by the Department of the Interior ...and would open to oil and gas development and production the private lands within the refuge."

I-20

We believe the report accurately describes the large oil and gas potential of the 1002 area by stating: "Despite its remote location and hostile environment, the 1002 area is the most attractive onshore petroleum exploration target in the United States today. Development of its potential oil and gas resources could make a significant contribution to the economy and security of this nation, and could be done in an environmentally responsible manner..."

Our experience on the North Slope supports the report's conclusion that industry has the ability to explore, develop and produce in an arctic environment with a minimum impact on wildlife, resources and habitat.

The geological/geophysical portion of the report is a complete and thorough analysis of the petroleum geology of the 1002 area. The discussions on the prospective sediments, source rocks, oil generation and prospect types are consistent with the data at hand and are a realistic appraisal of the geology and the petroleum potential.

It is important to recognize that other interpretations of the geology may be valid. Experience shows that different interpretations are common in Federal OCS Sales as evidenced by wide variations in tract bids. Areas identified in the report as non-prospective may be considered attractive by other interpreters and may be sites of subtly defined petroleum traps. In Chevron's opinion, full leasing of the 1002 area ("Alternative A") ensures the best opportunity for an objective and thorough evaluation of the petroleum potential since all concepts could be tested. None of the other alternatives presents such opportunity.

The statistical techniques used to determine the probabilities and the reserve ranges are similar to the methods used by much of the industry in assessing the resources of large unexplored basins. We believe the report's resource estimates are within the range of values that knowledgeable earth scientists agree upon.

While the report raises some concerns regarding water and gravel resources in the 1002 area, we believe this concern is overstated. All the valleys of larger streams are underlain by large quantities of coarse sand and gravel. Further, data from thousands of shallow shot-holes throughout the 1002 area show much of the area is underlain by near surface gravels. While fresh water may not be readily available in much of the 1002 area during the winter (as is the case generally in the Arctic) fresh water can be obtained from lakes, river gravel, storage of summer run-off, and by melting snow and ice as has been the practice for the numerous exploratory wells drilled throughout the Arctic and in Prudhoe Bay.

The environmental effects described for "Alternative A" assumes that three portions of the 1002 area are developed concurrently. We believe the 1002 area will be developed in a sequential manner that will have considerably less impact than stated in the report. There are numerous examples of successful wildlife-oil interfaces, both in Alaska and the Lower 48 States including the Aransas National Wildlife Refuge in South Texas, the Delta National Wildlife Refuge in Louisiana and the Kenai National Wildlife Refuge in Southern Alaska.

We agree with the conclusion 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." The Secretary's plan of following operations and watching for unexpected impacts and then preventing serious effects through special conditions for each project on a case-by-case basis is realistic and sensible. Blanket restrictions can result in inefficient patterns of development and preclude opportunities to learn the best way to mitigate the effects of Industry activity. Proposed restrictions should receive complete and fair review by all the parties involved.

We question the requirement for impact compensation. This requirement is from USFWS mitigation policy which has no authority in statute and is used to guide negotiations under the Fish and Wildlife Coordination Act. Compensation may be appropriate in individual cases, but should not be codified.

Chapter VII of the report aptly summarizes the uncertain condition of our country's oil and gas future, and we agree with the reasons for full leasing of the 1002 area. In addition to the economic benefits cited for Alaska and the Federal government, literally all states will benefit by contracts to supply goods and services as they did in the development of Prudhoe Bay Field and construction of the TAPS.

In conclusion, we agree with the Secretary's recommendation for "Alternative A." Legislation must be inacted that grants the Secretary authority to initiate a leasing and development program that is fully compatible with the purposes of the Arctic National Wildlife Refuge.

Although our comments in this letter are brief and deal only with our major viewpoints, there are details of the report which concern us. These topics are described by AOGA in their comments on the 1002 report. As a member company of AOGA, we participated in the identification and draft of comments which were submitted to the Director. We ask that you consider these comments in your preparation of the final draft of the 1002 report.

Very truly yours,

R. E. Kropschot

JJA/EKE:pac

James C. Patterson
Vice President
North American Exploration

Conoco Inc.
600 N. Dairy Ashford Road
P.O. Box 2197
Houston, TX 77252

February 5, 1987

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

Gentlemen:

Coastal Plain Resource Assessment
Arctic National Wildlife Refuge, Alaska

I-21

Conoco Inc. appreciates the opportunity to comment on the draft Coastal Plain Resource Assessment (1002 Report) for the Arctic National Wildlife Refuge (ANWR) which the Department issued November 24, 1986. We commend the Department for the fine job it did in assembling the report and making its recommendation. We recognize a great effort on the part of the many researchers, scientists and technical support staff that went into the compilation of the report. Conoco, as a North Slope operator with a long-standing commitment to exploration in Alaska, recognizes the significance of this draft assessment and the potential for oil and gas underlying the coastal plain. Further, we appreciate having had the opportunity to comment at the public hearings held in Anchorage and Washington, D.C. A copy of those comments is attached.

Conoco agrees that the potential contribution of the oil production from the 1002 Area would make tangibile positive contributions to the nation because it will create jobs, help to provide adequate energy supplies at reasonable costs, reduce our dependence on imported oil, enhance national

security, promote a favorable balance of international trade, and provide state, local and federal revenues.

I. CONOCO SUPPORTS FULL LEASING

Conoco firmly endorses Alternative A, which proposes full leasing of the 1002 study area, since it most readily meets the needs of the national interest and the vast majority of Americans. We believe there is no justification for Alternative B, which suggests partial leasing, since proper mitigation measures will adequately protect the wildlife. Likewise, Alternative C, allowing further exploration, does little to enhance the geophysical and geological information already available. Confirmation of the hydrocarbon potential of the area can only be verified by drilling the existing geologicial structures. Neither the Alternative D, permitting no action, nor E, which proposes wilderness designation, would allow for careful, reasoned planning and exploration and development of the coastal plain. Those elitist proposals would deny the nation the benefits which would accrue from ANWR oil and gas production in which nearly all Americans would share.

II. CONOCO SEES HIGH GEOLOGIC POTENTIAL

We concur that 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. The Draft 1002 Report Assessment of Oil and Gas Potential is a thorough and substantial analysis of the available geological and geophysical data which further supports Conoco's own evaluation of the potential of the coastal plain. Our preliminary geologic and geophysical studies carried out over the past several years indicate

that the coastal plain possesses major hydrocarbon potential. Its location, between two major oil provinces at Prudhoe Bay and Canada's MacKenzie Delta, as well as favorable on site geology, suggests a good probability that additional hydrocarbon accumulations of similar size may also be found in the coastal plain. We attach a high priority to the opportunity to explore for and develop economical hydrocarbon reserves that may underlie the area. It is imperative that industry be allowed to explore for oil and gas on the coastal plain and be permitted to develop it in a safe and environmentally sensitive manner to help ensure a secure domestic supply of energy for the future.

III. CONOCO RECOGNIZES THE NATIONAL SECURITY ISSUE

I-22

We can no longer ignore the vulnerability of the United States to energy disruptions. The examples of that vulnerability are all too recent to be forgotten. Conoco's leases on the Alaska North Slope at our Milne Point Field were purchased in 1969. Production from those leases did not begin until late 1985. Because of the necessarily long lead time from initial exploration to actual production (10 to 15 years), we must begin exploration of the ANWR coastal plain now. We cannot afford to wait 15 years after a crucial need arises for ANWR oil.

The United States is rapidly depleting its domestic reserves of oil and gas. Forecasts predict that domestic crude and oil production from existing fields will decline from the nearly nine million barrels per day average in 1985 to slightly more than six million barrels per day in 1991. This is based on predictions that prices will remain at $15.00 per barrel. Current U.S. production has already fallen to nearly eight and a half

million barrels per day and is forecast to fall as low as four million barrels per day by the end of the century. Alaskan crude plays a significant role in our energy supply by providing the U.S. with 20% of its total production.

IV. CONOCO EXPERIENCE IN ARCTIC AND ENVIRONMENTALLY SENSITIVE OPERATIONS

A. Milne Point North Slope Oil Field

Conoco has owned leases at Milne Point since 1969 and our operations there were planned in an environmentally sound and safe manner. The actual operations bear this out. No significant adverse effect has been detected and, in fact, it has been documented that the Central Caribou herd which calves in the area has increased almost threefold.

B. Aransas Pass, Home of the Whooping Crane

Since 1937, Conoco has operated in another environmentally sensitive area known as The Aransas National Wildlife Refuge. This Refuge, in the coastal marsh of southern Texas, is the winter home of the endangered Whooping Crane. During the past 50 years, Conoco has taken measures to insure that its personnel conduct site work with the welfare of the Whooping Cranes in mind. Since 1939, Conoco has drilled 74 wells in Aransas, 40 of which have been producers. When Conoco begins a new well, it works with the Refuge Manager to decide where to put in a road and what material to use to build it. Seismic and drilling activity is scheduled for those periods when the birds are not using the Refuge. The flock has grown from an all time low of 15 cranes in 1941 to 110 birds today. In 1951, Conoco received the Citation of Merit from the National Audubon Society in recognization of cooperation with conservation agencies in furthering the protection of the

Whooping Crane. This experience exemplifies the ability of industry to conduct oil and gas operations in extremely sensitive habitats with good results from both economic and environmental perspectives.

C. Paul J. Rainey Wildlife Refuge With Audubon Society

Another positive example of joint use of a wildlife refuge's resources is our exploratory drilling for oil and gas in the Paul J. Rainey Wildlife Refuge in the marshes of south Louisiana. The Refuge is operated by the National Audubon Society which issued the oil and gas leases to Conoco. We operated under stipulations designed to protect the delicate marsh. This relationship between the protection of environment and conduct of oil operations was portrayed in the film "Reflections" featured at the Petroleum Pavilion at the New Orleans World's Fair in 1984. While exploring there, Conoco worked with Refuge Management to improve the marsh. A weir system was put in place on the Refuge to control water levels. Conoco used four acres of prime wetlands for drilling operations and then worked together with Refuge and Audubon Society Managers to bring 1,200 acres previously void of marine productivity into the vibrant life cycle of the marsh, further demonstrating our consciousness and commitment to the preservation of the environmentally special habitats in which we work.

I-23

D. Conoco Operating Awards

In 1985, Conoco was one of three major oil companies honored by the U.S. Commerce Department for "Outstanding Contribution to the Conservation of Marine U.S. Fisheries." Conoco was cited for its efforts involved in the conservation and management of valuable coastal wetlands in the Paul J.

Rainey Wildlife Refuge, the Aransas National Wildlife Refuge, and the donation of Sea Dock property to the Texas Nature Conservancy.

V. CONOCO IS SENSITIVE TO ENVIRONMENTIAL AND WILDLIFE IMPACTS

A. Caribou

There is much concern over the effects of exploration and development activity on caribou in the 1002 area. We have concern for the welfare not only of Caribou, but all wildlife on the coastal plain. However, we believe that we have demonstrated our ability to operate in such an environment with no significant adverse impact to the habitat or the associated wildlife.

The main calving areas for the Central Arctic herd have remained unchanged with the development at Prudhoe Bay, Kuparuk River, and Milne Point. Caribou have never used the Prudhoe Bay area for significant calving activity, but calving activity in the Kuparuk River area has continued while two oil developments have taken place. The major factors determining calving location are snow cover and predator avoidance.

Resource Category I designation as described in the National Environmental Policy Act should not be applied to the coastal plain's core calving area; this area does not meet the "unique and irreplaceable" criteria. For instance, concentrated calving in the Jago Highlands has occurred in only five of the the last fourteen years. Also, there are no data that indicate calf mortality is greater or herd recruitment is lower when calving does not occur in the core calving area. The calving habitat is more

appropriately represented as a continuum across the Arctic coast, and a portion of this region lies within the 1002 area.

Research models at the University of British Columbia indicate forage habitat does not become a factor in the Porcupine herd population until herd size exceeds one million animals; the loss in forage from potential oil development is insignificant.

The caribou study by Dau and Cameron at Milne Point did not distinguish between maternal and nonmaternal females during the surveys. The distribution of maternal females was extrapolated using the total number of caribou and the number of calves. The authors noted that "the latter is an a posteriori analysis, and the results should not be granted the same level of objectivity as the other results." This study should not be characterized as "the most systematic study of caribou displacement by oil development" because the conclusions cited in the 1002 report are based on extrapolated and correlated data, not on actual measured data. The results presented in the 1002 report were for a two-week period in June. During May, July, and August there is no measurable difference in habitat use, including habitat within 100 meters of the road, and distance from the road.

I-24

There is no evidence that calving outside the core calving areas has reduced herd productivity with either the Central Arctic herd or the Porcupine Caribou herd (PCH). Positive correlations between calving location and calf mortality and/or herd recruitment have never been published. The population decline estimates for the Central Arctic and

Porcupine herds resulting from oil development are pure speculation and not supported by any actual data or theoretical models.

The Central Arctic herd has not been displaced from its traditional use areas by any North Slope oil field development. During the two or three week calving season, there may be a re-distribution of maternal caribou to avoid areas of human activity. There have been disturbances to caribou movement, particularly the combination of a pipeline adjacent to a road with heavy vehicle traffic. Work by J. A. Curatolo has shown that a roadway/pipline separation of 400-800 feet will minimize this disturbance.

The report states "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." There is a "...general lack of relevant information concerning probable reactions of that specific herd (PCH) to oil development..." In discussing the Central Arctic herd, the report states "no recognizable long-term effect upon the Central Arctic herd as a result of displacement by oil development in the central Alaskan Arctic has been documented to date." The above does not support the contention that a 20-40% decline or distribution change of the Porcupine Caribou herd is an "unavoidable impact."

The interactions between caribou and oil field development have been studied for nearly ten years on the North Slope. The information gained each year has been incorporated into subsequent development activities. The more recent developments at Kuparuk and Milne Point have incorporated this learning with revised construction and operation practices. This is a

dynamic process that is continually being refined as new knowledge is incorporated. The petroleum industry has spent millions of dollars in studies and mitigation measures on the North Slope and the efforts are working. The Central Arctic herd, the fastest growing herd in Alaska, shares traditional calving and insect relief habitat with oil field development.

The knowledge gained on the North Slope concerning caribou and oil field development can be directly applied to development on ANWR. Necessary and reasonable mitigation measures have been developed over the past ten years which foster the multiple surface utilization of both caribou and oil development in existing fields. The same cohabitation is possible at ANWR.

I-25

B. Water

The first paragraph under WATER RESOURCES on Page 21 of the Draft Report ignores the fact that Conoco routinely uses subsurface water wells at its Alaska North Slope Milne Point Field to obtain brackish water which is processed through a desalinization plant for the generation of fresh water which is used in our operations there. These desalinization plants are commonly used all over the world in both offshore and desert environments where fresh water might otherwise be unavilable. When this existing technology is applied to ANWR coastal plain operations in concert with the existing surface fresh and salt water resources, we believe that there will be more than adequate supplies of water to sustain oil and gas operations without significantly affecting local environmental demands for fresh water. Gravel borrow pits, if authorized in the coastal plain, could provide another fresh water reservoir source from run off as they do at

other North Slope fields.

At Milne Point, Conoco presently has the capability of providing some 850 barrels a day of desalinized water for operations. The 3 existing brackish water wells produce from a horizon some 3,000 feet below the surface. With a larger desalinization plant we believe that these 3 wells could provide as much as 15,000 barrels of fresh water per day. We have no information to believe that this technology cannot be used at ANWR although the Draft Report indicates that water resources are limited and surficially confined in the 1002 area.

The bulk of the water volume needed is 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 ice structures.

C. Gravel

There has been concern expressed regarding the availability of gravel in the 1002 area. However, on page 20, the report indicates: "The valleys of larger streams are underlain by large quantities of coarse sand and gravel. These include the valleys of the Canning, Tamayariak, Katakturuk, Sadlerochit, Hulahula, Okpilak, Jago, Okerokovik, Kogotpak and Aichilik Rivers. These rivers, especially the Canning, Sadlerochit, Hulahula, Jago and Aichilik, are heavily braided and have extensive unvegetative gravel bars. Gravel also occurs in the south part of the 1002 area between the Canning River and Marsh Creek along tops and flanks of ridges between the Katakturuk and Sadlerochit Rivers and on spits and bars along the coastline

of the Beaufort Sea. This is an apparent contradiction to the portion of the executive summary which says "water and gravel necessary for construction and development are in very limited supply in the 1002 area."

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. 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, two side benefits could result from these types of borrow pit: deep holes could be created for the overwintering of fish; and water reservoirs would be created, thus helping to alleviate the water supply problem.

I-26

Further indications of the availability of gravel comes from the shot holes created by drilling which was done throughout the 1002 area over the seismic shooting seasons of 1984 and 1985. Data from holes drilled then indicate that there was an abundance of very near surface gravel. We do not expect the availability of gravel to present a problem in the exploration and development of the coastal plain.

D. Fish

We also take issue with the conclusion in the resource assessment that "Development of KIC/ASRC lands or offshore areas could result in moderate

effects on coastal fish through lost or reduced habitat values, inhibited movements, and direct mortality." We have seen significant positive effects on coastal fish and fisheries related to oil and gas development in the Gulf of Mexico. While there are significant environmental differences between the Gulf and the Beaufort Sea, we cannot find any information in the resource assessment to justify or support the conclusion that coastal fish will be necessarily adversely affected by properly conducted oil and gas operations. Gravel borrow pits can provide overwintering habitat for many species of fish. At Milne Point a bridge over the only fish bearing stream in the area was designed to insure clear passage upstream for the coastal fish population.

VI. CONOCO AGREES WITH LEASING AUTHORITY RECOMMENDATION

The Draft Report's recommendation that leasing authority be granted by Congress to the Fish and Wildlife Authority and The Bureau of Land Management similar to authorities already existing in the National Petroleum Reserve in Alaska (NPRA) is a reasonable and useful way of establishing a leasing process for the coastal plain. The experience of the BLM in the leasing process coupled with oversight by the Fish and Wildlife Service will make the leasing process meet the special needs of this province.

VII. MITIGATION

Naturally, with respect to operating on the coastal plain of ANWR reasonable mitigation measures must be taken. The oil industry has demonstrated willingness and ability to mitigate environmental impacts on the North Slope. Examples of mitigation at Conoco's Milne Point Field

include but are not limited to: power lines were configured to minimize danger to Raptors; traffic minimization, stock piling of materials, the delay of major construction projects during Caribou calving and insect harrassment seasons; continuing educational programs for Conoco and contract personnel to insure that wildlife and environmental harrassment is avoided; prohibition of fire arms and hunting on the lease, pipeline and flow lines are elevated to allow Caribou to pass underneath and burial of pipelines to allow Caribou to cross over; trash containment to avoid attraction of wildlife. There are of course many other examples of reasonable mitigation measures used at Milne Point. We concur with the ANWR Coastal Plain Resource Assessment's general recognition that exploration and production can be accomplished without unacceptable changes to physical, biological or socioeconomic resources. I-27

VIII. CONCLUSION

In closing, Conoco Inc. again commends the Department on the effort undertaken in preparing the draft coastal plain Resource Assessment. We believe the report squarely frames the issues related to the opening of the coastal plain. We are confident we can meet our commitment to the environment and a strong secure domestic energy future through carefully planned exploration and development and strongly support the Department's recommendation to open the coastal plain to full leasing.

Respectfully,

James C. Patterson

RLL2/dm 024 (DEH)

ATTACHMENT TO CONOCO INC.

COMMENTS ON COASTAL PLAIN RESOURCE ASSESSMENT

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

DATED, FEBRUARY 5, 1987

CONOCO TESTIMONY ON DRAFT COASTAL PLAIN RESOURCE ASSESSMENT

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

DEPARTMENT OF INTERIOR HEARING

MY NAME IS JAMES C. PATTERSON. I AM A VICE PRESIDENT AND GENERAL MANAGER FOR CONOCO INC., WITH RESPONSIBILITY FOR EXPLORATION IN NORTH AMERICA. WE WELCOME THIS OPPORTUNITY TO APPEAR BEFORE YOU. CONOCO SUPPORTS WHOLEHEARTEDLY THE RECOMMENDATIONS CONTAINED IN THE DEPARTMENTS' DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT, TERMED THE SECTION 1002 REPORT, WHICH FAVORS OPENING THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE (ANWR) TO OIL AND GAS LEASING. OUR POSITION IS PREMISED ON OUR ASSESSMENT OF THE GEOLOGICAL POTENTIAL OF THE COASTAL PLAIN AND OUR FIRM BELIEF THAT OIL AND GAS EXPLORATION AND DEVELOPMENT CAN BE CONDUCTED IN A MANNER FULLY COMPATIBLE WITH PROTECTION OF THE ENVIRONMENTAL RESOURCES OF THIS FRAGILE AREA.

I-28

HYDROCARBON POTENTIAL OF THE COASTAL PLAIN

THE DEPARTMENT'S ESTIMATES OF THE HYDROCARBON POTENTIAL OF THE COASTAL PLAIN HAVE BEEN WELL-PUBLICIZED; WE ALSO BELIEVE THE AREA TO BE GEOLOGICALLY ATTRACTIVE HAVING THE POTENTIAL FOR MAJOR HYDROCARBON ACCUMULATIONS. FROM THE PERSPECTIVE OF AN INTEGRATED PETROLEUM COMPANY ENGAGED IN THE FULL RANGE OF OIL AND GAS OPERATIONS, I WOULD LIKE TO EXPLAIN WHY WE URGE THAT THE POTENTIAL OF THE COASTAL PLAIN BE DETERMINED MORE PRECISELY, AND AT THE EARLIEST OPPORTUNITY.

CONOCO'S EXPERIENCE IN FINDING AND DEVELOPING SIGNIFICANT NEW PETROLEUM RESERVES IS INTERNATIONAL IN SCOPE.

WE ARE A MAJOR OPERATOR IN THE NORTH SEA, INDONESIA AND DUBAI, AND ARE ACTIVELY PURSUING PROMISING EXPLORATION OPPORTUNITIES IN EGYPT, WEST AFRICA AND LATIN AMERICA. GENERALLY SPEAKING, THE SIZE OF RESERVES TO BE DISCOVERED ABROAD IS MUCH LARGER AND LESS COSTLY TO DEVELOP THAN THOSE BELIEVED TO REMAIN IN THE UNITED STATES.

YET, WE REMAIN COMMITTED TO EXPLORING FOR PETROLEUM IN THIS COUNTRY. PROXIMITY TO OUR DOWNSTREAM OPERATION, THE LARGE DOMESTIC MARKET FOR PETROLEUM PRODUCTS AND THE RELATIVELY FAVORABLE AND STABLE INVESTMENT CLIMATE REPRESENTED BY THE UNITED STATES ARE AMONG THE MANY REASONS FOR OUR CONTINUED INVOLVEMENT IN DOMESTIC OIL EXPLORATION.

MOST OF THE EASILY ACCESSIBLE, LARGE RESERVES OF PETROLEUM IN THIS COUNTRY HAVE ALREADY BEEN DISCOVERED AND DEVELOPED. IN ORDER TO REPLACE DOMESTIC RESERVES THAT ARE BEING DEPLETED AT A RAPID RATE, OUR INDUSTRY MUST FOCUS INCREASINGLY ON "FRONTIER AREAS" WHERE THE POSSIBILITY OF MAJOR NEW DISCOVERIES STILL EXISTS. THERE ARE VERY FEW FRONTIER AREAS THAT CONOCO REGARDS AS PARTICULARLY PROMISING. THE ANWR COASTAL PLAIN IS ONE OF THEM.

CONOCO ATTACHES HIGH PRIORITY TO THE OPPORTUNITY TO EXPLORE FOR AND DEVELOP ECONOMICAL HYDROCARBON RESERVES THAT MAY BE PROVEN TO EXIST IN THE COASTAL PLAIN. PRELIMINARY GEOLOGICAL AND GEOPHYSICAL STUDIES CARRIED OUT OVER THE PAST SEVERAL YEARS INDICATE MAJOR HYDROCARBON POTENTIAL. THE COASTAL PLAIN'S LOCATION, BETWEEN TWO MAJOR OIL PROVINCES AT PRUDHOE BAY AND IN CANADA'S MCKENZIE DELTA, SUGGESTS A GOOD PROBABILITY THAT ADDITIONAL HYDROCARBON ACCUMULATIONS OF SIMILAR SIZES MAY ALSO BE FOUND IN THE COASTAL PLAIN.

WE CANNOT KNOW FOR CERTAIN THAT THE COASTAL PLAIN CONTAINS OIL OR GAS ACCUMULATIONS UNTIL EXPLORATION DRILLING TAKES PLACE. THE ALASKAN NORTH SLOPE IS A HIGH COST OPERATING ENVIRONMENT. DISCOVERIES MUST BE LARGE TO JUSTIFY DEVELOPMENT AND ALLOW RECOUPMENT OF HEAVY CAPITAL INVESTMENTS REQUIRED FOR SUCH PROJECTS. THE PETROLEUM INDUSTRY IS ACCUSTOMED TO HIGH RISKS, IN ANTICIPATION OF THE REWARDS THAT COMMERCIAL DISCOVERIES BRING. THESE REWARDS EXTEND FAR BEYOND SPECIFIC COMPANY PROFITS. A FEW EXAMPLES RELATED TO CURRENT PETROLEUM OPERATIONS ON THE NORTH SLOPE ARE WORTH NOTING. OIL PRODUCED IN ALASKA PRESENTLY ACCOUNTS FOR APPROXIMATELY 20% OF TOTAL DOMESTIC PRODUCTION. THIS IMPORTANT SOURCE IS EXPECTED TO START DECLINING THIS YEAR AS EXISTING FIELDS BEGIN TO BE DEPLETED. NEW DISCOVERIES ON THE SLOPE WOULD HELP MAINTAIN AND EXPAND ALASKA'S CONTRIBUTION TO DOMESTIC OIL PRODUCTION.

I-29

THE U.S. DEPENDS ON FOREIGN SOURCES FOR ABOUT ONE-THIRD OF ITS OIL. THE AMOUNT OF IMPORTED OIL WILL CONTINUE TO RISE; HOWEVER, NEW DISCOVERIES AT HOME CAN HELP IN ALTERING THIS TREND. AMERICA'S ENERGY SECURITY DEPENDS ON FINDING NEW LARGE HYDROCARBON RESERVES AT HOME.

OPENING THE COASTAL PLAIN TO OIL AND GAS EXPLORATION WOULD ALSO STIMULATE ECONOMIC ACTIVITY IN ALASKA AND THE REST OF THE COUNTRY. PROJECTS CONDUCTED ON ALASKA'S NORTH SLOPE SINCE 1974 REQUIRED $36 BILLION IN INVESTMENTS BY THE OIL INDUSTRY. APPROXIMATELY $10.5 BILLION WAS SPENT IN THE LOWER 48 FOR ALASKAN PETROLEUM ACTIVITIES BETWEEN 1980 AND 1985. IF EXPECTATIONS ABOUT THE COASTAL PLAIN ARE REALIZED, SIMILAR LEVELS OF INVESTMENT AND THE CREATION OF SEVERAL THOUSAND JOBS CAN BE EXPECTED.

IF ECONOMIC DISCOVERIES ARE MADE IN THE COASTAL PLAIN, BOTH THE LOCAL AND FEDERAL GOVERNMENT WILL BENEFIT FROM INCREASED REVENUES IN TAXES AND ROYALTIES. OIL-RELATED INCOME IS A MAJOR FACTOR IN THE ALASKAN ECONOMY. RECEIPTS FROM PETROLEUM ACTIVITIES ON PUBLICALLY-OWNED LANDS IS THE SECOND LARGEST SOURCE OF FEDERAL REVENUES, AFTER INCOME TAXES. THUS, SUCCESSFUL PETROLEUM DEVELOPMENT IN THIS AREA WOULD SERVE BROAD U.S. ECONOMIC INTERESTS, AS WELL AS ENERGY SECURITY NEEDS.

ENVIRONMENTAL COMPATIBILITY OF PETROLEUM OPERATIONS

EARLIER I MENTIONED THE HIGH DEGREE OF RISK THAT AN ENERGY COMPANY LIKE CONOCO ASSUMES WHEN UNDERTAKING EXPLORATION IN FRONTIER AREAS SUCH AS THE ALASKA NORTH SLOPE. CONOCO IS EQUALLY AWARE OF ENVIRONMENTAL RESPONSIBILITIES IMPOSED BY OPERATING IN AREAS AS FRAGILE AS THE COASTAL PLAIN.

THE DEPARTMENT'S STUDY OF THE COASTAL PLAIN INCLUDED DETAILED ANALYSES OF THE BIOLOGICAL ENVIRONMENT OF THE AREA AND HOW IT MIGHT BE AFFECTED BY PETROLEUM OPERATIONS. THERE IS NO QUESTION THAT SPECIAL PRECAUTIONS WILL NEED TO BE TAKEN TO PROTECT THE UNIQUE ECOLOGY OF THE COASTAL PLAIN. CONOCO BELIEVES, HOWEVER, THAT EXPERIENCE GAINED THROUGH OUR OPERATIONS ON THE SLOPE, AND THE COMMITMENT TO ACCOMMODATE ENVIRONMENTAL CONCERNS WILL ENABLE US TO CONDUCT OUR ACTIVITIES IN A MANNER FULLY COMPATIBLE WITH THE SPECIAL CHARACTERISTICS OF THE COASTAL PLAIN. AGAIN, A FEW EXAMPLES FROM THE ESTABLISHED RECORD ARE ILLUSTRATIVE.

I-30

PROTECTION OF THE CARIBOU HABITAT IN ANWR IS A CENTRAL CONCERN REGARDING THE POSSIBLE IMPACT OF PETROLEUM ACTIVITIES ON THE COASTAL PLAIN. IN IMPLEMENTING OUR MILNE POINT PROJECT, CONOCO ENCOUNTERED THE NEED TO COEXIST WITH CARIBOU, IN THIS INSTANCE THE CENTRAL ARCTIC HERD. CONOCO ENGAGED WILDLIFE EXPERTS FROM THE UNIVERSITY OF ALASKA TO STUDY THE MOVEMENTS OF CARIBOU IN THE MILNE POINT AREA AND DESIGNED FACILITIES SO AS TO MITIGATE INTERFERENCE WITH THE HERD.

IN KEEPING WITH THE FINDINGS OF THAT STUDY, THE 11.5 MILE PIPELINE WE BUILT TO CONNECT WITH THE TAP'S SYSTEM INCLUDED SEVERAL CARIBOU CROSSINGS. AT SEVERAL POINTS ALONG THE LINE, THE PIPE IS BURIED, AND A GRADUAL SLOPE COVERS IT, ALLOWING THE ANIMALS TO WALK OVER. ELSEWHERE, THE PIPELINE IS ELEVATED TO PERMIT CARIBOU TO PASS UNDERNEATH. DURING THE SUMMER MONTHS, WHEN THE CARIBOU CALVE IN THE AREA, ROAD TRAFFIC IS RESTRICTED TO AVOID NOISE DISTURBANCE. SIMILAR DESIGN AND OPERATING PROCEDURES WOULD BE INCORPORATED INTO PROJECTS PLANNED FOR THE COASTAL PLAIN TO ENSURE COMPATIBILITY WITH WILDLIFE SPECIES THERE, SUCH AS CARIBOU, MUSK OXEN AND MIGRATORY BIRDS. CONOCO HAS BEEN PRODUCING PETROLEUM IN THE ARANSAS NATIONAL WILDLIFE REFUGE IN TEXAS FOR MORE THAN 40 YEARS WITHOUT HARMING THE ENVIRONMENT OR ENDANGERING THE WILDLIFE.

OTHER OPERATIONAL CONCERNS IN THE COASTAL PLAIN RELATE TO THE TUNDRA AND PERMAFROST BENEATH THE SURFACE. AGAIN, WE REFER TO EXPERIENCE IN NEARBY AREAS. AT EXISTING FIELDS ON THE SLOPE, FACILITIES ARE ELEVATED TO MINIMIZE SURFACE IMPACT. DRILLING AND PRODUCTION OPERATIONS ARE CONSOLIDATED ONTO SPECIALLY DESIGNED AND CONSTRUCTED UNITS THAT PROTECT THE SURFACE AND REDUCE THE TOTAL AREA OCCUPIED. MOST FACILITIES USED ON THE SLOPE ARE PREASSEMBLED AT LOCATIONS IN THE LOWER 48. THIS APPROACH MEANS THAT LESS ACTIVITY IS REQUIRED IN THE IMMEDIATE AREA OF ACTUAL OPERATIONS.

ANOTHER POTENTIAL PROBLEM AREA IS THE RELATIVELY LIMITED NATURAL SUPPLY OF FRESH WATER AVAILABLE ON THE COASTAL PLAIN, WHICH IS TECHNICALLY CATEGORIZED AS AN ARCTIC DESERT WITH LESS THAN 6 INCHES OF PRECIPITATION A YEAR. TECHNOLOGY FOR THE GENERATION OF FRESH WATER TO SUPPORT EXPLORATION AND DEVELOPMENT ACTIVITY IN ARID AREAS IS WELL KNOWN. AT MILNE POINT, CONOCO USES A TECHNIQUE KNOWN AS DESALINAZATION. THIS TECHNIQUE IS COMMONLY USED IN OFFSHORE OPERATIONS WORLDWIDE.

THE TRACK RECORD BUILT BY OIL COMPANIES OPERATING ON THE NORTH SLOPE OVER THE PAST 15 YEARS IS VERY POSITIVE. FROM THE STANDPOINT OF ENVIRONMENTAL PROTECTION, THERE ARE MANY EXAMPLES OF INDUSTRY'S ABILITY TO INNOVATE AND ADAPT IT'S TECHNOLOGIES IN RESPONSE TO LOCAL ENVIRONMENTAL CHARACTERISTICS. NEW PETROLEUM PROJECTS ON THE COASTAL PLAIN WILL BENEFIT FROM PROVEN TECHNOLOGY ON THE SLOPE. A DECISION BY CONGRESS TO ALLOW OIL AND GAS LEASING ON THE COASTAL PLAIN WILL ALLOW THE INDUSTRY TO PLAN FOR EXPLORATION AND DEVELOPMENT IN THE MOST EFFECTIVE AND EFFICIENT MANNER. IT WILL ALSO PROVIDE US VALUABLE TIME IN WHICH TO DESIGN APPROPRIATE FACILITIES FOR THIS SPECIAL ENVIRONMENT. IF CONGRESS DELAYS OPENING THE COASTAL PLAIN, THE INDUSTRY WILL BE UNABLE TO RESPOND IN A TIMELY MANNER TO AN ENERGY CRISIS WHEN IT OCCURS.

I-31

CONOCO COMMENDS THE DEPARTMENT FOR ITS TIMELY REPORT ON ANWR AND STANDS READY TO ASSIST IN EFFORTS TO IMPLEMENT ITS RECOMMENDATIONS. I WOULD BE HAPPY TO RESPOND TO ANY QUESTIONS YOU MAY HAVE.

AWD/SPCH/013
12/29/86

EXXON COMPANY, U.S.A.
POST OFFICE BOX 4279 • HOUSTON, TEXAS 77210-4279

EXPLORATION DEPARTMENT
OFFSHORE/ALASKA DIVISION

M. G. JOHNSON
MANAGER

February 5, 1987

Mr. William P. Horn
U.S. Fish and Wildlife Service
Division of Refuge Management
2343 Main Interior Building
18th and C Streets, NW
Washington, DC 20240

Dear Mr. Horn:

I-32

Exxon Company, U.S.A., a division of Exxon Corporation, is pleased to provide comments on the draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. Our overview of key ANWR issues and detailed comments on the draft are attached, along with the testimony we presented in Anchorage on January 5, 1987, and in Washington, DC, on January 9, 1987. Additionally, Exxon endorses the comprehensive comments of the Alaska Oil and Gas Association and the American Petroleum Institute.

Exxon strongly supports the Department of Interior's proposal that "...Congress authorize the Secretary to lease the entire 1002 area for oil and gas exploration and development." We urge that the Secretary of Interior adopt this proposal in the final 1002(h) report when he submits his recommendations to Congress later this year. This proposal is clearly justified on the basis of national energy needs and environmental compatibility.

The 1002(h) report describes the national importance of leasing in ANWR and properly identifies several events faced by our nation during this decade including a lack of major exploration successes and declines in both proven domestic reserves and domestic oil and gas production. Contrary to these production declines, domestic oil demand is increasing. If such trends continue, our nation will become increasingly dependent on potentially unreliable sources of foreign oil.

The anticipated resource potential of ANWR cited in the report is cause for optimism. All of the geologic parameters necessary for the accumulation of commercial quantities of oil and gas appear to be present under the ANWR

Coastal Plain, but there should be no comfort in estimates alone. The potential significance of the reserves possible in ANWR dictate that this nation determine with certainty if oil exists in ANWR. Accordingly, it is vital that Congress authorizes comprehensive and timely oil and gas exploration and development in the ANWR Coastal Plain.

We are not impressed by criticisms that have appeared in the press regarding the Department's resource estimates and discovery probabilities; for the record, we wish to observe that the probabilities of discovery of hydrocarbons are a matter of interpretation, as are the estimates of oil reserves. A wide range of interpretations of existing geological and geophysical data is possible among competent explorationists. If the odds of a commercial discovery are close to 19% as estimated in the report, those odds are very good for a previously undrilled geologic area. Other criticism of the resource estimate distorts the significance of the potential reserves to be found in the coastal plain. To say that the mean resource estimate of recoverable reserves cited in the report will supply the nation with only six months of oil fails to recognize that over 80% of all fields ever discovered in this country individually would have been less than a one day supply of oil and gas. If the DOI ANWR Coastal Plain estimates ultimately prove to be correct, the amount of oil would be very significant.

Fears of environmental degradation have been raised as if not previously investigated or resolved. These fears have inordinately dominated the ANWR access issue to date. We believe these fears misrepresent the facts by ignoring nearly 20 years of environmentally safe operations on the coastal plain of Alaska's North Slope. Based on extensive industry, academic, and resource agency research, there are no detectable adverse impacts on population size or dynamics of any species that inhabits the area. Energy resource development in the ANWR Coastal Plain and protection of environmental values are not mutually exclusive.

Although we strongly support the recommendation for leasing of the entire coastal plain of the Arctic National Wildlife Refuge, we are critical in our attached comments of some impact descriptions that are highly speculative and we object to several of the mitigating measures that are unjustifiable and very restrictive. Nevertheless, we have tried to make constructive comments based on our operating experience and a careful review of research findings.

Oil and gas exploration and development in the coastal plain of the Arctic National Wildlife Refuge is an important national issue. The land access decisions made today could have a profound impact on national and energy security, on our nation's balance of trade, and indeed on the lifestyle and livelihood of Americans. The right to regulate and legislate the use of this nation's public lands imposes a trust obligation upon the members of Congress as well as the Department of Interior. If Congress fails to authorize reasonable exploration and development in ANWR, notwithstanding the demonstrated environmental compatibility of oil and gas operations, then there will have been an obvious breach of trust of the American people.

In summary, we would like to acknowledge the five years of extensive field investigation, data collections and analyses by over 50 trained professional scientists, including wildlife and fishery biologists, botanists, zoologists, chemists, geologists, and resources specialists behind this report. Further, we applaud the authors of the draft report for the conclusions that the entire ANWR Coastal Plain should be open to exploration and development; and unequivocally believe that energy development and economic well-being are compatible with a safe and enjoyable environment.

Sincerely,

MGJ.DTS.pl
2b.DTS(pl2)

EXXON COMPANY, U.S.A. REVIEW COMMENTS
DOI - 1002(h) REPORT

Following a detailed review of the Department of the Interior's 1002(h) report, Exxon Company, U.S.A. endorses the DOI recommendation to support leasing of the entire 1002(h) coastal plain area for oil and gas development. Our endorsement of the DOI recommendation to open leasing is based on the following overview and detailed comments.

OVERVIEW

Prudhoe Bay

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."

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)."

Trans Alaska Pipeline

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 has allowed the State of Alaska to enjoy a period of unprecedented economic prosperity in harmony with a high quality environment and thriving wildlife populations.

Habitat and Carrying Capacity

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 with this discussion and the conclusions drawn is that the balance of the scientific community does not consider habitat to be 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 important.

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 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 Skoog's early conclusion and those of Bergerud et al. 1984, that habitat is not currently limiting the growth of the Porcupine Caribou Herd (PCH) and that the loss of habitat represented by likely development in the 1002(h) area will not impact growth or productivity of resident caribou.

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Caribou Calving Habitat

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

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(h) 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 varied from 74% to 35% and 82% respectively in the 1002(h) 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 strongly recommend that conclusions regarding the relative importance of a "core calving area" concept be de-emphasized throughout the report.

We would also like to highlight and support the statements in Chapter VIII of the report which conclude that "...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."

Resource Estimates

Exxon believes the DOI applied a reasonable method in analyzing all available information to develop resource estimates; therefore, we do not challenge these DOI estimates or probability of discovery. However, there is a potential for such a wide range of interpretations among competent geologists that it would be fruitless to debate the accuracy or precision of the resource estimates and discovery probabilities. In general, DOI analysis indicates that all of the necessary geologic factors appear to be present for the accumulation of commercial volumes of oil and gas. These estimated volumes are significant compared to: their potential impact on domestic energy needs, the size of prior discoveries in the United States, and potential discoveries.

In response to criticism that has been voiced, the following observations may be helpful. The DOI resource estimates are based on substantial data that in many cases are more complete than the pre-drilling data available in other frontier areas, such as the Alaskan outer continental shelf and the North Slope (prior to the discovery of Prudhoe Bay). For example, ANWR is bounded on the east and west by known petroleum provinces. Rock outcrops on the ANWR Coastal Plain and immediately south indicate that the necessary source and reservoir rocks exist. Oil seeps and oil stained rocks on the coastal plain are direct evidence that oil did form. Extensive geophysical information has been collected and there are several companies that have proprietary well data which undoubtedly are a factor in their support for exploration and development of the ANWR Coastal Plain.

All of this data, though voluminous, is only indirect evidence that oil and gas may exist in commercial quantities. Collecting additional indirect data through more concentrated geophysical surveys as suggested in Alternative B will not improve the resource estimates or reduce the uncertainty inherent in these estimates. A limited drilling program may yield additional information, but most likely would not answer the two most important questions: Are oil and gas present in ANWR, and are they in large enough quantities to economically produce? Only a well planned and comprehensive exploration drilling program will be able to answer these questions.

To the public, criticism of the Department's resource estimates may seem plausible and persuasive at first glance, but in fact these criticisms are very misleading and grossly distort the exploration and production process. For several reasons, it is very misleading to say that the DOI mean resource estimate, if produced, would supply the nation with only 200 days of oil. First, all of the recoverable oil in a field is not, and cannot, be produced in a matter of days. Fields produce for tens of years. Prudhoe Bay may produce for another 30 years. Second, the 200 days of oil is calculated by dividing the mean resource estimate by total U.S. daily consumption (approximately 16 million barrels). If ANWR ever produces oil, it obviously won't offset all

domestic production and imports for 200 days. However, it could offset a significant percentage of oil imports every day for a long time. Prudhoe Bay, for example, could on average offset approximately 13% of foreign oil imports every day for 30 years (assuming 10 billion barrels recoverable reserves and 7 million barrels per day imports). If the DOI estimate is accurate, the volume is truly significant, considering that over 80% of all the fields ever discovered in the United States would individually have supplied only one day's worth of oil and gas.

It may be intuitively appealing for opponents of ANWR leasing to combine the DOI probability of discovering oil with the estimated amount of oil by saying there is a "...one in five chance at a 33 day supply of oil"* (600 million barrels), but this statement is incorrect. It is intuitively appealing only because it is always appealing to have a simple explanation for a somewhat complex concept. The 19% chance of discovery says that there is one in five chances that there is at least one oil accumulation (or field) that can be commercially developed. (DOI says a field must be 440 million barrels or larger before it will be economic to develop) And, there are four chances in five that there aren't any fields that big in the ANWR Coastal Plain.

If exploration succeeds in finding this "threshold" size field, then it is almost certain (95%) that at least 600 million barrels will be found. There is a small chance (5%) that exploration will be extremely successful and find over 9 billion barrels, but the most likely amount to be found, if exploration is successful, is about 3 billion barrels.

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Detailed review comments on the report follow.

*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.

DETAILED COMMENTS

Chapter II - Existing Environment

Page 2, paragraph 1: The point from this paragraph is the bottom line conclusion of the entire 1002(h) 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, 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. 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 indeed highly speculative. References to the speculative nature of these consequences are obscure and need to be solidly emphasized for each of the environmental consequences. As currently written, many of the conclusions of severe impacts and concerns for caribou populations are stated as fact, when in actuality, they are ultra-conservative speculations not supportable by the Prudhoe Bay or any other experience.

Thus, we ask that the authors of the report reconsider the 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 speculative consequences as statements of fact.

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(h) 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 an endangered species 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 Porcupine Caribou Herd (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, the obvious conclusion is that ample room exists to accommodate development interests in the 1002(h) area without potential for impacts on the size or growth of the PCH. Habitat and carrying

capacity relationships are fundamental tenets of caribou biology and we would like this relationship to be much more strongly emphasized in the net conclusions of the 1002(h) 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 fidelity in any sense. (See general comment on calving habitat above.)

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(h) 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.

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.

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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(h) 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 strongly recommend 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 acknowledge the relative importance of insect relief 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. This section should clearly point out the favorable experience at Prudhoe Bay.

Pages 27-33, Other mammalian species. Population size and distribution data for other mammalian species in the 1002(h) area are summarized as follows:

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

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

As can be clearly seen from these data, very few individuals of these species are found in the 1002(h) area. The report conclusions should 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 three whales and Nuiqsut took one whale, thus filling their respective quotas as established by the International Whaling Commission. 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 45, column 2: Statistics on recreational use of the 1002(h) 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(h) area.

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

Page 46, paragraph 2: "The 1002(h) 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(h) 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 is currently designated as wilderness.

Even with full leasing under Alternative A, these 30 miles of coastal plain from the 1002(h) 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.

We ask that acknowledgement be given in this section to the wilderness nature and designation of the coastal plain area from the Aichilik River east to the Canadian border.

Chapter VI - Environmental Consequences

General

We understand that the draft document is a legislative EIS largely following outline and contents mandated by NEPA. We would like to point out that many of the environmental consequences predicted to occur for the five alternatives are based on "worst case" evaluations. In May 1986 the NEPA-EIS guidelines were changed from a "worst case" assessment to one of "reasonably foreseeable." We feel that many of the major conclusions of significant effects carry the earlier "worst case" assessment to an extreme, and thus ask that the authors reconsider many of their conclusions in light of the "reasonably foreseeable" assessment.

Page 98, paragraph 2: We feel that the designation of USFWS Resource Category 1 for a portion of the calving habitat available to the Porcupine Caribou Herd is inappropriate. The 1002(h) report does not present adequate evidence to support this designation. 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 100, paragraph 2: 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 have demonstrated that adequate technology exists to close pits in an environmentally safe manner.

Page 100, paragraph 5: This paragraph and the first item in the subsequent Unavoidable Consequences discussion fail to recognize the normal industry practice of closing-out (filling in) exploratory reserve pits upon completion of the well. With proper planning, there would be no need to mobilize and haul additional gravel. Even if it were, it would be unlikely that a new borrow pit would be opened.

Page 103, paragraph 5: Meehan (1986) is a draft report that contains a significant number of errors including many 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 106, paragraph 2: Data to support calving density in the pre-development Prudhoe Bay area are very sketchy. A general consensus exists that it never was a major calving area and, therefore, any conclusions regarding reduced calving density following development are unfounded.

We suggest this paragraph and Table VI-4 be amended to show this area as an historically low density calving area. 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.

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

We feel strongly that this is an inappropriate designation and over-extension of 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, and again in the general comments 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. Thus, we would like to again point out 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(h) area will not impact growth or productivity of resident caribou.

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Page 107, paragraph 5: "Whitten and Cameron (1985) found consistently low numbers..."

Change to read "Whitten and Cameron (1985) found consistently low numbers of caribou and generally low percentages of calves in the Prudhoe Bay oilfield 1978-82. One of several explanations offered is possible displacement by oilfield activities." Gavin (1979) also found very low percentages of calves and total caribou in this Prudhoe Bay oilfield area prior to and during initial oilfield development (1970-79). White et al. (1975) suggests that the high percentage of wet and moist areas near Prudhoe Bay makes this area less attractive to caribou.

Page 108, paragraph 3: Although the absolute density for the PCH is almost 14 times greater than the CAH and the Western Arctic almost 15 times greater than the CAH, none of these herds approach the carrying capacity of their respective ranges (Bergerud et al. 1984). 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 pages 107-109, above.)

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

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(h) area."

This statement is a misrepresentation of the study conclusions. In fact, the relationship between calves and distance from the road (Milne Pt.) 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 properly 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 108, paragraph 7: Repeat of comment for page 106, paragraph 4, above.

Page 110, paragraph 3 and 4: Available literature clearly shows that caribou can and do readily acclimate to aircraft overflight 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 500 foot elevation. Also, the experience with the central Alaskan Delta herd, where calving grounds are located next to overflight, bombing and strafing areas, further documents the acclimation of these animals to aircraft noise.

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

Page 111, item no. 10: Reduction of surface occupancy in the insect relief habitat to 3 miles from the coast.

In the Kuparuk 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, this stipulation for an arbitrary three mile reduced surface occupancy zone should 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 pages 107-109, above.

Page 112, paragraph 3: "A major change in distribution...could occur if the 1002(h) 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 has simply proven that these statements are false. The Kuparuk 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 and thus projections such as 80% loss of available relief habitat are unfounded.

These gross generalizations have no basis in scientific fact and should be removed from the report.

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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. This paragraph substantially undermines the credibility of the assessment of caribou impacts in the 1002(h) report. We conclude from substantial scientific data that the estimate is nothing more than pure speculation and urge that the entire paragraph be deleted from the final report.

Page 114, paragraphs 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 oilfield 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 qiviut, 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 rewritten to properly reflect the adaptability of muskox to human presence and thus reduce the severity of the projected effects.

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 400m 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 main 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 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 his viewpoint. These data should be reviewed and incorporated into the final report.

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 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 Lower 48 costs thousands of dollars and requires special custom air charter flights. Wet and moist ground conditions make hiking unenjoyable 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.

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

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 choice of pad material must ensure a safe and successful completion of the operations plan.

Stipulation 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 unnecessarily restrictive. This stipulation should be limited to summer season only and not be applied to research, surveying, seismic work, etc. approved by USFWS.

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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 this stipulation 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 to include drilling and testing of wells and minimum helicopter airlift support. When recognizing that such prohibition cannot reasonably be applied during any subsequent development activities, USFWS should allow those activities to be 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 SOA 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 significant disturbance of 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 exploration 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 2000 feet above ground level (AGL) during muskox and caribou calving and caribou insect harassment, April 15-August 15; and snow goose staging, August 20-September 25. At other times the minimum altitude generally will be 1000 feet AGL over areas of animal concentrations.

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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.

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 hold 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; and

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 Directory 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 Directory 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).

I-42

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 (WSFWS 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.

COMMENTS BY EXXON COMPANY, U.S.A.

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

Report and Recommendation to the Congress of the United States and Legislative Environmental Impact Statement

Anchorage, Alaska

January 5, 1987

My name is Don Cornett. I am the Alaska Coordinator for Exxon Company, U.S.A. here in Anchorage. I am pleased to offer these comments on the draft 1002(h) report and recommendation to Congress. Exxon assisted in the development and endorses the detailed AOGA comments. In addition to those comments, I would like to offer Exxon's perspective on the report and recommendation.

Exxon strongly supports the Department of Interior's proposal that the Congress authorize the Secretary to lease the entire 1002(h) area for oil and gas exploration and development. We agree with the report's overall conclusion (page 2) that "Development can proceed on the coastal plain and generate similar minimal effects" to those experienced at Prudhoe Bay and TAPS.

Our endorsement of the DOI conclusions regarding negligible or minimal impacts on the environment and resident biota is based on the following points:

Prudhoe Bay and TAPS

The environmental experience gained from development of the coastal plain at Prudhoe Bay demonstrates that oil field development can co-exist with wildlife resources. Experience with carefully applied mitigation measures as well as innumerable lessons learned and technology developed at Prudhoe Bay and from construction of the Trans-Alaska Pipeline System (TAPS) have proven that adverse effects on the environment can be minimized or eliminated.

Caribou

We agree that the Porcupine Caribou Herd is an international resource and that proven mitigation measures should be applied to ensure minimal effects of development on continued growth of the herd. We would like to caution the report's authors against unnecessarily drawing "worst case" conclusions. Our experience on the coastal plain at Prudhoe Bay with the Central Arctic Herd has proven oil field development can co-exist with a healthy and rapidly expanding herd. Over 15 years of monitoring data have clearly shown that even with development of the largest oil field in the U.S., the Central Arctic Herd has continued to proliferate and that sufficient habitat for calving, summer range and insect relief still exists. Similarly, the Porcupine Caribou Herd, as with the majority of circum-polar caribou herds, does not now approach the carrying capacity of its range. Thus, we believe that ample habitat is available to accommodate oil field development and continued growth of the Porcupine Caribou Herd.

Other Fish and Wildlife Species

As noted in the draft EIS report, extensive field monitoring of the other fish and wildlife species present on the coastal plain and immediately offshore provides ample data to support the conclusions of minimal to negligible effects on these species as a result of proposed leasing.

Mitigating Measures

We would like to caution the Department that the economic cost of developing any oil and gas reserves in the coastal plain will be high and the mitigating measures imposed can play a large role in the costs. We believe that reasonable measures can and should be implemented to protect the resources. some of the proposed measures, however, are unnecessary to protect fish and wildlife resources and could result in significantly increased costs, delays in exploration and development, and reduced recovery of any oil and gas.

We are particularly concerned with seasonal prohibitions on exploratory activities and with broad prohibitions of surface facilities on large areas of land, such as along the coast or major rivers. Over the past 15 years, Exxon has drilled 13 exploratory wells on the coastal plain in the Point Thomson and Canning River areas, immediately to the west of the 1002(h) area. A lot of this activity was conducted during the summer and there were no significant adverse effects to fish and wildlife resources or their habitat. This exploration experience clearly demonstrates that the technology and operating practices exist to explore for oil and gas resources in a safe and environmentally sound manner in the ANWR Coastal Plain throughout the year.

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In summary, we would like to acknowledge the five years of extensive field work by over 50 professional scientists in the DOI who stand behind the Secretary's recommendation in this report. Additionally, Exxon's experience on the Arctic Coastal Plain in the Prudhoe Bay and Point Thomson areas confirms our confidence that leasing, exploration and development of the ANWR Coastal Plain can proceed without significant deleterious effects to the environment or wildlife resources.

Thank you for the opportunity to comment.

COMMENTS BY EXXON COMPANY, U.S.A.

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

Report and Recommendation to the Congress of the United States and Legislative Environmental Impact Statement

Washington, D.C.

January 9, 1987

COMMENTS BY EXXON COMPANY, U.S.A.

Arctic National Wildlife Refuge, Alaska,
Coastal Plain Resource Assessment
Report and Recommendation to the Congress of the United States
and Legislative Environmental Impact Statement

Washington, D. C.
January 9, 1987

My name is Mike Johnson. I am the Manager of Exxon Company, U.S.A.'s Offshore and Alaska Exploration Division. It is my pleasure to be here today to offer these comments.

EXXON'S POSITION

I-45

Exxon strongly endorses the Department's preferred recommendation of full leasing of the coastal plain of the Arctic National Wildlife Refuge (ANWR). It is our judgment that this recommendation is well supported, and we very much oppose the other alternatives for three very important reasons. First, we believe there may be significant undiscovered hydrocarbon potential in the 1002 area. Second, the national need for oil and gas is best served by timely assessing and developing that potential. And third, we are confident that the environment can be appropriately protected while industry explores and, hopefully, develops the area. In my remarks today I would like to expand on each one of these three points.

HYDROCARBON POTENTIAL

Turning first to that of hydrocarbon potential, we know that the ANWR Coastal Plain lies between Prudhoe Bay, the largest oil field in North America to the west, and the numerous Canadian oil and gas fields in the Mackenzie River Delta and Beaufort Sea to the east. Our analyses suggests that the geologic conditions found in these major oilfields also exist in 1002 area. This judgment, though certainly not definitive, is based on a spectrum of hard data and is thus more than mere speculation. We have analyzed well control to the west and east, and, on the ANWR Coastal Plain itself, we have studied surface outcrops, oil seeps and seismic data. We believe that the 1002 area is indeed one of the few highly prospective untested frontiers left in the United States with the potential for substantial oil volumes that in a high side case could be on a par with Prudhoe Bay.

NATIONAL NEED

Next I'd like to address the need for timely development of domestic energy reserves. Exxon believes it is in this country's best interest to diligently explore potentially significant resources. We applaud the report drafters for recognizing the vital contributions that ANWR could make to the nation, namely: reducing our increasing dependency on foreign oil; generating positive economic impacts in Alaska as well as the Lower 48 states; and improving our long term balance of trade. Of equal significance, we concur with the report's conclusion that the exploration process should start now, since even under an accelerated schedule, production of any commercial resources would not start until at least the year 2000. By that time, according to the most recent NPC forecast, the United States will almost certainly be importing well over half of the oil being consumed. Also, by the year 2000, Alaska's North Slope production, according to the Alaska Department of Revenue forecast, will likely have declined from approximately 2 million BOPD to about 600,000 BOPD. As you may be aware, the 2 million barrels now produced from the North Slope account for nearly 20% of all U.S. production. Certainly ANWR by itself could not fully offset domestic production decline, but it could significantly mitigate it. At the same time, it is unlikely that the decline can be reversed by only exploring other frontier or high potential areas to the exclusion of ANWR.

For example, the California OCS appears attractive, but access is obstructed. The deepwater GOM holds promise, but exploration is incomplete and production technology will be expensive and needs further refinement. And much of the Beaufort and Chukchi Seas offshore the North Slope may not ultimately be viable due to the harsh environmental conditions and resultant high operating costs.

ENVIRONMENTAL

Finally, we recognize the significance of the existing ANWR environment. We also recognize that exploration and development of the ANWR Coastal Plain can only proceed in a manner that ensures appropriate safeguards for the environment, including the fish, wildlife and their habitat. Data collected from numerous impact studies on Prudhoe Bay facilities and the 800-mile long TransAlaska Pipeline, argue, however, for a more optimistic estimate of the potential environmental impacts from ANWR development than indicated in the 1002(h) report. Independently, our experts feel that the expressed impact concerns regarding caribou calving, etc., represent "worst case" and thus improbable scenarios, rather than the "most likely" outcomes which existing data indicate would be much less severe and of shorter duration. We believe that the safe history of oil and gas activities on Alaska's North Slope and in refuges elsewhere in this country, conclusively indicates that environmental conservation and mineral resource development are compatible. The companies associated with these operations, including Exxon, have worked hard and successfully to develop the expertise and technology to properly act in this environment. Common sense directs that industry's actions would be equally responsible in the ANWR Coastal Plain.

SUMMARY

To sum up. Exxon feels that on balance, the data and analyses argue conclusively for the recommended alternative of full leasing. The incentives - high potential and national need - are there, and the downside of environmental impact is limited. Other alternatives only postpone an already lengthy process of discovery and development which the nation's interest dictates must proceed today rather than tomorrow. The no-action alternative is clearly unacceptable because it is incompatible with energy needs and proven environmental compatibility.

It is our hope that this matter be ultimately judged on its merits, for if it is, we are confident the best interests of our country, and thus those of all of us, its citizens, will be properly served. I am grateful for the opportunity to speak. I hope that my support will contribute to the implementation of the DOI's recommendation of full leasing of the ANWR Coastal Plain.

10:35:15

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 DON. E. CORNETT

Mailing Address P.O. BOX 6601

ANCHORAGE, ALASKA 99501

Check appropriate box below:

☐ I am here to offer my own views.

—or—

☒ I am speaking for EXXON Co USA

(please enter name of organization you represent)

COMMENTS BY EXXON COMPANY, U.S.A.

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

REPORT AND RECOMMENDATION TO THE CONGRESS OF THE UNITED STATES AND LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

ANCHORAGE, ALASKA
JANUARY 5, 1987

WILDLIFE RESOURCES. EXPERIENCE WITH CAREFULLY APPLIED MITIGATION MEASURES AS WELL AS INNUMERABLE LESSONS LEARNED AND TECHNOLOGY DEVELOPED AT PRUDHOE BAY AND FROM CONSTRUCTION OF THE TRANS-ALASKA PIPELINE SYSTEM (TAPS) HAVE PROVEN THAT ADVERSE EFFECTS ON THE ENVIRONMENT CAN BE MINIMIZED OR ELIMINATED.

CARIBOU

WE AGREE THAT THE PORCUPINE CARIBOU HERD IS AN INTERNATIONAL RESOURCE AND THAT PROVEN MITIGATION MEASURES SHOULD BE APPLIED TO ENSURE MINIMAL EFFECTS OF DEVELOPMENT ON CONTINUED GROWTH OF THE HERD. WE WOULD LIKE TO CAUTION THE REPORT'S AUTHORS AGAINST UNNECESSARILY DRAWING "WORST CASE" CONCLUSIONS. OUR EXPERIENCE ON THE COASTAL PLAIN AT PRUDHOE BAY WITH THE CENTRAL ARCTIC HERD HAS PROVEN OIL FIELD DEVELOPMENT CAN CO-EXIST WITH A HEALTHY AND RAPIDLY EXPANDING HERD. OVER 15 YEARS OF MONITORING DATA HAVE CLEARLY SHOWN THAT EVEN WITH DEVELOPMENT OF THE LARGEST OIL FIELD IN THE U.S., THE CENTRAL ARCTIC HERD HAS CONTINUED TO PROLIFERATE AND THAT SUFFICIENT HABITAT FOR CALVING, SUMMER RANGE AND INSECT RELIEF STILL EXISTS. SIMILARLY, THE PORCUPINE CARIBOU HERD, AS WITH THE MAJORITY OF CIRCUM-POLAR CARIBOU HERDS, DOES NOT NOW APPROACH THE CARRYING CAPACITY OF

My name is Don Cornett. I am the Alaska Coordinator for Exxon Company, U.S.A. here in Anchorage. I am pleased to offer these comments on the draft 1002(h) report and recommendation to Congress. Exxon assisted in the development and endorses the detailed AOGA comments. In addition to those comments, I would like to offer Exxon's perspective on the report and recommendation.

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<u>Prudhoe Bay and TAPS</u>

The environmental experience gained from development of the coastal plain at Prudhoe Bay demonstrates that oil field development can co-exist with

WE ARE PARTICULARLY CONCERNED WITH SEASONAL PROHIBITIONS ON EXPLORATORY ACTIVITIES AND WITH BROAD PROHIBITIONS OF SURFACE FACILITIES ON LARGE AREAS OF LAND, SUCH AS ALONG THE COAST OR MAJOR RIVERS. OVER THE PAST 15 YEARS, EXXON HAS DRILLED 13 EXPLORATORY WELLS ON THE COASTAL PLAIN IN THE PT. THOMSON AND CANNING RIVER AREAS, IMMEDIATELY TO THE WEST OF THE 1002(H) AREA. A LOT OF THIS ACTIVITY WAS CONDUCTED DURING THE SUMMER AND THERE WERE NO SIGNIFICANT ADVERSE EFFECTS TO FISH AND WILDLIFE RESOURCES OR THEIR HABITAT. THIS EXPLORATION EXPERIENCE CLEARLY DEMONSTRATES THAT THE TECHNOLOGY AND OPERATING PRACTICES EXIST TO EXPLORE FOR OIL AND GAS RESOURCES IN A SAFE AND ENVIRONMENTALLY SOUND MANNER IN THE ANWR COASTAL PLAIN THROUGHOUT THE YEAR.

IN SUMMARY, WE WOULD LIKE TO ACKNOWLEDGE THE 5 YEARS OF EXTENSIVE FIELD WORK BY OVER 50 PROFESSIONAL SCIENTISTS IN THE DOI WHO STAND BEHIND THE SECRETARY'S RECOMMENDATION IN THIS REPORT. ADDITIONALLY, EXXON'S EXPERIENCE ON THE ARCTIC COASTAL PLAIN IN THE PRUDHOE BAY AND PT. THOMSON AREAS CONFIRMS OUR CONFIDENCE THAT LEASING, EXPLORATION AND DEVELOPMENT OF THE ANWR COASTAL PLAIN CAN PROCEED WITHOUT SIGNIFICANT DELETERIOUS EFFECTS TO THE ENVIRONMENT OR WILDLIFE RESOURCES.

THANK YOU FOR THE OPPORTUNITY TO COMMENT.
DEC/153

ITS RANGE. THUS, WE BELIEVE THAT AMPLE HABITAT IS AVAILABLE TO ACCOMMODATE OIL FIELD DEVELOPMENT AND CONTINUED GROWTH OF THE PORCUPINE CARIBOU HERD.

OTHER FISH AND WILDLIFE SPECIES

AS NOTED IN THE DRAFT EIS REPORT, EXTENSIVE FIELD MONITORING OF THE OTHER FISH AND WILDLIFE SPECIES PRESENT ON THE COASTAL PLAIN AND IMMEDIATELY OFFSHORE PROVIDES AMPLE DATA TO SUPPORT THE CONCLUSIONS OF MINIMAL TO NEGLIGIBLE EFFECTS ON THESE SPECIES AS A RESULT OF PROPOSED LEASING.

MITIGATING MEASURES

WE WOULD LIKE TO CAUTION THE DEPARTMENT THAT THE ECONOMIC COST OF DEVELOPING ANY OIL AND GAS RESERVES IN THE COASTAL PLAIN WILL BE HIGH AND THE MITIGATING MEASURES IMPOSED CAN PLAY A LARGE ROLE IN THE COSTS. WE BELIEVE THAT REASONABLE MEASURES CAN AND SHOULD BE IMPLEMENTED TO PROTECT THE RESOURCES. SOME OF THE PROPOSED MEASURES, HOWEVER, ARE UNNECESSARY TO PROTECT FISH AND WILDLIFE RESOURCES AND COULD RESULT IN SIGNIFICANTLY INCREASED COSTS, DELAYS IN EXPLORATION AND DEVELOPMENT, AND REDUCED RECOVERY OF ANY OIL AND GAS.

COMMENTS BY EXXON COMPANY, U.S.A.

Arctic National Wildlife Refuge, Alaska,
Coastal Plain Resource Assessment
Report and Recommendation to the Congress of the United States
and Legislative Environmental Impact Statement

Washington, D. C.
January 9, 1987

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(PAUSE)

NATIONAL NEED

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ENVIRONMENTAL

Finally, we recognize the significance of the existing ANWR environment. We also recognize that exploration and development of the ANWR Coastal Plain can only proceed in a manner that ensures appropriate safeguards for the environment, including the fish, wildlife and their habitat. Data collected from numerous impact studies on Prudhoe Bay facilities and the 800-mile long TransAlaska Pipeline, argue, however, for a more optimistic estimate of the potential environmental impacts from ANWR development than indicated in the 1002(h) report. Independently, our experts feel that the expressed impact concerns regarding caribou calving, etc., represent "worst case" and thus improbable scenarios, rather than the "most likely" outcomes which existing data indicate would be much less severe and of shorter duration. We believe that the safe history of oil and gas activities on Alaska's North Slope and in refuges elsewhere in this country, conclusively indicates that environmental conservation and mineral resource development are compatible. The companies associated with these operations, including Exxon, have worked hard and successfully to develop the expertise and technology to properly act in this

I-51

environment. Common sense directs that industry's actions would be equally responsible in the ANWR Coastal Plain.

SUMMARY

To sum up, Exxon feels that on balance, the data and analyses argue conclusively for the recommended alternative of full leasing. The incentives - high potential and national need - are there, and the downside of environmental impact is limited. Other alternatives only postpone an already lengthy process of discovery and development which the nation's interest dictates must proceed today rather than tomorrow. The no-action alternative is clearly unacceptable because it is incompatible with energy needs and proven environmental compatibility.

(PAUSE)

It is our hope that this matter be ultimately judged on its merits, for if it is, we are confident the best interests of our country, and thus those of all of us, its citizens, will be properly served. I am grateful for the opportunity to speak. I hope that my support will contribute to the implementation of the DOI's recommendation of full leasing of the ANWR Coastal Plain.

24.DTS(p11)

GEOPHYSICAL SERVICE INC.
POST OFFICE BOX 2803 • HOUSTON, TEXAS 77001

06 February 1987

U.S. Fish and Wildlife Service
Department of the Interior
18th and C Streets, Northwest, Room 2343
Washington, D.C. 20240

Attention: Division of Refuge Management

Ladies and Gentlemen:

Enclosed please find comments offered by the GSI ANWR Exploration Group in response to your request for comments on the Draft Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment dated November 1986.

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The Draft Resource Assessment allows us to make specific the concern that we have repeatedly expressed in general terms about the Department's handling of proprietary geophysical data. We are pleased to have had this opportunity to express our concerns, and we hope that our comments will be received in the spirit of cooperation with the Department in which they are offered. We are unanimously supportive of the Department's recommendation to open the entire 1002 Study Area to oil and gas leasing. Since we believe that adequate protection of proprietary data rights is critical to the health and success of the oil industry and on that success depends the success of any leasing program, we see our comments as supporting and not opposing the Department's goals in ANWR.

This submission is made on behalf of those companies named on the last page of the comments.

Yours truly,

GEOPHYSICAL SERVICE INC.

Lonnie D. Brooks, Manager
Western U.S. Marketing

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A SUBSIDIARY OF TEXAS INSTRUMENTS INCORPORATED

COMMENTS OF THE ANWR SURVEY GROUP

The Arctic National Wildlife Refuge Seismic Survey Group ("ANWR Survey Group") appreciates this opportunity to submit comments on the "Draft Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment" ("draft report") released in November, 1986. The ANWR Survey Group consists of the 22 energy companies which funded, designed, and conducted -- through their contractor, Geophysical Service Inc. (GSI) -- the 1984 and 1985 seismic surveys of the Arctic National Wildlife Refuge ("ANWR") study area as mandated by Congress under Section 1002 of the Alaska National Interest Lands Conservation Act ("ANILCA"), 16 U.S.C. 3142.

The ANWR Survey Group wishes to compliment the Interagency Advisory Work Group for their fine job in preparing the draft report. Our member companies strongly support the Secretary's recommendation that Congress permit leasing in the ANWR Coastal Plain for oil and gas development and urge that a final report be issued as expeditiously as possible.

Nevertheless, the ANWR Survey Group is deeply concerned over the Interagency Advisory Work Group's decision to release confidential processed geophysical data in the draft report. These data pertain to areas within the ANWR as well as areas outside of the ANWR. The public release of processed geophysical data contravenes Congress' express mandate that "any processed, analyzed and interpreted data and information shall be held confidential by the Secretary for a period of not less than two

years following any lease sale including the area from which the information was obtained." 16 U.S.C. 3142(c).

Each of the companies which comprise the ANWR Survey Group may submit comments on the draft report and the Secretary's recommendation under separate cover. These comments submitted on behalf of the group as a whole focus solely on the issue of geophysical data disclosure and reflect the unanimous position of the undersigned members of the Group that the release of processed geophysical data in the draft report was contrary to law.

The ANWR Survey Group respectfully requests that the Interagency Advisory Work Group refrain from further disclosure of processed geophysical data and information whether such data and information pertain to the ANWR or not. No processed, analyzed or interpreted data and information pertaining to the ANWR may be released until two years after a lease sale including the area from which the information was obtained has been held. No raw, processed, analyzed or interpreted data and information pertaining to areas outside of the ANWR may be released without the express written consent of the ANWR Survey Group.

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DISCUSSION

I. SECTION 1002 OF ANILCA EXPRESSLY PROHIBITS THE DISCLOSURE OF ANY PROCESSED GEOPHYSICAL DATA AND INFORMATION AT THIS TIME.

Section 1002(e)(2) of ANILCA requires inter alia that the Secretary:

> (B) shall require that all data and information (including processed, analyzed

> and interpreted information) obtained as a result of carrying out the plan shall be submitted to the Secretary; and
>
> (C) shall make such data and information available to the public except that any processed, analyzed and interpreted data or information shall be held confidential by the Secretary for a period of not less than two years following any lease sale including the area from which the information was obtained.

16 U.S.C. 3142(e)(2)(B),(C).

Congress enacted these provisions to encourage private companies to finance the costly seismic exploration of the ANWR. As a further incentive to private exploration, Congress prohibited the Secretary from approving any plan submitted by the U.S. Geological Survey ("U.S.G.S.") unless private parties were unwilling to explore or would not provide sufficient information to make an adequate report. 16 U.S.C. 3142(e)(2).

However, Congress recognized that private entities would not invest in ANWR exploration unless they were permitted to protect their proprietary interest in data obtained through their efforts. The importance of Congress' promise to protect this proprietary interest cannot be underestimated. The only benefit which accrues to a company which financed ANWR data collection is the ability to use it in lease sale decisionmaking. If ANWR data were made available to all comers regardless of whether they contributed toward its collection there would be no incentive for any company to contribute.

Thus, a significant portion of the value of the data to any given company lies primarily in its proprietary nature rather than in its content per se.

This principle is simply illustrated. Seismic data showing that an area is or is not prospective has virtually no inherent value. But the companies that own it know that the area is one on which they should or should not bid. Conversely, companies that do not own the data must either spend money to acquire it or risk bidding on a non-prospective tract. If those data are made public, the situation is reversed. The companies that did not acquire the data from the permittee get it for free, giving them a substantial competitive advantage over the companies that paid for the data in the first place.

Recognizing this to be the case, Congress amended Section 1002(e)(2) in an attempt to further protect the proprietary interest of companies which financed ANWR data collection. The amendment states:

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> ... Provided, That the Secretary shall prohibit by regulation any person who obtains access to such data and information from the Secretary or from any person other than a permittee from participation in any lease sale which includes the areas from which the information was obtained and from any commercial use of the information. The Secretary shall require that any permittee shall make available such data to any person at fair cost.

The amendment is not a substitute for the Secretary's obligation to maintain the confidentiality of <u>any</u> processed, analyzed and interpreted data and information. It is directed at companies which receive raw geophysical data and information which is the only form in which ANWR data and information may presently be released.

As can be seen, the amendment allows raw data to be made available to those who desire to use it during the debate regarding the future status of ANWR but takes away from any recipient of the data, the right to participate in any future lease sale and thus any competitive advantage that recipient might otherwise have obtained from the data.

A. Data Processed by U.S.G.S. Must Remain Confidential by Virtue of Section 1002 of ANILCA

As shown above, Section 1002 requires the Secretary to keep "... processed, analyzed and interpreted data ... confidential for a period of not less than two years following any lease sale including the area from which the information was obtained."

The protection afforded by ANILCA Section 1002(e)(2)(C) must be viewed not only within the context of the other provisions of ANILCA but also in the context of other related statutes.

The Trade Secrets Act (18 U.S.C. § 1905) prohibits all agencies from disclosing "information concern[ing] or relat[ing] to trade secrets, processes, operations, style of work, or apparatus" unless "authorized by law". The Act has been described as "providing a standard by which to judge the legality of proposed agencies disclosures ... to create a federal right of non-disclosure." Chevron Chemical Company v. Costle, 641 F.2d 104, 115 (3d Cir. 1981). See also Chrysler Corporation v. Brown, 441 U.S. 281, 306 (1979).

ANILCA provides the statutory authority for certain disclosures of data and information which would otherwise undoubtedly be considered trade secrets. ANILCA Section

1002(e)(2)(B) requires that a permittee submit all data and information obtained as a result of carrying out an Exploration Plan to the Secretary. ANILCA Section 1002(e)(2)(C) empowers the Secretary to make such data available to the public except that any processed, analyzed or interpreted data or information must be held confidential for a period of not less than two years following any lease sale including the area from which the information was obtained. Thus ANILCA provides plenary authority for disclosure of "raw data" but only limited authority to disclose processed, analyzed or interpreted data after a minimum period of years. Although the Secretary must, at some point make raw data available, the statute contains no time limits, conditions or procedures governing the Secretary's release of that data. Similarly, although the Secretary must hold processed, analyzed and interpreted information confidential for a minimum period, he may lengthen that term indefinitely at his discretion.

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The plain language of Section 1002(e)(2) prohibits disclosure of "any processed, analyzed [or] interpreted data and information ..." The term "any" is clear and unambiguous: it describes something which is "unmeasured in amount, number or extent." Read in this context, it certainly describes all processed, analyzed or interpreted data which is submitted by a permittee under Section 1002(e)(2)(B) or derives from data which was obtained as a result of carrying out an exploration plan.

This interpretation is also supported by the grammatical construction of Section 1002(e)(2)(C). Had the drafters intended

to limit the protections afforded to processed, analyzed and interpreted data to only that processed, analyzed and interpreted data submitted by the permittee to the Secretary they could easily have done so by merely modifying the protection to state "any [of such data which is] processed ... etc." or "any processed, analyzed or interpreted data ... [submitted by the permittee] ..."

In the absence of these limitations, however, one is required to interpret the word "any" as including all processed, analyzed and interpreted data in the Secretary's possession.

The legislative history of Section 1002 fully supports this conclusion. While the legislative history supporting initial enactment of Section 1002(e)(2) does not address the scope of confidentiality protection, Congress addressed the evil arising from the unauthorized release of data in the 1982 amendments, stating:

> Language in the current law requires the Secretary to make such data and information obtained in private exploration available to the public. Since this allows companies that don't directly finance the exploration to get the information and data from the Secretary at little or no expense, there is no incentive for a company to explore. In essence then, nonparticipating companies could reap a windfall. Comments to the Department of Interior on this matter from prospective explorers suggest that private industry will not explore absent the change agreed to by the managers. The Congressional Budget Office in 1980 reported that the cost to the government to conduct the exploration was estimated at more than $61 million. Because the exploration effort has been mandated by an act of Congress, either the government or private industry must bear the expense. This amendment will thus save the government this expense.

> The effect of the language is to put all commercial interests on an equal footing by denying any company that gets data and information from the Secretary or any party other than a permittee from participating in a subsequent lease sale of land within the ANWR, unless the permittee is financially compensated at fair cost for such data or information.
>
> At the same time, this language preserves the right of public access to this data for the purpose of full public discussion and debate regarding whether the ANWR should be opened to lease.

H. Conf. Rep. 97-978, 97th Cong. 2d Sess. to accompany H.R. 7356 at 27. The Conference version of the amendment was adopted without debate by both houses and signed into law.

Although the Secretary was already prohibited from disclosing processed, analyzed or interpreted data and information, Congress was concerned that raw data which was releasable would be processed or otherwise used commercially by entities which did not finance the exploration effort. It was feared that these "freeloaders" would create a disincentive for other companies to finance exploration.

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The amendment added by the Congress in direct response to this concern was extremely broad. It prohibits any person who has access to any data from any person other than the permittee from (1) participating in any lease sale involving the areas from which the data were obtained, and (2) from making any commercial use of the data whatsoever.

Because the Secretary holds the raw data and the data processed, analyzed and interpreted by the permittee, he is in a unique position, akin to a fiduciary. His knowledge of the

processing methods used by the permittee and other parties gives him valuable commercial information regarding processing techniques and philosophies beyond that derived merely from viewing a single sample of processed data. Because of his unique position, it is likely that any processing done by the Secretary will be nothing more than a good quality compilation of the data already submitted and could provide a product very similar to that paid for by the permittee. Even more importantly, the Secretary is uniquely positioned to interpret and analyze data already submitted in processed form by the permittee. Should that ultimate end product be released, there could well be nothing of value left to protect. Also, the disclosure of any processed data would provide similar clues as to the processing preferences of the permittee or third parties. Further, release of data processed by the Secretary using processing methods similar or identical to those used by the permittee would destroy any commercial value the permittee's processed data would otherwise have gutting the protections afforded by the 1982 amendment.

Thus, public release of any privately acquired data whether federally processed or not subverts Congress' stated intention to protect the legitimate interests of those who took a risk in financing exploration. It renders the 1982 protection virtually unenforceable since the agency has no way of monitoring access to processed, analyzed or interpreted data once it has entered the public domain.

The regulations also support this conclusion. 50 C.F.R. 37.53(e) provides:

> Any permittee or other person submitting processed, analyzed or interpreted data or information to the Regional Director shall clearly identify them by marking the top of each page bearing the words "PROCESSED, ANALYZED AND INTERPRETED DATA OR INFORMATION ..."

50 C.F.R. 37.54(a) provides in relevant part:

> The Department shall withhold from the public all processed, analyzed and interpreted data or information obtained as a result of carrying out exploratory activities and submitted by the permittee or a third party.

(Emphasis added.)

In essence, the statutory and regulatory scheme requires anyone that processes information obtained from the program to submit the processed product to the Secretary, who is, in turn, required to hold it confidential. This is fully consistent with the Department's prior statement that the primary purpose of Section 1002 is the collection of data to be used by the Executive and Legislative branches in deciding what conclusions to draw and recommendations to make in the report required by Section 1002(h).

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Obviously, given this statutory and regulatory coverage, there is no circumstance under which data could be processed by a third party and the processed, analyzed and interpreted product not be required to be submitted to the Secretary. The Secretary, is, in turn, required even by the Secretary's unduly narrow interpretation of his own regulations, to hold that material confidential. In this context, it cannot be the case that

Congress or the Secretary intended to create a class of private persons who are exempt from submitting their processed data to the Secretary. Since the regulations require that all data submitted be held confidential, no privately processed data would be subject to public disclosure by the Secretary. Given the breadth of the protection afforded private explorers, it does not appear rational that the Secretary, acting as fiduciary for all privately processed data in his possession, would be able to process and release the data himself.

The only exception to these wide-ranging confidentiality provisions is created by 50 C.F.R. 37.45. This Section prohibits the U.S.G.S. from asserting confidentiality over processed, analyzed or interpreted data but only when those data are collected by the U.S.G.S. itself under a Special Use Permit. Such a permit can only be issued where no private entity has submitted a plan for the area involved which meets established guidelines and the information which would be obtained is needed to make an adequate report under Section 1002(h). 50 C.F.R. 37.45 does not address the confidentiality of data collected by a private permittee but processed by the U.S.G.S.

As shown, the plain meaning of the statute, its grammatical construction, and its legislative history do not contemplate any exception to the prohibition on releasing privately collected, federally processed data.

B. Expenditure of Public Funds Does Not Transform Confidential Industry Data Into Public Data.

Section 1002(e)(2) does not merely protect data and information which was submitted by a permittee in processed, analyzed or interpreted form. There is no evidence that Congress contemplated that the confidentiality protection could apply this narrowly.

The Department has asserted that the expenditure of public funds for the processing of raw data extinguishes the permittee's confidentiality interest in the resultant processed data. That conclusion is unsupported by authority and, when placed against the provisions of the Trade Secrets Act, 18 U.S.C. 1905, ANILCA, the ANILCA regulations, and general tenets of intellectual property law, it is clearly erroneous.

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True enough, data which is collected and processed wholly at the expense of the U.S.G.S. has been exempted from ANILCA's confidentiality requirements by regulation. 50 C.F.R. 37.45. The preamble to this regulation states:

> GS and its contractors and subcontractors have been exempted from the provisions dealing with processed, analyzed and interpreted data or information, as data acquisition, processing, analysis and interpretation done by [Geological Survey] or on its behalf is financed by public funds and, therefore, the Department has no intention of withholding such data and information from the public.

48 Fed. Reg. 16855 (April 19, 1983) (emphasis added).

However, it clearly does not apply where data acquisition is undertaken by a private permittee. By protecting processed,

analyzed and interpreted data from potential misuse, Congress desired to stimulate privately funded exploration of the ANWR.

Although this exception is not authorized by statute, it is not inconsistent with Congress' intent. The U.S.G.S. can only conduct exploration in the event that no private parties were willing to do so. Consequently, the competitive concerns underlying ANILCA Section 1002(e)(2)(C) do not apply. However, where private explorers mount a multi-million dollar effort to acquire data which is subsequently processed for U.S.G.S. on the Secretary's behalf, competitive concerns resurface. This is especially true since acquisition expenses account for 80 to 90 percent of the total cost of the project. Thus, release of data which is privately acquired but processed by U.S.G.S. is no less harmful to the permittee than release of privately processed data. In fact, the Secretary's unique ability to compile and evaluate data from all possible sources renders the release of his interpretations the most harmful of all.

The expenditure of public funds for the processing of data which is acquired by private entities has no bearing on the releasability of the resultant data. Congress has expressly declined to authorize the release of any processed, analyzed and interpreted data until at least two years after a lease sale has occurred. The Trade Secrets Act independently prohibits the agency from releasing such data and ANILCA does not authorize its release until at least that point in time.

C. Disclosure of U.S.G.S. Processed Data Will Vitiate the Protections Sought to be Provided by the 1982 Amendment.

The 1982 amendment to ANILCA barring companies which obtain raw data from the Secretary from bidding at an ANWR lease sale is addressed in regulations published at 50 C.F.R. 37.54(d).

> Commercial use by any person of data or information obtained as a result of carrying out exploratory activities and disclosed pursuant to this section is prohibited. No person shall obtain access from the Department ... to any data or information obtained as a result of carrying out exploratory activities and submitted by the permittee or a third party until such person provides the Department with a statement certifying that person's awareness of the prohibitions contained in this paragraph and the disqualification [from bidding at lease sales] ...

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In commenting on this regulation, members of the ANWR Survey Group also sought additional controls on the release of raw data. The Department responded to these concerns in the preamble to the Final Rule but failed to make the requested changes.

> No changes have been made to [the definitions of raw and processed data] because of the intervening amendment ... The Service considers the commenter's concerns about the harm that could be done to the competitive positions of permittees should their seismic tapes be made available to the public and their competitors as raw data and the consequent disincentive that the Service's disclosure provisions provided to participation in the exploration program to have been mooted by the [amendment]. [The amendment] should restore the economic incentive needed by industry to participate in exploration of the coastal plain. According to its legislative history, the purpose of [the amendment] is to put all commercial interests on an equal footing by denying any company that gets data and information from the Department or from any party other than a permittee from

> participating in a subsequent lease sale of the land to which such data and information pertain.

48 Fed. Reg. 16840 (April 19, 1983).

The Department sought to implement the 1982 amendment by seeking from each party requesting data a certification of his awareness of the prohibitions on bidding contained in the statute. Such a certification would provide the Department not only with a list of requestors (who would presumably be barred from participating in upcoming lease sales) but also with a statement from the requestor which would be used to demonstrate that, even absent the prohibitions contained in the 1982 amendment, the requestor had waived any right it might have had to participate in an ANWR lease sale.

Obviously, the general release by publication of data processed by U.S.G.S. gives the general public, including the direct competitors of the survey group members, access to valuable seismic data, which, had they requested it from the Department, would have triggered the restrictions contained in the 1982 amendment. Further, since the data are released by publication, the Department has no record of those potential bidders that have received data nor any statement by them waiving their right to bid. Thus, the entire objective of the 1982 amendment is vitiated by publication.

Apparently in an attempt to reduce the potential commerciality of the processed data published in the draft ANWR report, certain identifying data were deleted from the processed seismic sections contained in Plate 5. For instance, the precise

locations of the ends of the published sections have been deleted along with the locations of the individual shotpoints. Despite this attempt, enough identifying information was included, inadvertently or otherwise sufficient to locate the geologic features identified in those sections with sufficient precision to make the data very commercial.

For example, several of the sections are published in their entirety and the line identification numbers are shown. The precise location of these lines are available to the public on maps submitted in conjunction with the exploration plans. Further, some of the sections are tied to existing wells outside the refuge. Since the location of these wells is precisely known, the location of structures within the refuge may be easily extrapolated.

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In short, to the extent that U.S.G.S. processed data has been published, its confidentiality and hence its value to the survey group has been irrevocably compromised. Since a small amount of the data has actually been published, the group's competitive position has already been severely damaged. Further, disclosure of data as yet undisclosed will render the group's investment of over $40 million virtually worthless. Thus, should it become apparent that further unauthorized disclosure of U.S.G.S. processed data is intended, the group will be forced to consider whether legal action is appropriate to enjoin it.

II. NO DATA WHICH PERTAINS TO AREAS OUTSIDE OF THE ANWR MAY BE RELEASED IRRESPECTIVE OF ITS FORM.

Another data disclosure problem, potentially even more serious than the disclosure of U.S.G.S. processed data, has also arisen as a consequence of the publication of the draft report. That problem is the disclosure of data collected outside the refuge boundary pursuant to State of Alaska permits but submitted to the Department in order to aid its evaluation of ANWR.

At the time that the exploration plans were submitted, the applicable regulations required that the permittee submit to DOI "all data and information obtained as a result of carrying out exploratory activities." 50 C.F.R. 37.53(a).

Each submission was required to contain:

> 1) An accurate and complete record of each geophysical survey conducted under the permittee's permit, ...
>
> 2) All seismic data developed under the permit.

50 C.F.R. 37.53(b).

The regulations define certain terms used above as follows:

> (i) "Exploratory activities" mean ... seismic exploration ... of the coastal plain ... and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands ... .
>
> (p) "Raw data and information" means all original observations and recordings in written or electronic form ... obtained during field operations.
>
> (w) "Special use permit" means a revocable nonpossessory privilege issued in writing ... authorizing the permittee to enter and use

> the refuge for a specified period to conduct exploratory activities ...

50 C.F.R. 37.2.

Thus, the regulations require the submission of only data collected as a result of "exploratory activities" and those activities are limited by definition to the exploration of the coastal plain or other types of geophysical exploration of the coastal plain involving the surface use of refuge lands. Given this framework, it would have been impossible for a prospective permittee to infer from the regulations that it would be required to submit (and thus possibly subject to public disclosure) data collected outside of the coastal plain.

Apparently, however, Departmental officials became aware through informal discussions with group members that data would be collected outside the refuge in order to provide an integrated data base to the group members. However, no communications were made by the Department to the group that the Department expected to receive any off-refuge data until the Record of Decision ("ROD") was issued regarding the approval of the exploration plan. It stated:

> (8) Copies of any well tie-in data obtained during the surveys will be provided to the Government. The Government will protect the proprietary nature of these data.

ROD I Conditions of Approval, 1 C (8) at p. 7 (emphasis added).

It did not mention the submission of other data collected outside the refuge. The Special Use Permit itself, however, states:

> 22. In addition to data obtained from the coastal plain, the permittee shall submit to

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> the [Government] all data obtained during this program which ties to adjacent areas.

Special Use Permit 83-C10, Special Conditions 22.

Obviously, the Department's authority to require the collection and authorize release of geophysical data in this instance is limited by the plain language of the statute and the rules for activities conducted within the ANWR. Indeed, the Department cannot even authorize, let alone require, the collection of data on state lands or in state waters.

Further, geophysical data is generally exempt from disclosure under the Freedom of Information Act, 5 U.S.C. § 552 ("FOIA"), and would undoubtedly be considered confidential "trade secrets" pursuant to 18 U.S.C. § 1905 (the "Trade Secrets Act"). That is, seismic data is generally to be held confidential by government officials unless its release is authorized by statute as opposed to most other types of data collected by the government, which are subject to disclosure unless prohibited by statute.

In view of the general exemption of seismic data from disclosure (discussed more fully above) express statutory authorization is required to release seismic data in the government's possession. However, ANILCA jurisdiction pertains only to data collected in the ANWR itself and no other statute authorizes release of these data especially since they were obtained on state lands rather than federal lands. Thus, no statute authorizes release of off-refuge data and any further release would constitute a violation of 18 U.S.C. 1905.

The significance of this problem is heightened by the fact that much of the off-refuge data in question was collected in State of Alaska waters offshore of the ANWR from the eastern edge of Camden Bay to an area eastward of the boundary of the Coastal Plain survey area. This area is to be offered for lease in State of Alaska Sales 50 and 55, currently scheduled for June, 1987 and June, 1988. Industry interest in the sale is high and the group is aware that many companies who were not members of the ANWR survey group are interested in bidding. By contrast review of off-refuge data is not necessary to informed debate over the conclusions drawn in the draft report.

In spite of this, the Department published some off-refuge data in the draft report. In spite of the express representation that "the Government would protect the proprietary nature" of well tie data contained in the ROD, extensive well tie data are published in Plate 4 of the report and are illustrated on lines 84-1, 84-5, 85-2 and 85-8, while offshore, state water data are apparently published on lines 85-8, 84-10 and 85-1. In addition, Line 85-1 projects into the State of Alaska lease sale 55 area. These disclosures are not only unauthorized but in the case of well tie data constitute a blatant breach of promise for which the Department is clearly liable.

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As in the case of U.S.G.S. processed data there is no way that the competitive harm that disclosure has already caused can be undone. Further, as in the case of U.S.G.S. processed data,

the group will be forced to consider the appropriateness of legal action to enjoin any further releases of off-refuge data in order to prevent further competitive harm.

CONCLUSION

Congress enacted ANILCA's prohibitions on the release of privately collected geophysical data in order that the companies that funded the seismic survey of the ANWR would not be required to forfeit their investment. Concomitantly, the passage of the 1982 amendment signaled Congressional concurrence in the position that carefully controlled disclosure of raw data, but not processed data, would enable those who desired it to participate fully in the ANWR debate.

However, the Department has released processed data by publication in direct violation of Section 1002, completely vitiating the statutory protection. Further, it has breached its promise to protect the confidentiality of well-tie data and has released highly proprietary data collected outside the ANWR without statutory authority and in direct violation of 18 U.S.C. 1905 -- data which is unnecessary to informed public debate but which is essential to companies wishing to participate in State of Alaska Sales 50 and 55.

We trust that the Department will understand the seriousness of its past actions and take steps to ensure that they will cease. The recommendations contained in the draft report and its analysis of the issues are generally commendable and, as demonstrated in the public hearings in Anchorage and Washington many members of the survey group have actively supported the

Department's position. It would be a shame were that relationship to be marred by continued Departmental violations of its own guarantees of confidentiality.

Geophysical Service Inc. is the geophysical contractor and the authorized representative of the following companies of the GSI ANWR Exploration Group who have authorized submission of these comments:

AMERADA HESS CORPORATION

AMOCO PRODUCTION COMPANY

ARCO ALASKA, INC.

CHAMPLIN PETROLEUM CO.
(a subsidiary of Union Pacific Corporation)

CHEVRON U.S.A. INC.

CONOCO INC.

ELF AQUITAINE PETROLEUM

EXXON COMPANY, U.S.A.
(a Division of Exxon Corp.)

KERR-McGEE CORPORATION

MARATHON OIL COMPANY

MOBIL OIL CORPORATION

MURPHY OIL USA, INC.

PETROFINA DELAWARE, INCORPORATED

PLACID OIL COMPANY

SHELL WESTERN EXPLORATION AND PRODUCTION INC.

STANDARD ALASKA PRODUCTION COMPANY

SUN EXPLORATION AND PRODUCTION COMPANY

TENNECO OIL COMPANY

TEXACO INC.

UNOCAL

UNION TEXAS PETROLEUM CORPORATION

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JOHN M. STUCKEY
OF COUNSEL

February 9, 1987

U.S. Fish and Wildlife Service
Department of the Interior
18th and C Streets, Northwest, Room 2343
Washington, D.C. 20240

Attention: Division of Refuge Management

Ladies and Gentlemen:

On Friday, February 6, 1987, this office transmitted the comments of the Arctic National Wildlife Refuge Seismic Survey Group on the Draft ANWR Report and Environmental Impact Statement via U.S. mail.

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Regrettably, the comments enclosed were but a draft and not the final comments. Please find enclosed the final comments. We would ask that these comments labelled "Corrected Comments of the ANWR Survey Group" be substituted for those you will receive in the mail.

We regret this error and hope that you will not be inconvenienced by our request.

Sincerely yours,

Nathan S. Bergerbest

Enclosure

/CORRECTED/

COMMENTS OF THE ANWR SURVEY GROUP

The Arctic National Wildlife Refuge Seismic Survey Group ("ANWR Survey Group") appreciates this opportunity to submit comments on the "Draft Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment" ("draft report") released in November, 1986. The ANWR Survey Group consists of the 22 energy companies which funded, designed, and conducted -- through their contractor, Geophysical Service Inc. (GSI) -- the 1984 and 1985 seismic surveys of the Arctic National Wildlife Refuge ("ANWR") study area as mandated by Congress under Section 1002 of the Alaska National Interest Lands Conservation Act ("ANILCA"), 16 U.S.C. 3142.

The ANWR Survey Group wishes to compliment the Interagency Advisory Work Group for their fine job in preparing the draft report. Our member companies strongly support the Secretary's recommendation that Congress permit leasing in the ANWR Coastal Plain for oil and gas development and urge that a final report be issued as expeditiously as possible.

Nevertheless, the ANWR Survey Group is deeply concerned over the Interagency Advisory Work Group's decision to release confidential processed geophysical data in the draft report. These data pertain to areas within the ANWR as well as areas outside of the ANWR. The public release of processed geophysical data contravenes Congress' express mandate that "any processed, analyzed and interpreted data and information shall be held confidential by the Secretary for a period of not less than two

years following any lease sale including the area from which the information was obtained." 16 U.S.C. 3142(c).

Each of the companies which comprise the ANWR Survey Group may submit comments on the draft report and the Secretary's recommendation under separate cover. These comments submitted on behalf of the group as a whole focus solely on the issue of geophysical data disclosure and reflect the unanimous position of the undersigned members of the Group that the release of processed geophysical data in the draft report was contrary to law.

The ANWR Survey Group respectfully requests that the Interagency Advisory Work Group refrain from further disclosure of processed geophysical data and information whether such data and information pertain to the ANWR or not. No processed, analyzed or interpreted data and information pertaining to the ANWR may be released until two years after a lease sale including the area from which the information was obtained has been held. No raw, processed, analyzed or interpreted data and information pertaining to areas outside of the ANWR may be released without the express written consent of the ANWR Survey Group.

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DISCUSSION

I. SECTION 1002 OF ANILCA EXPRESSLY PROHIBITS THE DISCLOSURE OF ANY PROCESSED GEOPHYSICAL DATA AND INFORMATION AT THIS TIME.

Section 1002(e)(2) of ANILCA requires inter alia that the Secretary:

> (B) shall require that all data and information (including processed, analyzed

> and interpreted information) obtained as a result of carrying out the plan shall be submitted to the Secretary; and
>
> (C) shall make such data and information available to the public except that any processed, analyzed and interpreted data or information shall be held confidential by the Secretary for a period of not less than two years following any lease sale including the area from which the information was obtained.

16 U.S.C. 3142(e)(2)(B),(C).

Congress enacted these provisions to encourage private companies to finance the costly seismic exploration of the ANWR. As a further incentive to private exploration, Congress prohibited the Secretary from approving any plan submitted by the U.S. Geological Survey ("U.S.G.S.") unless private parties were unwilling to explore or would not provide sufficient information to make an adequate report. 16 U.S.C. 3142(e)(2).

However, Congress recognized that private entities would not invest in ANWR exploration unless they were permitted to protect their proprietary interest in data obtained through their efforts. The importance of Congress' promise to protect this proprietary interest cannot be underestimated. The only benefit which accrues to a company which financed ANWR data collection is the ability to use it in lease sale decisionmaking. If ANWR data were made available to all comers regardless of whether they contributed toward its collection there would be no incentive for any company to contribute.

Thus, a significant portion of the value of the data to any given company lies primarily in its proprietary nature rather than in its content per se.

This principle is simply illustrated. Seismic data showing that an area is or is not prospective has virtually no inherent value. But the companies that own it know that the area is one on which they should or should not bid. Conversely, companies that do not own the data must either spend money to acquire it or risk bidding on a non-prospective tract. If those data are made public, the situation is reversed. The companies that did not acquire the data from the permittee get it for free, giving them a substantial competitive advantage over the companies that paid for the data in the first place.

Recognizing this to be the case, Congress amended Section 1002(e)(2) in an attempt to further protect the proprietary interest of companies which financed ANWR data collection. The amendment states:

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> ... Provided, That the Secretary shall prohibit by regulation any person who obtains access to such data and information from the Secretary or from any person other than a permittee from participation in any lease sale which includes the areas from which the information was obtained and from any commercial use of the information. The Secretary shall require that any permittee shall make available such data to any person at fair cost.

The amendment is not a substitute for the Secretary's obligation to maintain the confidentiality of <u>any</u> processed, analyzed and interpreted data and information. It is directed at companies which receive raw geophysical data and information which is the only form in which ANWR data and information may presently be released.

As can be seen, the amendment allows raw data to be made available to those who desire to use it during the debate regarding the future status of ANWR but takes away from any recipient of the data, the right to participate in any future lease sale and thus any competitive advantage that recipient might otherwise have obtained from the data.

A. Data Processed by U.S.G.S. Must Remain Confidential by Virtue of Section 1002 of ANILCA

As shown above, Section 1002 requires the Secretary to keep "... processed, analyzed and interpreted data ... confidential for a period of not less than two years following any lease sale including the area from which the information was obtained."

The protection afforded by ANILCA Section 1002(e)(2)(C) must be viewed not only within the context of the other provisions of ANILCA but also in the context of other related statutes.

The Trade Secrets Act (18 U.S.C. § 1905) prohibits all agencies from disclosing "information concern[ing] or relat[ing] to trade secrets, processes, operations, style of work, or apparatus" unless "authorized by law". The Act has been described as "providing a standard by which to judge the legality of proposed agencies disclosures ... to create a federal right of non-disclosure." Chevron Chemical Company v. Costle, 641 F.2d 104, 115 (3d Cir. 1981). See also Chrysler Corporation v. Brown, 441 U.S. 281, 306 (1979).

ANILCA provides the statutory authority for certain disclosures of data and information which would otherwise undoubtedly be considered trade secrets. ANILCA Section

1002(e)(2)(B) requires that a permittee submit all data and information obtained as a result of carrying out an Exploration Plan to the Secretary. ANILCA Section 1002(e)(2)(C) empowers the Secretary to make such data available to the public except that any processed, analyzed or interpreted data or information must be held confidential for a period of not less than two years following any lease sale including the area from which the information was obtained. Thus ANILCA provides plenary authority for disclosure of "raw data" but only limited authority to disclose processed, analyzed or interpreted data after a minimum period of years. Although the Secretary must, at some point make raw data available, the statute contains no time limits, conditions or procedures governing the Secretary's release of that data. Similarly, although the Secretary must hold processed, analyzed and interpreted information confidential for a minimum period, he may lengthen that term indefinitely at his discretion.

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The plain language of Section 1002(e)(2) prohibits disclosure of "any processed, analyzed [or] interpreted data and information ..." The term "any" is clear and unambiguous: it describes something which is "unmeasured in amount, number or extent." Read in this context, it certainly describes all processed, analyzed or interpreted data which is submitted by a permittee under Section 1002(e)(2)(B) or derives from data which was obtained as a result of carrying out an exploration plan.

This interpretation is also supported by the grammatical construction of Section 1002(e)(2)(C). Had the drafters intended

to limit the protections afforded to processed, analyzed and interpreted data to only that processed, analyzed and interpreted data submitted by the permittee to the Secretary they could easily have done so by merely modifying the protection to state "any [of such data which is] processed ... etc." or "any processed, analyzed or interpreted data ... [submitted by the permittee] ..."

In the absence of these limitations, however, one is required to interpret the word "any" as including all processed, analyzed and interpreted data in the Secretary's possession.

The legislative history of Section 1002 fully supports this conclusion. While the legislative history supporting initial enactment of Section 1002(e)(2) does not address the scope of confidentiality protection, Congress addressed the evil arising from the unauthorized release of data in the 1982 amendments, stating:

> Language in the current law requires the Secretary to make such data and information obtained in private exploration available to the public. Since this allows companies that don't directly finance the exploration to get the information and data from the Secretary at little or no expense, there is no incentive for a company to explore. In essence then, nonparticipating companies could reap a windfall. Comments to the Department of Interior on this matter from prospective explorers suggest that private industry will not explore absent the change agreed to by the managers. The Congressional Budget Office in 1980 reported that the cost to the government to conduct the exploration was estimated at more than $61 million. Because the exploration effort has been mandated by an act of Congress, either the government or private industry must bear the expense. This amendment will thus save the government this expense.

> The effect of the language is to put all commercial interests on an equal footing by denying any company that gets data and information from the Secretary or any party other than a permittee from participating in a subsequent lease sale of land within the ANWR, unless the permittee is financially compensated at fair cost for such data or information.
>
> At the same time, this language preserves the right of public access to this data for the purpose of full public discussion and debate regarding whether the ANWR should be opened to lease.

H. Conf. Rep. 97-978, 97th Cong. 2d Sess. to accompany H.R. 7356 at 27. The Conference version of the amendment was adopted without debate by both houses and signed into law.

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Although the Secretary was already prohibited from disclosing processed, analyzed or interpreted data and information, Congress was concerned that raw data which was releasable would be processed or otherwise used commercially by entities which did not finance the exploration effort. It was feared that these "freeloaders" would create a disincentive for other companies to finance exploration.

The amendment added by the Congress in direct response to this concern was extremely broad. It prohibits any person who has access to any data from any person other than the permittee from (1) participating in any lease sale involving the areas from which the data were obtained, and (2) from making any commercial use of the data whatsoever.

Because the Secretary holds the raw data and the data processed, analyzed and interpreted by the permittee, he is in a unique position, akin to a fiduciary. His knowledge of the

processing methods used by the permittee and other parties gives him valuable commercial information regarding processing techniques and philosophies beyond that derived merely from viewing a single sample of processed data. Because of his unique position, it is likely that any processing done by the Secretary will be nothing more than a good quality compilation of the data already submitted and could provide a product very similar to that paid for by the permittee. Even more importantly, the Secretary is uniquely positioned to interpret and analyze data already submitted in processed form by the permittee. Should that ultimate end product be released, there could well be nothing of value left to protect. Also, the disclosure of any processed data would provide similar clues as to the processing preferences of the permittee or third parties. Further, release of data processed by the Secretary using processing methods similar or identical to those used by the permittee would destroy any commercial value the permittee's processed data would otherwise have gutting the protections afforded by the 1982 amendment.

Thus, public release of any privately acquired data whether federally processed or not subverts Congress' stated intention to protect the legitimate interests of those who took a risk in financing exploration. It renders the 1982 protection virtually unenforceable since the agency has no way of monitoring access to processed, analyzed or interpreted data once it has entered the public domain.

The regulations also support this conclusion. 50 C.F.R. 37.53(e) provides:

> Any permittee or other person submitting processed, analyzed or interpreted data or information to the Regional Director shall clearly identify them by marking the top of each page bearing the words "PROCESSED, ANALYZED AND INTERPRETED DATA OR INFORMATION ..."

50 C.F.R. 37.54(a) provides in relevant part:

> The Department shall withhold from the public all processed, analyzed and interpreted data or information obtained as a result of carrying out exploratory activities and submitted by the permittee or a third party.

(Emphasis added.)

In essence, the statutory and regulatory scheme requires anyone that processes information obtained from the program to submit the processed product to the Secretary, who is, in turn, required to hold it confidential. This is fully consistent with the Department's prior statement that the primary purpose of Section 1002 is the collection of data to be used by the Executive and Legislative branches in deciding what conclusions to draw and recommendations to make in the report required by Section 1002(h).

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Obviously, given this statutory and regulatory coverage, there is no circumstance under which data could be processed by a third party and the processed, analyzed and interpreted product not be required to be submitted to the Secretary. The Secretary, is, in turn, required even by the Secretary's unduly narrow interpretation of his own regulations, to hold that material confidential. In this context, it cannot be the case that

Congress or the Secretary intended to create a class of private persons who are exempt from submitting their processed data to the Secretary. Since the regulations require that all data submitted be held confidential, no privately processed data would be subject to public disclosure by the Secretary. Given the breadth of the protection afforded private explorers, it does not appear rational that the Secretary, acting as fiduciary for all privately processed data in his possession, would be able to process and release the data himself.

The only exception to these wide-ranging confidentiality provisions is created by 50 C.F.R. 37.45. This Section prohibits the U.S.G.S. from asserting confidentiality over processed, analyzed or interpreted data but only when those data are collected by the U.S.G.S. itself under a Special Use Permit. Such a permit can only be issued where no private entity has submitted a plan for the area involved which meets established guidelines and the information which would be obtained is needed to make an adequate report under Section 1002(h). 50 C.F.R. 37.45 does not address the confidentiality of data collected by a private permittee but processed by the U.S.G.S.

As shown, the plain meaning of the statute, its grammatical construction, and its legislative history do not contemplate any exception to the prohibition on releasing privately collected, federally processed data.

B. Expenditure of Public Funds Does Not Transform Confidential Industry Data Into Public Data.

Section 1002(e)(2) does not merely protect data and information which was submitted by a permittee in processed, analyzed or interpreted form. There is no evidence that Congress contemplated that the confidentiality protection could apply this narrowly.

The Department has asserted that the expenditure of public funds for the processing of raw data extinguishes the permittee's confidentiality interest in the resultant processed data. That conclusion is unsupported by authority and, when placed against the provisions of the Trade Secrets Act, 18 U.S.C. 1905, ANILCA, the ANILCA regulations, and general tenets of intellectual property law, it is clearly erroneous.

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True enough, data which is collected and processed wholly at the expense of the U.S.G.S. has been exempted from ANILCA's confidentiality requirements by regulation. 50 C.F.R. 37.45. The preamble to this regulation states:

> GS and its contractors and subcontractors have been exempted from the provisions dealing with processed, analyzed and interpreted data or information, as data acquisition, processing, analysis and interpretation done by [Geological Survey] or on its behalf is financed by public funds and, therefore, the Department has no intention of withholding such data and information from the public.

48 Fed. Reg. 16855 (April 19, 1983) (emphasis added).

However, it clearly does not apply where data acquisition is undertaken by a private permittee. By protecting processed,

analyzed and interpreted data from potential misuse, Congress desired to stimulate privately funded exploration of the ANWR.

Although this exception is not authorized by statute, it is not inconsistent with Congress' intent. The U.S.G.S. can only conduct exploration in the event that no private parties were willing to do so. Consequently, the competitive concerns underlying ANILCA Section 1002(e)(2)(C) do not apply. However, where private explorers mount a multi-million dollar effort to acquire data which is subsequently processed for U.S.G.S. on the Secretary's behalf, competitive concerns resurface. This is especially true since acquisition expenses account for 80 to 90 percent of the total cost of the project. Thus, release of data which is privately acquired but processed by U.S.G.S. is no less harmful to the permittee than release of privately processed data. In fact, the Secretary's unique ability to compile and evaluate data from all possible sources renders the release of his interpretations the most harmful of all.

The expenditure of public funds for the processing of data which is acquired by private entities has no bearing on the releasability of the resultant data. Congress has expressly declined to authorize the release of any processed, analyzed and interpreted data until at least two years after a lease sale has occurred. The Trade Secrets Act independently prohibits the agency from releasing such data and ANILCA does not authorize its release until at least that point in time.

C. Disclosure of U.S.G.S. Processed Data Will Vitiate the Protections Sought to be Provided by the 1982 Amendment.

The 1982 amendment to ANILCA barring companies which obtain raw data from the Secretary from bidding at an ANWR lease sale is addressed in regulations published at 50 C.F.R. 37.54(d).

> Commercial use by any person of data or information obtained as a result of carrying out exploratory activities and disclosed pursuant to this section is prohibited. No person shall obtain access from the Department ... to any data or information obtained as a result of carrying out exploratory activities and submitted by the permittee or a third party until such person provides the Department with a statement certifying that person's awareness of the prohibitions contained in this paragraph and the disqualification [from bidding at lease sales] ...

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In commenting on this regulation, members of the ANWR Survey Group also sought additional controls on the release of raw data. The Department responded to these concerns in the preamble to the Final Rule but failed to make the requested changes.

> No changes have been made to [the definitions of raw and processed data] because of the intervening amendment ... The Service considers the commenter's concerns about the harm that could be done to the competitive positions of permittees should their seismic tapes be made available to the public and their competitors as raw data and the consequent disincentive that the Service's disclosure provisions provided to participation in the exploration program to have been mooted by the [amendment]. [The amendment] should restore the economic incentive needed by industry to participate in exploration of the coastal plain. According to its legislative history, the purpose of [the amendment] is to put all commercial interests on an equal footing by denying any company that gets data and information from the Department or from any party other than a permittee from

> participating in a subsequent lease sale of the land to which such data and information pertain.

48 Fed. Reg. 16840 (April 19, 1983).

The Department sought to implement the 1982 amendment by seeking from each party requesting data a certification of his awareness of the prohibitions on bidding contained in the statute. Such a certification would provide the Department not only with a list of requestors (who would presumably be barred from participating in upcoming lease sales) but also with a statement from the requestor which would be used to demonstrate that, even absent the prohibitions contained in the 1982 amendment, the requestor had waived any right it might have had to participate in an ANWR lease sale.

Obviously, the general release by publication of data processed by U.S.G.S. gives the general public, including the direct competitors of the survey group members, access to valuable seismic data, which, had they requested it from the Department, would have triggered the restrictions contained in the 1982 amendment. Further, since the data are released by publication, the Department has no record of those potential bidders that have received data nor any statement by them waiving their right to bid. Thus, the entire objective of the 1982 amendment is vitiated by publication.

Apparently in an attempt to reduce the potential commerciality of the processed data published in the draft ANWR report, certain identifying data were deleted from the processed seismic sections contained in Plate 5. For instance, the precise

locations of the ends of the published sections have been deleted along with the locations of the individual shotpoints. Despite this attempt, enough identifying information was included, inadvertently or otherwise sufficient to locate the geologic features identified in those sections with sufficient precision to make the data very commercial.

For example, several of the sections are published in their entirety and the line identification numbers are shown. The precise location of these lines are available to the public on maps submitted in conjunction with the exploration plans. Further, some of the sections are tied to existing wells outside the refuge. Since the location of these wells is precisely known, the location of structures within the refuge may be easily extrapolated.

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In short, to the extent that U.S.G.S. processed data has been published, its confidentiality and hence its value to the survey group has been irrevocably compromised. Since a small amount of the data has actually been published, the group's competitive position has already been severely damaged. Further, disclosure of data as yet undisclosed will render the group's investment of over $40 million virtually worthless. Thus, should it become apparent that further unauthorized disclosure of U.S.G.S. processed data is intended, the group will be forced to consider whether legal action is appropriate to enjoin it.

II. NO DATA WHICH PERTAINS TO AREAS OUTSIDE OF THE ANWR MAY BE RELEASED IRRESPECTIVE OF ITS FORM.

Another data disclosure problem, potentially even more serious than the disclosure of U.S.G.S. processed data, has also arisen as a consequence of the publication of the draft report. That problem is the disclosure of data collected outside the refuge boundary pursuant to State of Alaska permits but submitted to the Department in order to aid its evaluation of ANWR.

At the time that the exploration plans were submitted, the applicable regulations required that the permittee submit to DOI "all data and information obtained as a result of carrying out exploratory activities." 50 C.F.R. 37.53(a).

Each submission was required to contain:

> 1) An accurate and complete record of each geophysical survey conducted under the permittee's permit, ...
>
> 2) All seismic data developed under the permit.

50 C.F.R. 37.53(b).

The regulations define certain terms used above as follows:

> (i) "Exploratory activities" mean ... seismic exploration ... of the coastal plain ... and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands ... .
>
> (p) "Raw data and information" means all original observations and recordings in written or electronic form ... obtained during field operations.
>
> (w) "Special use permit" means a revocable nonpossessory privilege issued in writing ... authorizing the permittee to enter and use

> the refuge for a specified period to conduct exploratory activities ...

50 C.F.R. 37.2.

Thus, the regulations require the submission of only data collected as a result of "exploratory activities" and those activities are limited by definition to the exploration of the coastal plain or other types of geophysical exploration of the coastal plain involving the surface use of refuge lands. Given this framework, it would have been impossible for a prospective permittee to infer from the regulations that it would be required to submit (and thus possibly subject to public disclosure) data collected outside of the coastal plain.

Apparently, however, Departmental officials became aware through informal discussions with group members that data would be collected outside the refuge in order to provide an integrated data base to the group members. However, no communications were made by the Department to the group that the Department expected to receive any off-refuge data until the Record of Decision ("ROD") was issued regarding the approval of the exploration plan. It stated:

> (8) Copies of any well tie-in data obtained during the surveys will be provided to the Government. <u>The Government will protect the proprietary nature of these data</u>.

ROD I Conditions of Approval, 1 C (8) at p. 7 (emphasis added).

It did not mention the submission of other data collected outside the refuge. The Special Use Permit itself, however, states:

> 22. In addition to data obtained from the coastal plain, the permittee shall submit to

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> the [Government] all data obtained during this program which ties to adjacent areas.

Special Use Permit 83-C10, Special Conditions 22.

Obviously, the Department's authority to require the collection and authorize release of geophysical data in this instance is limited by the plain language of the statute and the rules for activities conducted within the ANWR. Indeed, the Department cannot even authorize, let alone require, the collection of data on state lands or in state waters.

Further, geophysical data is generally exempt from disclosure under the Freedom of Information Act, 5 U.S.C. § 552 ("FOIA"), and would undoubtedly be considered confidential "trade secrets" pursuant to 18 U.S.C. § 1905 (the "Trade Secrets Act"). That is, seismic data is generally to be held confidential by government officials unless its release is authorized by statute as opposed to most other types of data collected by the government, which are subject to disclosure unless prohibited by statute.

In view of the general exemption of seismic data from disclosure (discussed more fully above) express statutory authorization is required to release seismic data in the government's possession. However, ANILCA jurisdiction pertains only to data collected in the ANWR itself and no other statute authorizes release of these data especially since they were obtained on state lands rather than federal lands. Thus, no statute authorizes release of off-refuge data and any further release would constitute a violation of 18 U.S.C. 1905.

The significance of this problem is heightened by the fact that much of the off-refuge data in question was collected in State of Alaska waters offshore of the ANWR from the eastern edge of Camden Bay to an area eastward of the boundary of the Coastal Plain survey area. This area is to be offered for lease in State of Alaska Sales 50 and 55, currently scheduled for June, 1987 and June, 1988. Industry interest in the sale is high and the group is aware that many companies who were not members of the ANWR survey group are interested in bidding. By contrast review of off-refuge data is not necessary to informed debate over the conclusions drawn in the draft report.

In spite of this, the Department published some off-refuge data in the draft report. In spite of the express representation that "the Government would protect the proprietary nature" of well tie data contained in the ROD, extensive well tie data are published in Plate 4 of the report and are illustrated on lines 84-1, 84-5, 85-2 and 85-8, while offshore, state water data are apparently published on lines 85-8, 84-10 and 85-1. In addition, Line 85-1 projects into the State of Alaska lease sale 55 area. These disclosures are not only unauthorized but in the case of well tie data constitute a blatant breach of promise for which the Department is clearly liable.

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As in the case of U.S.G.S. processed data there is no way that the competitive harm that disclosure has already caused can be undone. Further, as in the case of U.S.G.S. processed data,

the group will be forced to consider the appropriateness of legal action to enjoin any further releases of off-refuge data in order to prevent further competitive harm.

CONCLUSION

Congress enacted ANILCA's prohibitions on the release of privately collected geophysical data in order that the companies that funded the seismic survey of the ANWR would not be required to forfeit their investment. Concomitantly, the passage of the 1982 amendment signaled Congressional concurrence in the position that carefully controlled disclosure of raw data, but not processed data, would enable those who desired it to participate fully in the ANWR debate.

However, the Department has released processed data by publication in direct violation of Section 1002, completely vitiating the statutory protection. Further, it has breached its promise to protect the confidentiality of well-tie data and has released highly proprietary data collected outside the ANWR without statutory authority and in direct violation of 18 U.S.C. 1905 -- data which is unnecessary to informed public debate but which is essential to companies wishing to participate in State of Alaska Sales 50 and 55.

We trust that the Department will understand the seriousness of its past actions and take steps to ensure that they will cease. The recommendations contained in the draft report and its analysis of the issues are generally commendable and, as demonstrated in the public hearings in Anchorage and Washington many members of the survey group have actively supported the

Department's position. It would be a shame were that relationship to be marred by continued Departmental violations of its own guarantees of confidentiality.

Geophysical Service Inc. is the geophysical contractor and the authorized representative of the following companies of the GSI ANWR Exploration Group who have authorized submission of these comments:

AMERADA HESS CORPORATION	MURPHY OIL USA, INC.
AMOCO PRODUCTION COMPANY	PETROFINA DELAWARE, INCORPORATED
ARCO ALASKA, INC.	PLACID OIL COMPANY
CHEVRON U.S.A. INC.	SHELL WESTERN EXPLORATION AND PRODUCTION INC.
CONOCO INC.	STANDARD ALASKA PRODUCTION COMPANY
ELF AQUITAINE PETROLEUM	SUN EXPLORATION AND PRODUCTION COMPANY
EXXON COMPANY, U.S.A. (a Division of Exxon Corp.)	TENNECO OIL COMPANY
KERR-McGEE CORPORATION	TEXACO INC.
MARATHON OIL COMPANY	UNOCAL
MOBIL OIL CORPORATION	UNION TEXAS PETROLEUM CORPORATION

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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 ROGER C. HERRERA

Mailing Address P.O. Box 196612

ANCHORAGE : AK 99519

Check appropriate box below:

☐ I am here to offer my own views.

--or--

☒ I am speaking for STANDARD ALASKA PRODUCTION Co

(please enter name of organization you represent)

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TESTIMONY OF

STANDARD ALASKA PRODUCTION COMPANY

ON THE

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

FOR THE

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

January 5, 1987

PRESENTED BY:

ROGER C. HERRERA

MANAGER EXPLORATION AND LANDS

Mr. Chairman:

My name is Roger Herrera and I am representing the Standard Alaska Production Company with whom I am employed as Manager of Exploration and Lands.

The 1002(h) report has two great attributes which are not often seen in environmental impact statements - it is short and readable. The authors are to be complimented because these praiseworthy characteristics have probably resulted in the report having been read in its entirety by a large number of people. The nature of the decision to be made regarding the Coastal Plain of Arctic National Wildlife Refuge obviously demands a careful and dispassionate assessment of the knowledge gained from the six years of concentrated study in the area. It is our opinion that the 1002(h) report sets out that information in a meaningful and relatively balanced way. It is an adequate document to make judgments on the issue.

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You have previously heard testimony from the Alaska Oil and Gas Association. Standard Alaska Production Company was involved in the preparation of that statement and endorses it in its entirety. We believe that the Coastal Plain of ANWR must be opened in full to responsible leasing, exploration, development, and oil production (Alternative A). Only in that way will our future state and national interests be adequately considered. We must plan to boost our domestic

reserves and production, and at the same time indulge in responsible conservation if we are to preserve our life-style.

The Coastal Plain of ANWR figures prominently both as a possible source of major oil supplies and as means to assuage man's yearnings for the aesthetics of solitude, scenery, and wildlife.

Without Coastal Plain oil it is perhaps pertinent to mention that the aesthetic experience of wilderness that is perceived to be the alternate goal to development will be available only to an elite few. It is also reasonable to mention that the tens of thousands of Americans and other visitors who have enjoyed a once-in-a-lifetime trip to the North Slope in the past decade have done so because of the development of Prudhoe Bay. Prudhoe Bay has not destroyed their arctic experience, it has made it possible, unique, and memorable. A small point, but one worth remembering.

One aspect of the report requires comment at this stage namely the bias recognizable in the chapters dealing with caribou. This bias has lead to an emphasis on a proposed mitigation measure, the utilization of the Fish and Wildlife Service mitigation policy.

In discussing the inappropriateness of this policy in Alaska, reference must be made to the recently initialed U.S./ Canadian Porcupine Caribou Agreement of December 3, 1986.

The Fish and Wildlife Service mitigation policy was deliberately excluded by the U.S. Government from that Agreement. If the use of the mitigation policy is unacceptable to the Government in its efforts to achieve conservation of the Porcupine Caribou herd in conjunction with the Government of Canada, what justification is there to impose it on industry in order to achieve exactly the same results on the Coastal Plain?

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The Fish and Wildlife Service mitigation policy and some of the biological conclusions in the report result from an assumption that fish and wildlife populations using the ANWR Coastal Plain are indiscriminately limited by habitat availability. There is no evidence to support this assumption and, in fact, the report does not cite or discuss any evidence to justify that position.

Nesting birds on the North Slope are in general much more influenced by weather than they are by habitat, and there are no examples of mammal population size or productivity which has been limited by North Slope habitat availability. Caribou abundance is believed to approximate prehistoric levels in the North American Arctic, and it is generally accepted that caribou productivity is limited principally by

wolf predation on the fall, winter, and spring ranges, augmented by human harvest. It is therefore not logical to suggest that animal species distribution or abundance would change in any biological, meaningful way as a result of the limited, low-density oilfield construction approach used in Arctic Alaska. Recent bird studies (Troy et al 1986) and fish studies (Craig 1986) support this conclusion, and the steadily increasing caribou populations during the period of oilfield development also indicate that habitat is not a confining factor.

The only biologically effective approach to assessing and mitigating any effects of development on wildlife is to determine how industry activities will alter population-limiting factors for each species of concern, and then to apply mitigative measures that avoid those limiting factors. That is quite different from and more practical than the Fish and Wildlife Service policy of preserving "habitat value". Such a policy usually translates into protecting land from change, or ensuring that all change is "natural". This ignores Arctic biology and makes policy dominant over biology. It imposes a particular point of view on the real world without determining whether the real world conforms with the imposed viewpoint.

In this case the policy is flawed and should be scrapped in Alaska. Likewise some of the proposed mitigating measures which result from the policy are unnecessary and often

counter-productive. Many of the mitigating measures that have been proposed have been proven to be effective on the North Slope and are fully supported by Standard Alaska Production Company. Our aim with regard to environmental protection is the same as the Department of Interior's, but we feel strongly that the end result of oil production with minimum and acceptable environmental impact cannot be achieved using the Fish and Wildlife mitigation policy in the Arctic.

Two other points about the caribou sections of the report: First, the report would be greatly strengthened and balanced if reasonable use had been made of the information and analysis of the expert caribou Canadian biologists, Bergerud Jakimchuk and Bamfield. Their work has been largely ignored in the draft LEIS and the dismissal of the dissident views of Bergerud on Page 110 as "widely disputed" is a distortion unworthy of the authors. Second the so-called core calving areas of the Porcupine herd and the "space constraints" which the caribou are supposedly subjected to at that time of the year, ignore the fact that many tens of thousands and in some years, hundreds of thousands of Porcupine Caribou calve in Canada. The maps in the report are misleading and less than scientific in not depicting the full calving range.

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It is our intention, Mr. Chairman, to comment in detail on this and other issues in a separate written submission which we hope will be carefully considered.

TESTIMONY OF

THE STANDARD OIL COMPANY

ON THE

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

FOR THE

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

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January 9, 1987

Washington, D.C.

PRESENTED BY:

ROGER C. HERRERA

MANAGER EXPLORATION AND LANDS

STANDARD ALASKA PRODUCTION COMPANY

Mr. Chairman:

My name is Roger Herrera and I am Manager of Exploration and Lands for the Standard Alaska Production Company. Today I am presenting testimony for The Standard Oil Company.

Standard is the largest producer of oil from the state of Alaska and has been present as an explorer and producer in Alaska since the late 1950's. The 1002(h) report has drawn on many scientific and technological studies carried out by or for Standard Oil as is recognized by the bibliography. Based on our long experience of operating in the Arctic, we believe the report is thorough, balanced and fair in its description of the coastal plain ecosystem and assessment of scenarios of development. It needs some modification in the caribou section to make it more realistic, and it does not justify some of the proposed mitigation measures, especially the use of the Fish and Wildlife Service mitigation policy. That policy, which concentrates on preserving habitats rather than populations of animals, cannot benefit wildlife in Alaska. Alaska, in particular the North Slope and coastal plain, is unique in having more habitat than animal species can ever occupy. Consequently, administrative efforts to protect habitat above all does little or nothing to benefit populations such as caribou, polar bear, musk oxen, etc. The concept and practice of mitigation is akin to motherhood and totally accepted by my company, but I know from 25 years experience in the Arctic that the Fish and Wildlife Service mitigation policy is a poor protective mechanism and it should be changed.

The success of our mitigation efforts in the past is perhaps measured by the results of a recent public opinion poll in Alaska (Dittman Nov. 1986). 86% of the respondents thought that the oil industry has operated in an environmentally safe manner at Prudhoe

Bay. Only 5% gave negative replies. That accolade was earned not because of protective envrironmental regulations and stipulations, although they obviously played a part, but principally because the operating oil companies pursued a philosophy of care for the environment and the animals. This was done for two reasons. First and foremost, because we are human beings too and have the same appreciation of wilderness and the asthetics of scenary or seas of caribou as anyone else. Secondly, there is a clear logic and self-interest in not doing things wrong in the Arctic. A simple example is an oil spill on a gravel pad or the tundra. The spill itself cost the value of the oil—perhaps a few dollars, but the cost of clean up is usually measured in thousands, tens of thousands, or millions of dollars. The incentive not to spill oil quickly becomes very clear, as does the incentive to design better equipment to prevent oil spills.

It is perhaps worth mentioning, in passing, that the statistics on oil spills contained in the report are no doubt correct and represent the facts of life of working outside at 40 or 50° F below zero in a harsh environment. What is not mentioned is the fact that the vast majority of those spills occur on gravel pads or roads and that all of them are totally cleaned up.

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A recognition of this effort is seen in the figure of 83% of Alaskan respondents (Nov. '86 Dittman poll) who believe that the oil industry can operate safely in wildlife refuges in Alaska.

The success of future development on the coastal plain of ANWR will be achieved in two ways. One, by continuous and friendly consultation and coordination between industry, native residents and refuge managers and other Fish and Wildlife Service personnel, and secondly, by repeating and enhancing the philosophy and practice which has worked so well at Prudhoe, Kuparuk, Milne Point and Endicott. Surely those two requirements are not beyond our capability?

Before closing let me mention some aspects of the report that require attention. The maps depicting caribou calving areas are less than truthful and if they have been

used to arrive at the conclusions on caribou concentrations, etc, those conclusions must be wrong. Caribou calving areas have been mapped annually deep into Canadian territory, and not to depict the total calving area on the maps is unscientific and akin to joining the flat earth society. This should be rectified.

The three mile buffer zone precluding development factilities at the coast to protect caribou insect relief areas is unnecessary. Caribou use of that zone is sporadic and ephemeral and southern areas of the coastal plain are much more important to the herd than the northern fringe.

Standard Oil supports Alternative A. We appreciate the opportunity to testify and will submit detailed written comments in due course.

Shell Western E&P Inc.
A Subsidiary of Shell Oil Company

Thomas F. Hart
President

February 2, 1987

P.O.Box 576
Houston,Texas 77001

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

Dear Sir:

SUBJECT: ARCTIC NATIONAL WILDLIFE REFUGE - RESOURCE ESTIMATE

Shell Western E&P Inc., a subsidiary of Shell Oil Company, appreciates this opportunity to comment on the draft proposal for opening the coastal plain of the Arctic National Wildlife Refuge to oil and gas leasing, development and production.

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Shell Western supports the Department of the Interior's "Alternative A" recommendation, full leasing of the "1002" study area. We concur with the DOI's statement that this area is an outstanding oil and gas frontier and could contribute significantly to our domestic energy supplies.

In this era of rapidly increasing oil imports, it is imperative that the United States look toward the future when the need for domestic sources of oil and gas may be critical, and remember what occurred in the 1970s when OPEC manipulated the market to our disadvantage. Surely, the American people and their representatives in Congress do not wish a reenactment of those circumstances in the future. If we can find, develop and produce the potentially vast resources on the ANWR coastal plain, we can lessen the potential impact of an OPEC-induced energy disruption 10 to 15 years from now, and beyond.

Further, Shell Western endorses the detailed comments on the assessment offered by the Alaska Oil and Gas Association and the American Petroleum Institute, of which we are a member.

We do, however, wish to make a specific comment regarding the price premises used in the report. On page 72, Table III-4, entitled "Significant Economic Assumptions," states that the most likely crude oil market price in the year 2000 (1984$) would be $33/BBL, and that an optimistic price would be $40/BBL. This range of prices, when corrected to 1986$, using the GNP deflator, is $35 to $42.50.

We would like to offer an alternative price scenario which is used in a National Petroleum Council report on U.S. Oil and Gas Outlook, published in October 1986, and which was suggested by the Department of Energy to be the basis for the outlook report. This range of "plausible prices" is between $21 and $36 (1986$). A copy of the letter suggesting this range is attached. We believe this price projection is more realistic than that currently contained in the 1002 report and we urge the Department of Interior to consider using it in the final report submitted to Congress.

Thank you for this opportunity to comment.

Sincerely,

Thomas F. Hart

MBD:DK

Enclosure

Department of Energy
Washington, DC 20585

May 14, 1986

Mr. James L. Ketelsen
Chairman and Chief Executive Officer
Tenneco Incorporated
Tenneco Building
Post Office Box 2511
Houston, TX 77001

Dear Mr. Ketelsen:

Immediately following the April 22, 1986, meeting of the National Petroleum Council (NPC) Committee on U.S. Oil and Gas Outlook, the Coordinating Subcommittee met. A prime agenda item was to discuss critical path items for the study examining the primary factors affecting the Nation's future supply and demand of oil and gas.

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It was agreed that the Department of Energy would provide two oil price cases intended to suggest a range of plausible prices as assumptions for the purpose of this study. In response, we would propose the following simplified cases:

1. Case A -- Starting at $12 per barrel in 1986 and increasing by four percent per year to about $21 per barrel in the year 2000.

2. Case B -- Starting at $18 per barrel in 1986 and increasing by five percent per year to about $36 per barrel in the year 2000.

These oil prices are expressed in 1986 dollars and should be interpreted as the U.S. Composite Refiner Acquisition Cost.

We appreciate the efforts of you and the other NPC members on this most important study.

Sincerely,

Donald L. Bauer
Acting Assistant Secretary
for Fossil Energy

cc:
Marshall Nichols

U.S. Oil & Gas Outlook

An Interim Report of the National Petroleum Council

October 1986

James L. Ketelsen, Chairman
Committee on U.S. Oil & Gas Outlook

Comments of

THE STANDARD OIL COMPANY

on the

Draft Legislative Environmental Impact Statement

for the

Arctic National Wildlife Refuge, Alaska

Coastal Plain Resource Assessment

COMMENTS OF STANDARD OIL COMPANY

ON THE

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

FOR THE

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

February 6, 1987

SUMMARY COMMENTS
OF THE
STANDARD OIL COMPANY
ON THE
DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT
FOR THE
ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

The Standard Oil Company has prepared detailed analytical comments on the draft report plus line by line suggestions, corrections and comments. These comments are presented in two sections: general comments and specific comments, and include considerable detail on the subjects mentioned below.

Standard Oil Company identified several major weaknesses which require special attention in the final LEIS. Nevertheless the report clearly supports our recommendation to lease the ANWR coastal plain under Alternative A.

Our comments and observations include:

ALTERNATIVE A

- Alternative A - full leasing - offers the greatest potential benefit of the leasing options with significantly more resource potential (3.2 billion barrels versus 2.6 billion) than Alternative B.

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- Delay in leasing the so-called "core calving area" has significant negative impacts: the area as depicted in the draft report covers three geological prospects (two of them of large size - 30 X 7 miles and 21 X 4 miles), which are said to have potential for the presence of the prospective Sadlerochit sandstone reservoir intervals - the principal reservoir at Prudhoe Bay.

- The U.S. domestic energy situation is even more serious than that portrayed in Chapter VII of the report and the contribution of ANWR's potential resources are greater than depicted.

- Projections on the economic impact of the development of the ANWR coastal plain's hydrocarbon resources may be underestimated by the DOI, given major trends in the oil industry and energy picture during the past 18 months.

THE CARIBOU CORE CALVING AREA

- There is no single, fixed, "core" calving area used by the Porcupine caribou herd and uniquely necessary for its continued well-being.

- The Porcupine herd shows no fidelity to a specific area in the coastal plain for calving.

- The Porcupine herd calves annually in greatly varying locations within an approximate 200-mile east-west area stretching from the Canning River in Alaska to the Babbage River in the Yukon Territory.

- In any given year, the majority of the Porcupine herd will calve outside of the supposed "core" area. Concentrations may not occur inside the "core" area at all. In 1982 and 1986, for example, nearly all calving occurred in Canada.

- The "core" area near the Jago River was defined by FWS on the basis of frequency of overlap of mapped calving concentration areas, not on the basis of actual densities of caribou.

- There is no firm basis for defining a "core" calving area; the FWS criterion of overlap was arbitrary: mapped concentrations had to overlap in at least 5 of 14 years (only 36% percent of the time). It is thus very inappropriate to imply that this area is "critical" to the continued existence of the caribou and warrants designation as Resource Category 1, which would essentially preclude any oil and gas development.

- The methodology and data analysis was flawed in defining the "core" calving area: (1) there are no data to provide a quantitative basis for the density criteria of 50 caribou/square mile (many areas had densities of less), and (2) the maps of calving concentrations used by FWS vary from the originals and appear to have been misplotted.

UNREALISTICALLY NEGATIVE PREDICTIONS OF THE 1002 REPORT

Flawed assumptions and methodology have resulted in environmental impact conclusions that are consistently extreme . Problems include:

- Application of the FWS Mitigation Policy, which assumes habitat is limiting to the wildlife populations of concern in ANWR; this is not supported by the scientific evidence;

- The habitat-based approach, stemming from that policy, has been used to assess impacts by simply overlaying very general "maps of fish and wildlife areas" with hypothetical development scenarios. The results were used to quantify predictions of wildlife habitat losses, disturbances, and even mortality. Such a methodology applied to Prudhoe Bay would predict major decreases in wildlife populations. The Prudhoe Bay experience shows that this does not occur.

- Unrealistic assumptions of concurrent development for 3 major fields. If three fields of different sizes were discovered simultaneously (which is highly unlikely), the largest field would inevitably be developed first. The development of Prudhoe Bay in 1977, Kuparuk in 1981 and Lisburne in 1987 illustrates this. They were all discovered in 1968-1969.

- Impact conclusions which appear to ignore existing laws and regulations that currently govern oil and gas activities.

- Use of non-primary, out-dated, out-of-context, or incomplete documentation upon which the report's conclusions were based.

"SPHERES OF INFLUENCE"

- Every structure, road or facility has been assigned an arbitrary "sphere of influence" on wildlife (e.g. caribou, muskox). It is assumed that total displacement of animals occurs from these areas. This is not realistic

- Furthermore, it is assumed that passive facilities sited within the so-called "core" calving area could cause a decline of 20-40% of the PCH . There is no justification for this conclusion.

- Experience at Kuparuk shows that calving caribou are not significantly displaced by facilities, and their reproductive success is not diminished.

INSECT HARASSMENT AND USE OF THE COAST FOR RELIEF

- The 1002 report emphasizes insect harassment and the importance of insect-relief habitat to caribou, stating that insect harassment is one of the primary driving forces in the annual caribou cycle.

- The report describes the coastal strip of the 1002 area as critically important insect relief habitat and concludes that east-west roads and pipelines will essentially block access to this habitat with detrimental consequences to the caribou population.

- These conclusions are in error because:

  -- Annual migration cycles do not correlate with insect conditions in many years.

  -- Coastal areas are generally visited for only a short period of time. Some years they are not visited at all.

  -- Blockage of migration is a non-issue since pipelines and roads can be built to permit passage, and traffic controls can be implemented as necessary. (Prudhoe Bay has clearly not proved to be an impediment to the Central Arctic caribou herd.)

  -- It is doubtful that even a major (hypothetical) loss of the coastal fringe habitat would prove to be of significant consequence to the Porcupine herd.

I-86

THE USFWS MITIGATION POLICY

- The FWS Mitigation Policy forms the basis for biological assessments and proposed mitigation approaches in the draft report. The FWS policy assumes, as a basis for analysis, that the size and growth potential of wildlife populations are limited by habitat availability. The validity of this principle in the Arctic is not supported by scientific evidence. Therefore, habitat-based conclusions and mitigation recommendations in the draft report are generally unrealistic.

- A better approach to mitigation is to focus on population limiting factors. Mechanisms by which the size and growth of a population are linked should be identified and then managed to achieve a desired population level.

- Population-limiting factors acting on arctic wildlife vary with species. Such factors include shortness of the summer snow-free period, predation, severe winter conditions, and characteristics of winter range used by migratory species when absent from the Arctic. Availability of high value habitat -- the basis for the FWS Mitigation Policy -- has not been shown to limit most arctic wildlife species.

EXISTING REGULATORY STRUCTURE AND INDUSTRY PRACTICES

- The report fails to review the existing regulatory framework governing petroleum leasing, exploration, development, and production in arctic Alaska, creating an impression that these activities occur in a regulatory vacuum. The report also fails to document current (and evolving) industry practices that routinely accomplish significant mitigation of potentially adverse environmental effects.

RECOMMENDATIONS OF THE STANDARD OIL COMPANY

The Draft ANWR Coastal Plain Resource Assessment establishes a basis for the production of a credible final report to Congress supporting full leasing (Alternative A) of the ANWR coastal plain, with the following recommended revisions:

1. Update of Chapter VII to reflect probable effects of the 1986 price collapse on future U.S. energy reserves and the contribution of potential ANWR petroleum resources;

2. Re-evaluation of the caribou literature and revision of analyses relating to the "core calving area" concept, the "sphere of influence" hypothesis, and the importance of insect relief in driving the caribou annual cycle;

3. Modification of impact assessment methods to eliminate over-simplified analyses based on "reductions in habitat value"; examination of known population-limiting factors acting on caribou and other wildlife species of concern;

4. Revision of development scenarios to reflect a sequential series of oilfield developments rather than assumed concurrent developments, with corresponding revision of environmental assessments and conclusions;

5. A critical review of applicability of the FWS Mitigation Policy as applied to the North Slope of Alaska and species of concern, including caribou, muskoxen, polar bear, snow geese, and arctic char; and

6. Review and documentation of the existing regulatory framework and standard industry practices in arctic Alaska, and revision of environmental assessments and mitigation recommendations to reflect these.

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INDEX OF COMMENTS PROVIDED BY STANDARD OIL COMPANY

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT
ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA
COASTAL PLAIN RESOURCE ASSESSMENT

INTRODUCTION

Standard Oil Company has conducted a thorough review and analysis of the Draft Arctic National Wildlife Refuge (ANWR) Coastal Plain Resource Assessment and Legislative Environmental Impact Statement (LEIS) published by the U.S. Department of the Interior in November 1986. We commend the authors for producing a report that is brief and readable. Based on our long experience of operating in the Arctic, we believe the report reasonably represents the substantial body of baseline information which will be helpful to support decisions regarding future leasing on the coastal plain.

We find that the authors need to modify caribou discussions to make assessments of environmental consequences more realistic, and that it does not justify some of the proposed mitigation measures. We question in particular the appropriateness of the application of the U.S. Fish and Wildlife Service (FWS) Mitigation Policy to the Arctic, and the use of that policy as the basis for assessments of potential environmental consequences of petroleum development on the ANWR coastal plain. We have attempted in our general and specific comments to explain the biological difficulties inherent in applying the FWS Mitigation Policy to the Arctic, and to provide substantive information that will assist the authors with a reevaluation of caribou issues.

I-88

We believe that the ANWR coastal plain must be opened in full to responsible petroleum leasing, exploration, development, and production (Alternative A), and that Alternative A is entirely compatible with sound management and conservation of the Nation's fish and wildlife resources. Only in this way will our future national interest be responsibly served.

Our review comments are presented in two major sections, General Comments and Specific Comments. Under General Comments, we address issues that apply to the entire draft report, to major sections, or to subjects that receive prominent treatment. Under Specific Comments, we provide a detailed review organized by chapter, page, column, paragraph, and line.

GENERAL COMMENTS

1. U.S. FISH AND WILDLIFE SERVICE MITIGATION POLICY

The draft report contains flaws in biological assessment that apparently stem from inappropriate application of the U.S. Fish and Wildlife Service's (FWS) nationwide Mitigation Policy (FWS 1981) to the Arctic. Biological assessments presented in the draft report follow a standardized habitat-based approach which, as explained below, has no real basis for use in arctic environments where habitat availability is not known or thought to limit most wildlife populations (for evidence, see General Comment No. 2). This habitat-based approach leads to easy, unrealistically extreme predictions of reductions in habitat value across large tracts of land and even of potential declines in wildlife populations. The draft report's almost total reliance on habitat availability as the basis for biological assessments casts serious doubt on the validity of the report's conclusions and mitigation recommendations.

The draft report's use of the FWS Mitigation Policy in an arctic context leads to a case of reverse logic. It places policy first, and biology last. The text (pp. 95-98) suggests that first, a decision was made to apply the FWS Mitigation Policy to potential petroleum development on the ANWR coastal plain. Second, because that policy is based on the assumption that habitat availability limits any wildlife species under review, this assumption was implicitly adopted as the rationale governing biological assessments of potential development-related effects on coastal plain wildlife, including the majority of vertebrate species which are present only during the brief arctic summer. Third, habitat-based mitigation goals and recommendations were adopted. The problem with this reasoning is that it starts with policy, not with biology. It imposes a particular point of view on the real world without first determining whether the real world conforms with the imposed viewpoint.

The FWS Mitigation Policy is intended for nationwide application and does not take geographic differences into account. It establishes a standardized approach to biological impact assessment based on the concept that habitat

availability limits (or is likely to limit under foreseeable and probable circumstances) the size and biological productivity of wildlife populations in their "natural" state, i.e., in the absence of human influence. FWS biologists know that this is not always so. It is often true in the tropics, and sometimes true in temperate regions. However, most evidence (see General Comment No. 2) indicates that arctic (polar/subpolar) habitat availability does not limit the size or productivity of most bird and mammal populations that use arctic (polar/subpolar) regions during part or all of the year.

If the FWS mitigation policy and its habitat-based assessment/mitigation approach are considered applicable to the Arctic in general and the 1002 area in particular, the report should be revised to present a clear rationale and supporting evidence for this assertion.

2. HABITAT-BASED ASSESSMENTS OF BIOLOGICAL CONSEQUENCES

As noted above, biological assessments and conclusions presented in the draft report are based, apparently for reasons of policy, on the implicit assumption that wildlife populations using the ANWR coastal plain are limited by habitat availability. This assumption is never stated outright, but for the draft report's habitat-based assessment approach to make sense, the assumption must be there. It is doubtful that the authors have systematically examined the proposition, and it seems clear that they have not thought about population-limiting factors or reviewed available scientific literature elucidating such factors. There is no a priori reason to suppose the assumption to be true; yet evidence or even logic supporting its validity is neither cited nor discussed.

I-89

Obviously, sufficient habitat (as space, food, cover, etc.) is a precondition for the existence of any plant or animal population, but habitat availability does not necessarily regulate or limit population size and growth rate. As discussed in greater detail below, animal populations may be limited by a great variety of other factors (e.g., snow-free season too short to allow consistently successful reproduction from year to year, direct mortality through predation or from severe winter conditions) that prevent animal

numbers from ever approaching habitat carrying capacity. Although a habitat-based approach to biological assessment is clearly applicable to geographic areas where habitat availability is known to limit year-round resident wildlife populations (e.g., tropical and some temperate regions), the applicability of such an approach to the Arctic Coastal Plain has yet to be demonstrated or even convincingly suggested. Thus a critical reading of Chapter VI, Environmental Consequences, indicates that its entire biological basis may be erroneous, casting serious doubt on the validity of biological conclusions and mitigation recommendations contained therein.

Because this is such an crucial point, with important implications for how biological impact assessment should be conducted in the Arctic, we wish to discuss it at some length. There is no biological principle and no available evidence that would lead one to presuppose that habitat availability is likely to limit populations of most bird and mammal species inhabiting the ANWR coastal plain during any part of the year. Therefore, it does not make sense to use this assumption as justification for predicting adverse effects of oilfield development on wildlife populations. Yet this unexamined assumption serves as the primary basis for biological assessments and predictions presented in the draft report. Analyses of direct and indirect reductions in habitat value are used to suggest that population declines may result from oilfield development, when the described reductions in habitat value -- were they actually to occur in the manner and at the magnitudes stated in the draft report -- would most likely have no detectable effect on reproductive rates, recruitment rates, physical condition, abundance, sex/age composition, or overall distribution of wildlife populations inhabiting the 1002 area at any time of the year.

We make this assertion because in the Arctic, the availability of habitat has not been shown or convincingly suggested to be the factor limiting most wildlife populations. Evidence (discussed below) clearly indicates that most animal populations in the Arctic are well below the carrying capacities of their habitats and are prevented by various limiting factors from ever reaching those carrying capacities. Major habitat losses on a regional scale would be required to lower carrying capacities to the point that animal

numbers would be limited as a consequence. For habitat availability to become a population-limiting factor in the ANWR 1002 area, major habitat losses far beyond those predicted in the draft report would have to occur.

The following discussions briefly review evidence for population-limiting factors acting on a few examples of wildlife species using the Alaskan Arctic Coastal Plain.

A. Mammals

We have found no evidence that arctic populations of large mammals are limited by habitat availability, except in cases involving island introductions of reindeer and muskoxen not subject to hunting and predation (e.g., Klein 1968, Smith 1984). Continental caribou populations are probably limited by wolf and other predation augmented by human harvest (Bergerud et al. 1984), and herds calving on the Arctic Coastal Plain have steadily increased during the period of oilfield development. Mainland caribou herds (including the Porcupine, Central Arctic, and Western Arctic) typically have less than 2 individuals per square mile of the area over which they range (Bergerud 1980). Several estimates of numbers of caribou that could (theoretically) be supported on various caribou ranges are available. Bergerud (1980) reported that the carrying capacity of the region over which the Fortymile herd in Alaska ranges is about 13 animals per square mile. A simulation model for the Kaminuriak herd in Canada (Walters et al. 1975) also predicted a density limitation on food at about 13 animals per square mile. A similar model for the Porcupine herd in Alaska and Canada indicated that food depletion might occur at 35 caribou per square mile (Walters et al. 1978). Measurements of vascular plant production and caribou consumption rates in the Prudhoe Bay area indicated that 1 caribou per square mile using the range year-round would consume at most about 1.5% of the annual vascular plant production (calculated from White et al. 1975), a large proportion of which is high-quality caribou forage. These estimates indicate that existing arctic ranges could support many more caribou than currently exist, and that range carrying capacities are unlikely

I-90

ever to be approached unless predation and hunting are severely curtailed in the future [see Bergerud et al. (1984)].

As a further indication that mainland caribou populations seldom, if ever, reach the carrying capacities of their ranges: reindeer (the same species as caribou, Rangifer tarandus) introduced to islands relatively free of predation and hunting pressures have reached population levels far exceeding those of mainland caribou in North America. On St. Paul Island in the Bering Sea, introduced reindeer reached a density of 49 per square mile before declining from over-grazing (Scheffer 1951). On St. Matthew Island, an entirely different study found that introduced reindeer peaked at 47 per square mile before declining (Klein 1968). On South Georgia Island in the South Atlantic, introduced reindeer reached 58 per square mile before declining [calculated from Leader-Williams (1980)]. All these herds, and apparently also one in West Greenland where predation and hunting were absent (Roby 1980), eventually declined because of food shortages that would not have occurred had the herds been reduced in the normal fashion by predation and hunting.

Some biologists have suggested that caribou herd declines in North America in the early 1900s were caused by winter forage (mainly lichen) destruction by forest fires (Edwards 1954, Scotter 1967). But more rigorous analyses (e.g., Klein 1967, Henshaw 1968, Miller 1971, Bergerud 1974, Kelsall and Klein 1979, Roby 1980) suggest that starvation or even observable debilitation in caribou in winter is rare except in populations isolated from predators and prevented from dispersing to unoccupied habitats. In Newfoundland, where caribou access to forage in winter is frequently hampered by some of the most severe snow and ice conditions in North America, there has been no evidence that any population parameter has been influenced by winter food availability (Bergerud 1971).

In the case of muskox populations in the High Arctic, climatic extremes are thought to result in die-offs and reproductive failures that, in the absence of hunting, impose an upper limit on muskox numbers before range carrying capacities are reached (Gunn 1984). Where a formerly steady hunting pressure has been relieved through human resettlement, muskox populations have rapidly

expanded (Gunn et al. 1984). Mainland Canadian and Alaskan muskox populations were sharply reduced by hunting with the introduction of firearms to the North in the nineteenth century (Gunn 1984). Recent introductions to formerly occupied range have, with regulated constraints on hunting pressure, resulted in rapid population growth (Gunn 1984). Thus in comparatively moderate climatic zones such as the 1002 area, it is conceivable that if an enforced ban were imposed on hunting and predators were eliminated or consistently reduced over the long term, descendants of introduced muskoxen might reach range carrying capacity at some future time. However, it seems unlikely that existing limiting factors would be artificially suppressed through such intensive management controls, because there would be no useful purpose in raising muskox population levels to range carrying capacities.

B. Birds

Migratory birds nesting in the 1002 area are generally at or near the northern limit of their range. The population-limiting factor operating on most of these ground-nesting species is the density-independent influence of the short arctic summer. North Slope habitat is considered marginal for birds because the short and highly variable snow-free period can sharply reduce nesting success, especially for waterfowl (McKnight and Hilliker 1970, King 1970).

I-91

Although food supplies are abundant in the Arctic and competition for food is generally low (Ogilvie 1978), late snow-melt, a late snowstorm, or an early first snowstorm can impair reproductive success regardless of how much habitat is available or how many birds are using it. Thus weather exerts a large density-independent influence on reproductive success that is ameliorated in more southerly regions where the snow-free period is consistently longer. This may explain why the majority of (or perhaps all) bird species nesting on the Arctic Coastal Plain are found to nest in greater numbers and higher densities in more temperate places such as the Yukon-Kuskokwim Delta, the Tetlin-Northway area, and the Canadian prairie pothole region (King 1970, Bellrose 1976, Johnson et al. 1985; see Table 1). The marginal climatic character of the Arctic Coastal Plain may also account for the typically lower productivity of North Slope nesters compared to the same species nesting

elsewhere. In tundra swans, for example, percent young-of-year measured in winter for swan groups breeding in northern Alaska and the Northwest Territories, Canada, is typically lower than for swans breeding in the Yukon-Kuskokwim Delta and farther south (Lensink 1973, Bellrose 1976). Brood sizes of Alaska North Slope swans are typically lower than those of swans nesting in the Yukon-Kuskokwim Delta (King 1970, Wilmore 1974).

[Note: Raptors are an exception to the general principle that bird populations nesting in the Arctic are subject to density-independent limits imposed by the length of the snow-free period. Raptors (e.g., gyrfalcon, peregrine falcon, golden eagle) tend to be limited by availability of suitable nesting sites (see review by Newton 1979). Some cliff-nesting sites can shelter breeding adults and their young from snow accumulation and allow successful fledging under prolonged adverse weather conditions. Even raptors, however, can be subject to prevention of successful clutch production or fledging by severe summer climatic constraints.]

C. Fish

In the case of the five anadromous fish species associated with the 1002 area (including arctic char, a 1002 evaluation species), availability of overwintering habitat (deep, unfrozen pools in river channels) -- i.e., not coastal marine habitat -- probably limits productivity and abundance [see review by Craig (1987)]. As long as overwintering pools are identified and left unchanged, free passage is maintained, and entrainment of eggs or young is avoided, no changes in fish populations are expected to result from onshore petroleum development structures or activities within the 1002 area. The measures necessary to accomplish these objectives are already standard civil engineering practice in Alaska.

Table 1. **Very general** estimates[1] of numbers of commonly-breeding waterfowl on the Arctic Coastal Plain of Alaska and elsewhere. Estimates based on general information presented in Bellrose (1976), King (1970), and Johnson et al. (1985). (Note: Most geese of all species summering on the Arctic Coastal Plain are non-breeders.)

ESTIMATED NUMBERS OF BREEDING BIRDS

	Alaska, Arctic Coastal Plain (ACP)	Alaska, Yukon-Kuskokm. Delta	Alaska, Entire State	North America (Winter Populations)	ACP Nos. As % Alaska	ACP Nos. As % North America[2]
Canada Goose	1,000	80,000	125,000	>2 mill.	0.8	0.05
L. White-Fr. Goose	5,800	80,000	100,000	200,000	5.8	2.90
Snow Goose	100-200	0	100-200	1.3 mill.	100.0	0.02
Brant	5,000	75,000	100,000	>300,000	5.0	1.70
Tundra Swan	1,000	40,000	--?--	90,000	2.5	1.10
Oldsquaw	50,000-100,000	290,000	590,000	3-4 mill.	16.9	2.50

1 These estimates are made solely for the purpose of illustrating the present discussion and should not be otherwise used or cited.

2. Percentages of estimated winter populations.

3. BIOLOGICAL ASSESSMENT PROCEDURE

The described procedure (p. 95, col. 2, par. 3 and 4) by which environmental consequences were determined appears to be flawed for several reasons, as explained below. If the procedures described in the draft report were not, in fact, those used to arrive at conclusions concerning potential biological consequences of petroleum exploration and development within the 1002 area, the text should be revised to provide clarification.

A. Apparent use of small-scale maps

Wildlife use areas shown on Plates 1-3 are vague and general, and are mapped at an extremely small scale. Although they may be helpful in providing the public with a general idea of wildlife use areas within the 1002 area, these maps are not appropriate to serve as the basis for a professional analysis of biological issues or to support professional review of the draft report. If -- as indicated on p. 95, col. 2, par. 3 -- the maps shown in Plates 1-3 were indeed used to develop an assessment of potential development effects on wildlife, the results can have no real usefulness. If larger-scale, location-specific maps were used, the text should be revised to say so.

B. Inappropriately precise use of hypothetical development scenarios

The draft report states, "Maps of fish and wildlife use areas (pls. 1-3) were overlaid with full and limited development scenarios (fig. V-1). This allowed measurement of direct habitat loss or alteration. Determinations were then made as to the nature and magnitude of direct and indirect habitat losses, disturbance, mortality, and other potential effects" (p. 95, col. 2, par. 3). In reality, overlaying fish and wildlife use maps (even if superior to Plates 1-3) with the full and limited development scenarios shown in Figure V-1 (p. 90) was pointless because, as the draft report properly acknowledges, "Alternatives A and B depict hypothetical infrastructures", and "any prediction as to the various stages of development at any given time on the 1002 area would be highly speculative and perhaps misleading" (p.95, col. 2, par. 4). Yet the text states that this procedures was in fact used to measure

"direct habitat loss or alteration" and apparently to quantify the "magnitude of direct and indirect habitat losses, disturbance, mortality, and other potential effects" (p.95, col. 2, par. 3). It is difficult to see how such measurements, especially determinations of disturbance and mortality, could have been made using the described approach, or how any substantive conclusions could have been reached. The described assessment approach can only shake the critical reader's confidence and cast doubt on all biological conclusions presented in Chapter VI.

C. Indiscriminate use of habitat as the basis for biological assessments

Most important, the text implicitly assumes, for reasons unstated, that predicting "direct and indirect habitat losses" is a biologically appropriate means of assessing probable development effects on wildlife inhabiting the 1002 area (pp. 95-98). This relates to the concept, discussed in General Comment 3.B, that overlaying maps of general wildlife use areas with hypothetical oilfield layout plans, and then inferring changes to habitat, is a valid basis for predicting a wide range of effects on wildlife. In reality, habitat change is only one of many factors that can affect animal populations. Availability of arctic habitat has not been shown or even suggested to limit populations of most wildlife species that live in the Arctic during part or all of the year [and is likely to do so primarily in the case of anadromous fish, raptors, and possibly other bird species that combine (1) highly exclusive nesting territories with (2) nesting range confined exclusively or predominately to the Arctic]. On the Arctic Coastal Plain of Alaska, a habitat-based approach to assessing potential effects of development on wildlife may miss the mark entirely. Where habitat availability is likely to be a contributory factor in limiting the productivity of a species -- e.g., arctic and red-throated loons (Davis 1972, Johnson et al. 1975, Bergman and Derksen 1977, Derksen et al. 1981) or dunlin (Holmes and Pitelka 1968, Holmes 1970) -- loss or alteration of habitat is one of several factors that can be appropriate for predicting development-related effects on the species in question. However, for species where there is no evidence that habitat availability is or is likely to be a population-limiting factor -- e.g., caribou (Bergerud 1986, Bergerud et al. 1984) -- a predominately habitat-based

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approach is clearly inappropriate. This is especially true when factors unrelated to habitat (e.g., mortality on winter range in other geographic areas) are ignored or de-emphasized as a result of applying an across-the-board habitat-based approach as a matter of policy.

D. Apparent misunderstanding of population-limiting factors

The only biologically meaningful approach to assessing and mitigating effects of development on wildlife is -- first -- to determine systematically how project activities and structures will affect population-limiting factors for each species of concern, and -- second -- to apply mitigative measures that avoid or offset project effects on those limiting factors. If an automatically applied habitat-based approach happens to be effective for a species, this is because one or more population-limiting factors happens to involve habitat.

It is in keeping with the national trend of FWS, codified in the FWS Mitigation Policy (FWS 1981; p. 12, col. 2, par. 2 and 3; pp. 97-98), to think largely in terms of preserving "habitat value" -- an approach that usually translates into protecting land from change, or ensuring that all change is "natural". This represents a departure from the more conventional but tried-and-true approach of managing fish and wildlife populations through limiting factors (which may include habitat components requiring protection).

The latter approach -- managing (or mitigating) through limiting factors -- is superior because it is reality-oriented. One first identifies, to the extent that available knowledge allows, the key factor or factors that really do regulate a population by limiting its productivity and growth. Having done so, one can then establish concrete objectives and procedures based on managing those limiting factors to achieve or sustain the desired population growth rate and size.

In geographic regions where habitat-based mitigation or management approaches have been shown successfully to stabilize wildlife populations or reverse their declines, the reason has been that the availability of one or several

habitat components (food, three-dimensional space, cover, etc.) is limiting to the species in question. This is often true for specialized species occupying a relatively narrow niche of habitat parameters (e.g., greater and lesser prairie chickens, Kirtland's warbler) and tends to be more common in the tropics (e.g., quetzals and other trogons, toucans, hornbills, etc.) than in temperate or especially polar regions, where (in the latter case) few examples of wildlife (e.g., raptors, anadromous fish) are known to be limited strictly by habitat availability.

4. UNREALISTICALLY EXTREME PREDICTIONS

The draft report presents unrealistically negative assessments of biological consequences as the norm. Extreme predictions result from two procedures employed to develop assessments: first, the use of "indirect" reductions in habitat value as the primary basis for predicting adverse biological effects of development; and second, an assumed development scenario based on concurrent construction of oilfield facilities. Because of their important bearing on the draft report's conclusions, we have chosen to discuss these approaches at length.

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A. Indirect reductions in habitat value

Outright loss of habitat (e.g., by covering tundra with gravel) is clearly too narrow an approach to allow a realistic assessment of potential development effects on wildlife, as many effects of development are not mediated through habitat at all. In recognition of this fact, the FWS Mitigation Policy (FWS 1981) formally introduced the term "habitat value". Inclusion of this term in a policy context is highly significant because the term has no specific definition. It can therefore be used to embrace factors that are not really habitat-related -- for example, noise, aircraft overflights, traffic, construction activities -- in a way that appears to link them with habitat through the idea of "value". This means that if a road or pipeline is to be built across a stretch of tundra, a vast expanse of untouched land on either side can be determined to lose "habitat value" because of the potential of the linear structure to impede access by an unpredictable number of animals.

Likewise, one can take a map, draw a circle of any radius around a structure or center of human activity, and declare all land inside the circle to have "reduced habitat value". A huge land area may remain untouched, yet be factored into an additive scheme used to formulate a mitigation requirement.

Through the "habitat value" concept, human activities or structures of any kind can be translated into a specific tract of land with exact boundaries to be protectively regulated. This maintains a formal, although tenuous, consistency with the habitat-based principle of the FWS Mitigation Policy, allowing mitigation to be defined in terms of acres or hectares of specific land areas to be avoided by development or compensated for through agreements involving other, separate tracts elsewhere -- and providing legally precise boundaries and acreages for permit stipulations and record-keeping.

In the draft report, reductions in habitat value are predicted to occur in any of three ways: (a) direct habitat modification; and also indirect habitat modification through (b) displacement of wildlife or (c) blockage of their access to habitat.

Direct habitat modification: The draft report limits predictions of direct habitat modification primarily to caribou. On p. 106, col. 1, par. 5, the report states that "direct modification of caribou habitat could total approximately 5,650 acres." On p. 107, col. 1, par. 2, the report further states that "secondary modification of habitat... could occur on approximately 7,000 acres, of which nearly 1,800 acres is in Resource Category 1.... 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)." These acreage estimates impart a tone of precision to the report; yet there is no explanation of how they were derived, no citation of another report containing the information, not even reference to another chapter of the 1002 report (e.g., Chapter IV) which might be expected to provide acreages to be affected by oilfield development. Where did these acreages come from? Do they somehow relate to the hypothetical development scenarios shown in Plates 1, 2, and 3? Using numbers in this way, without explaining or citing their origin, is

confusing and can be misleading. The final report should be revised to provide clarification on this point.

In any case, the estimated portion of the "core" calving area predicted to be modified by oilfield development -- 1.3 percent -- would be too small to constitute, in itself, a threat to annual calving success. The draft report argues that a more important adverse effect on caribou would result from displacement of animals from or blockage of their access to calving and insect-relief habitats purportedly required to maintain the herd, i.e., indirect losses of habitat value, as discussed below.

Displacement: The draft report frequently uses this term to infer a reduction in "habitat value" for wildlife through their behavioral avoidance of development activities. The quantification of predicted adverse effects on most species (e.g., caribou, muskox, snow goose) is based on the idea that such displacement will be absolute, and that all land involved will undergo a complete and irretreivable loss in habitat value, i.e., will be avoided entirely and receive no use. In other words, the report's evaluation of environmental consequences is based on an unrealistically extreme and biologically improbable concept. Yet this approach is never stated as a working assumption by the authors. The reader must discover it by a close analysis of the text and tables.

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Species-by-species discussions in the draft report indicate that "displacement" is the primary means through which the authors predict adverse effects on wildlife populations from oilfield development within the 1002 area. Because predicting the actual degree of such displacement (assuming it were to occur) would not be feasible, the authors use a "sphere of influence" concept to develop what at first appear to be precise acres and boundaries amenable to treatment under the FWS Mitigation Policy. In the case of caribou, for example, Table VI-5, p. 107, presents acres and percentages in a format that superficially appears to consist of "hard numbers". In fact, as stated in the table, the acreages represent areas "potentially influenced by development". The problem with this type of analysis is that it bases an absolute, black-and-white picture on very tenuous grounds. This can be highly misleading. For example, the study by Dau and Cameron (1985) from which the

2-mile sphere of influence on caribou was inferred does not find that calving caribou avoided any structure or activity by a distance of 2 miles. It reports a vague but statistically describable trend of increasing density of cows and calves with distance from the Milne Point road. There is no 2-mile effect specifically mentioned in the paper or evident in the data presented, and no apparent justifiction for inferring a "sphere of influence" within which habitat would receive no use, i.e., lose all value. (See General Comment 6.G for discussion in greater detail.) Evidence (e.g., Shank 1979, Jakimchuk 1980, Curatolo et al. 1982) shows that the extent to which caribou avoid a road will depend more on the frequency of traffic on that road than on the mere presence or absence of the road itself.

The text accompanying Table VI-5 (p. 107) is misleading, in that it stretches "Area (acres) potentially influenced by development" (Table VI-5) into "complete loss of habitat values" (p. 108, col. 2, par. 5). In applying this extreme approach to the 242,000-acre "core calving area" defined on p. 28, col. 1, par. 3 and in Plate 2A, the authors conclude that "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)" (p. 108, col. 2, par. 5). However, the authors fail to point out that such an absolute displacement of caribou (or other wildlife) by North Slope oilfield development has not been documented and was not reported in the Dau and Cameron (1985) study from which the 2-mile displacement was inferred. They are presenting an extreme and highly improbable prediction as the norm for analysis, but do not say so.

A similar picture is painted for muskoxen. Table VI-6, p. 113, again assumes (on a different basis) "a 2-mile sphere of influence", indicating that with full (or limited) leasing, the "Percent of Arctic Refuge range influenced by development" would be 53 (or 52) percent of the 211,000-acre range said to receive high use "seasonally or year-round, with calving". As with caribou, the authors stretch their conclusion to the limit, stating:

> "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" (p. 113, col. 2, par. 1).

As with caribou, there is an implicit assumption, for the purpose of the analysis, that all muskoxen would be "displaced" , i.e., lose "habitat value", from a large percentage of their range on the coastal plain. The analysis is based entirely on acreage potentially affected, not on numbers of animals potentially involved.

The muskox conclusions presented in the draft report cannot be justified on the basis of the evidence cited. The authors state, "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" (p. 113, col. 1, par. 2 through col. 2, par. 1, line 3). Using this approach, the authors indicate that habitat value could be "lost or greatly reduced throughout about one-third (256,000 acres) of the muskox range within the 1002 area" (p. 113, col. 2, par 1). However, the reports cited by the authors do not support their conclusion. Those reports document observations of muskox groups near winter seismic surveys. Reynolds and LaPlant (1985) state, "Muskoxen apparently were not displaced from areas of traditional use in 1984. All muskoxen observed were within or near use areas documented in 1982-1984." These authors continue, "Information from movements of radio-collared animals also showed that muskoxen did not move long distances in response to seismic surveys" and conclude that "Any movements caused by the presence of seismic activities probably did not exceed the range of daily movements which occur in undisturbed conditions."

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Reynolds and LaPlant (1985), Urquhart (1973), Beak Consultants Ltd. (1976), and Jingfors and Lassen (1984) all report that muskoxen sometimes show local, transient movements away from seismic trains. As Reynolds and LaPlant (1985) conclude, "Movements away from lines were apparently of relatively short duration and herd or population size did not appear to be affected." None of these authors reports a 2-mile "sphere of influence" from within which muskoxen remove themselves. In fact, the cited reports document an absence of

lasting effects on muskoxen from winter seismic trains, a conclusion reinforced by the work of McLaren and Green (1985) documenting reactions of wild muskoxen to snowmobile activity. To translate local and transient avoidance reactions by wildlife into a generalized loss of habitat value "throughout about one-third (256,000 acres) of the muskox range within the 1002 area", and to postulate "a major negative influence on herd productivity" (i.e., reductions in reproductive rates or in rates of calf recruitment into the adult population) seems unwarranted and misleading.

Again for snow geese, the draft report presents a similar table of specific acreages (Table VI-7, p. 122), this time based on alternative 1.5- and 3-mile "spheres of influence", and states in the accompanying text: "Habitat values could be lost on up to 45 percent of the preferred staging area on the 1002 area and 27 percent of the total preferred staging area in the Arctic Refuge with an assumed 3-mile displacement. A 1.5-mile displacement would result in lost habitat values on nearly 31 percent of the preferred staging area within the 1002 area and up to 18 percent of the total preferred staging area within the Arctic Refuge" (p. 121, col. 2, par. 2).

In all these cases, the problem is the same: displacement within a defined "sphere of influence" will not necessarily result in <u>all</u> animals avoiding the <u>entire</u> area. To base the evaluation of environmental consequences of 1002 area petroleum development on this extreme and biologically inappropriate foundation introduces a strong bias that skews the analysis and conclusions.

<u>Blockage of access to wildlife</u>: Primarily in the case of caribou, potential structural barriers (roads and pipelines) are presented as a mechanism by which habitat value will be reduced or eliminated. The argument is that if some unpredictable number of caribou were to avoid crossing a linear corridor, the entire acreage on the other side of the corridor would be reduced in habitat value. As with displacement, the reduction in habitat value is calculated on the basis of the land area on the other side of the corridor, not on documented observations of actual caribou crossing success. The simplistic conclusion is that some very large number of acres would be reduced in habitat value due to the presence of a linear structure. The draft report

concludes: "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.... If caribou refuse to cross through any development areas, the 294,000 acres would be unavailable as habitat. That area encompasses 52 percent of total 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" (p. 109, col. 2, par. 4).

As with the case for "displacement", the blockage argument assumes that all caribou would fail to cross the corridor. All acreages and percentages presented in the text (pp. 105-109) are based on this premise, along with all conclusions concerning loss of habitat value. A biologically more appropriate assessment procedure would be to base predictions on observed rates of crossing success reported in the scientific literature. There is an abundance of published evidence documenting that a small proportion of caribou in a group might be deterred by a pipeline or road (especially if traffic is present), while the remaining, larger number of animals would cross successfully (e.g., Banfield 1954; Davis et al. 1977; Roseneau 1979; Cameron and Whitten 1980; Fancy 1982, 1983; Fancy et al. 1981; Curatolo et al. 1982; Robus 1983; Bergerud et al. 1984; Russell and Martell 1985). In the case of the 1002 area, where careful attention will be given to the design and operation of roads and pipelines to facilitate caribou crossings, the draft report's conclusions seem particularly far-fetched.

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B. Assumed concurrent construction of oilfield facilities

The development scenario presented in the draft report as the basis for biological assessments contains a major failing: it assumes that all aspects of oilfield development will proceed concurrently. The development scenario

is based on a variety of information contained in Chapter IV (pp.75-87). This chapter gives readers much information on what might be required to develop potential oil and gas fields in ANWR, but it does not address the issue of how activities might proceed. In Chapter VI, the authors chose to perform biological analyses "as if concurrent development were to take place" (p. 95, col. 2, par. 4 and p. 97, col.1, par.1). The authors state that this approach was taken because "any prediction as to the various stages of development at any given time in the 1002 area would be highly speculative and perhaps misleading" (p. 95, col. 2, par. 4, l. 14-16). We can hardly agree with this. In fact, contrary to the authors' position, we suggest that it is more misleading and considerably less accurate to base analyses on obviously unrealistic "all or nothing" concepts than on informed judgments that attempt to take into account more realistic scales and sequences of events. [Many readers are almost certain to conclude that all development stages will in fact proceed concurrently.]

As common sense and knowledge of previous development (e.g., the Prudhoe Bay and Kuparuk oilfields) would indicate, the authors should recognize that development in ANWR will follow a logical progression of events wherein certain types and levels of activities will occur in certain places over varying (sometimes relatively short) time-spans. In reality, caribou and other wildlife will, in many cases, be encountering these activities "one at a time" (or at least not all at once). For example, camps and other infrastructure components may be built at one location to support the first "find", and then several years later at another distant location to support another find (i.e., similar to Prudhoe Bay and Kuparuk). Similarly, a system of production roads and wells may be built in one locale, during which time there will be high levels of activity, and then, after the wells are in place and on line, the kinds and levels of activities will change markedly (many fewer people, vehicles, etc.). Caribou and other wildlife will probably have to contend with activities at only a few locations in any one year, and the locations will undoubtedly shift numerous times over the years. Development occurring sequentially along these lines is a very different matter in terms of assessing potential effects on caribou compared to development occurring in many areas all at once.

Development scenarios are valuable tools for helping assess potential effects of proposed actions, but to be useful models, they must not only incorporate the best information available (both engineering and biological), but also take into account how events might be expected to unfold. Despite many unknowns, development scenarios should still be as realistic and logical as possible. Unrealistically assuming concurrent, large-scale developments in ANWR while at the same time failing to take into account how some activities might proceed, (e.g., general timing and duration of events, differences between actual construction vs. operation) seriously calls into question many of the conclusions and predictions presented in the draft report.

5. DOCUMENTATION

Much of the documentation throughout biological sections of the draft report refers to non-primary references, and some references are outdated or cited out of context. In general, considering the extensive research conducted in the 1002 area over the past 5-7 years, the amount of data collected, and the time available for intensive review, we found biological documentation to be poor or non-existent for many important points, and often incomplete in crucial ways.

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For example, p. 109 (col. 1, par. 3 and col. 2, par 1-3) includes a brief discussion of "the varying successes of caribou in crossing roads and pipelines associated with Prudhoe Bay [and other oilfield] facilities". This discussion generally concludes that roads and pipelines tend to deter crossings by caribou, except in cases of oestrid fly harassment not relevant to the 1002 area analysis (see discussion below). Several papers are cited in support of this negative conclusion. However, most of the cited papers document local behavioral variations observed in caribou when moving near structures, and none documents a definite blockage of free passage by a road or pipeline that resulted in an adverse effect on caribou. Some of the papers cited could be used equally to support the conclusion that roads and pipelines have only a minor influence on caribou movements (e.g., Curatolo et al. 1982; Fancy 1982, 1983), and a considerable body of work by other authors reporting little or no effect of roads, pipelines, or other structures on caribou

crossing success is ignored (e.g., Banfield 1954, Davis et al. 1977, Roseneau 1979, Cameron and Whitten 1980, Fancy et al. 1981, Robus 1983, Bergerud et al. 1984, Russell and Martell 1985). Moreover, there is a failure to note that in no instance has a behavioral modification by caribou in response to a structure been documented to produce any effect on herd size, physical condition of animals, or productivity of a population.

We suggest that a more balanced treatment of the caribou access issue might state:

> In studies involving the effects of the Kuparuk pipeline and associated roads and traffic on caribou movements and behavior, Curatolo et al. (1982) and Robus (1983) found that caribou showed little or no reaction to traffic-free gravel roads, crossing them consistently and frequently. However, when traffic was present, caribou exhibited negative responses which were in direct relation to the proximity of the vehicles (Curatolo et al. 1982). Cameron and Whitten (1980) found that light traffic, minor construction activities, road repairs, etc. in the Kuparuk Development Area had no detectable effect on caribou crossings of roads and use of adjacent areas. In general, caribou cross roads and railroads freely if traffic levels are low, but tend to avoid transportation corridors with heavy traffic (Klein 1971, Curatolo et al. 1982, Mahoney 1982, Northcott 1984). The tendency of caribou to cross a road with traffic or pass near an active drilling site appears to be greatly influenced by the relative level of insect harassment; the greater the degree of insect harassment, the lesser the tendency to be deterred by traffic or other human activities (Cameron and Whitten 1980, Fancy et al. 1981, Robus 1983).

Similar problems involving misinterpretation of cited information are evident in the draft report's discussions of behavioral avoidance by caribou. The draft report states:

> "Behavioral avoidance of development areas displaces caribou from preferred habitats of traditional use.... 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)....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)" (p. 107, col. 2, par. 2).

In fact, none of the referenced papers presents evidence for large-scale displacement of caribou from habitat or for displacement of caribou from "historic" calving grounds. The cited authors report localized, transient

behavioral avoidance of human activities and structures by caribou. What this really means is that caribou tend in some cases (e.g., parturient cows) to maintain a variable distance between themselves and centers of oilfield activity (e.g., Dau and Cameron 1985), and that caribou tend to steer clear of structures when moving through a developed area (e.g., Fancy et al. 1981). All such findings are expected, unsurprising, and generally accepted, and none suggests that large areas of habitat have been abandoned by or made inaccessible to caribou as a result of oilfield development. Moreover, we have found no evidence that the Prudhoe Bay oilfield area was in the past a calving concentration area for the Central Arctic caribou herd. It is therefore misleading to infer that low-density calving currently observed in the Prudhoe Bay area represents a change from past conditions, and that the change is a consequence of oilfield development, especially in light of the fact that caribou of the Central Arctic herd presently calve in and around the Kuparuk oilfield (Cameron and Whitten 1979, 1980; Robus 1983) without any detectable adverse effect on that steadily growing caribou population.

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An additional, related problem concerning biological documentation within the draft report is that authors are sometimes cited out of context. For example, on p. 109, col. 1, par. 2, the authors cite Helle and Tarvainen (1984) and Davis and Valkenburg (1979) out of context. This paragraph discusses insect harassment and its observed effects on caribou during the post-calving period on the ANWR coastal plain. At that time and location, caribou are exposed to harassment by biting mosquitoes. However, the cited references and the draft report's descriptions of supposed extreme consequences to caribou survival all concern infestation by oestrid flies. Oestrid fly harassment of Porcupine herd caribou tends to occur later in the season and predominately southeast of the 1002 area after the majority of caribou have vacated the coastal plain. The issue of insect harassment relative to 1002 area development should be kept strictly in its proper context, i.e., relief from biting mosquitoes, not warble flies and nose bots (oestrid flies).

In a number of instances, relevant literature has been overlooked. For example, McLaren and Green (1985) published in a major journal (Arctic) a useful study quantifying reactions of wild muskoxen to snowmobile activity

that should help form a basis for the muskox discussion on pp. 112-113. These workers found that muskox responses to snowmobile harassment trials were complex and may have been dependent on variables such as herd size, age structure, sex of animal, wind direction, windspeed, and topography. Noise levels appeared to be an especially influential variable, and inconsistent degrees of habituation were observed. In addition, this report documents measured distances at which first reactions and closest approaches occurred.

It has been noted above (General Comment 4.A) that certain papers (Dau and Cameron 1985 for caribou, Reynolds and LaPlant 1985 and Russell 1977 for muskoxen) are cited in the draft report as the basis for postulating "spheres of influence" within which wildlife displacement occurs. Indeed, this concept is the primary assumption on which biological assessments and quantitative conclusions concerning potential impacts of oilfield development on these species are based. Yet none of the cited authors presents evidence supporting a specific zone of caribou or muskox avoidance that could serve as the basis for the quantitative, all-or-nothing assessments presented in the draft report (i.e., Table VI-5, p. 107, and Table VI-6, p. 113). The results of Dau and Cameron (1985) are discussed in greater detail in General Comment 6.G.

6. CARIBOU

One can make an assertion on the basis of intuition or on the basis of evidence. Upon reviewing the evidence of actual experience, we find that no adverse effects of Alaskan petroleum exploration or oilfield development on caribou herd size or productivity have been documented. The published scientific literature clearly shows that during the period of oilfield development in arctic Alaska since about 1976, caribou herds in the region have steadily increased. None has declined. The evidence shows that carefully planned and managed petroleum exploration and oilfield development in the Arctic are compatible with caribou.

We have carefully reviewed sections of the draft report pertinent to caribou and have identified a considerable number of inappropriate assertions and conclusions. The following sections identify and discuss some of the more important problems found in the draft report's treatment of caribou.

A. The Porcupine caribou herd calving grounds

No single, fixed location is used consistently from year to year by the Porcupine caribou herd (PCH), and no such location is "unique and irreplaceable on a national basis or in the ecoregion" (Table VI-3, p. 98) from the standpoint of habitat value or other biological criteria. Figure 1 shows the area used in at least one year by concentrations of calving caribou, as well as the area used by cows that were more dispersed. These might be termed the "principal calving area" and the "general calving area". Together they form a large continuum of calving habitat extending from approximately the Canning River in Alaska nearly to the Mackenzie Delta in the Yukon Territory, Canada.

Calving females comprising a varying portion of any caribou herd do tend to concentrate briefly in one or more areas in the spring of any given year. Lent (1966) and Valkenburg and Davis (1986) described such areas for the Western Arctic herd and the Steese-Fortymile herd, respectively. "Core" or "concentrated" calving areas may or may not be consistent from year to year (Valkenburg and Davis 1986); consistency of use may, for example, depend on annual snowdepth patterns (Lent 1980). PCH calving concentrations vary annually in number and location, sometimes falling within the same general area, other times varying by hundreds of miles (Roseneau et al. 1975). Calving occurs primarily in the uplands along the northern sides of the Sadlerochit, Romanzof, 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 the Yukon Territory, an east-west distance of over 200 miles and an area exceeding 6,500 square miles. In 1982, for example, the majority of the PCH calved east of the United States-Canada border in the Yukon Territory, completely outside ANWR (FWS 1983), and FWS investigators, citing Roseneau et al. (1975), stated "this pattern of spring range use has been noted several times previously" (FWS 1983). In any given spring, there are often (but not always, e.g., 1973, possibly 1980; see Fig. 2) one to several areas where the densities of parturient cows are higher than elsewhere in the PCH calving range (D. Roseneau 1986, pers. comm.). These concentrations may be several hundred miles apart, some in Alaska, some in the

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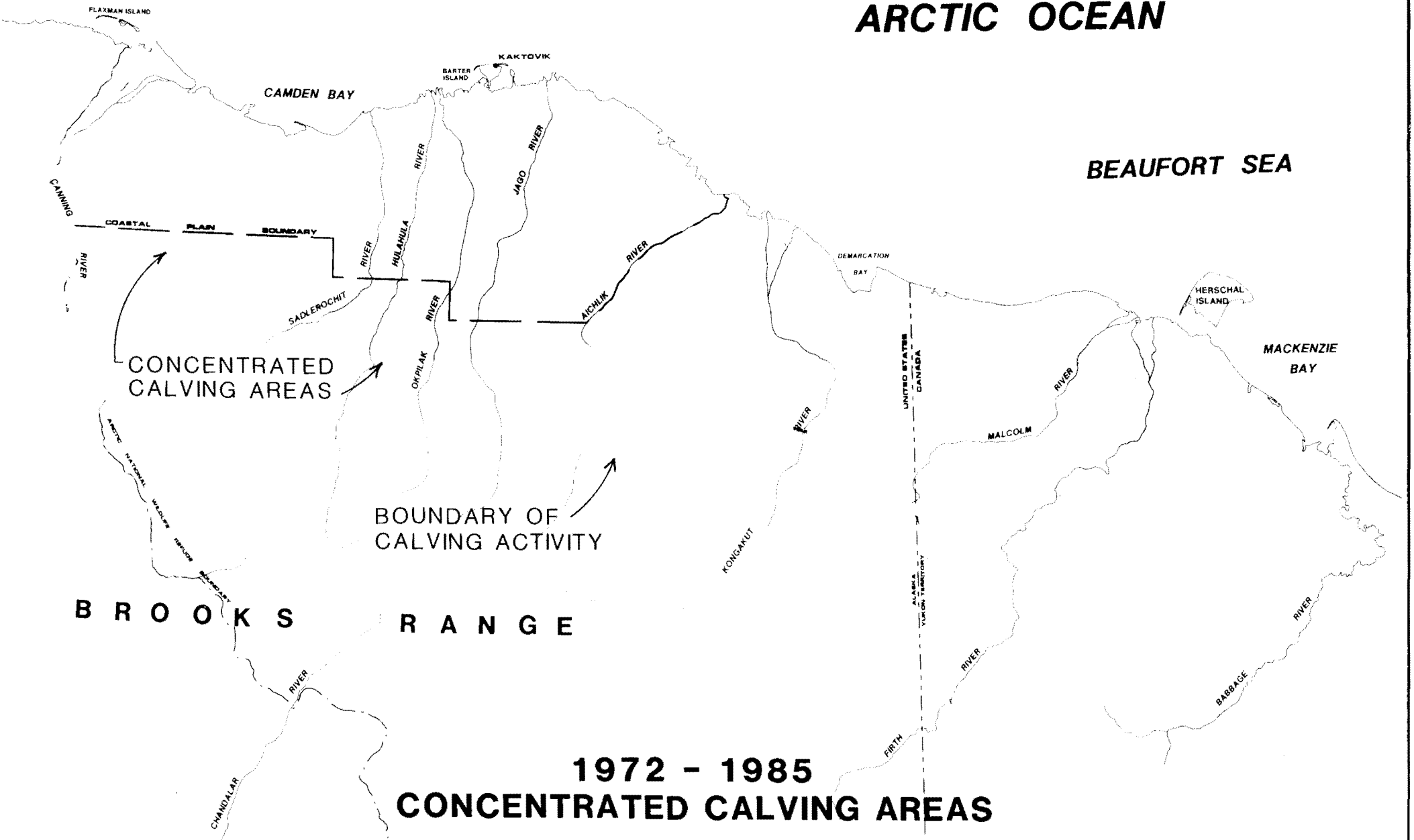
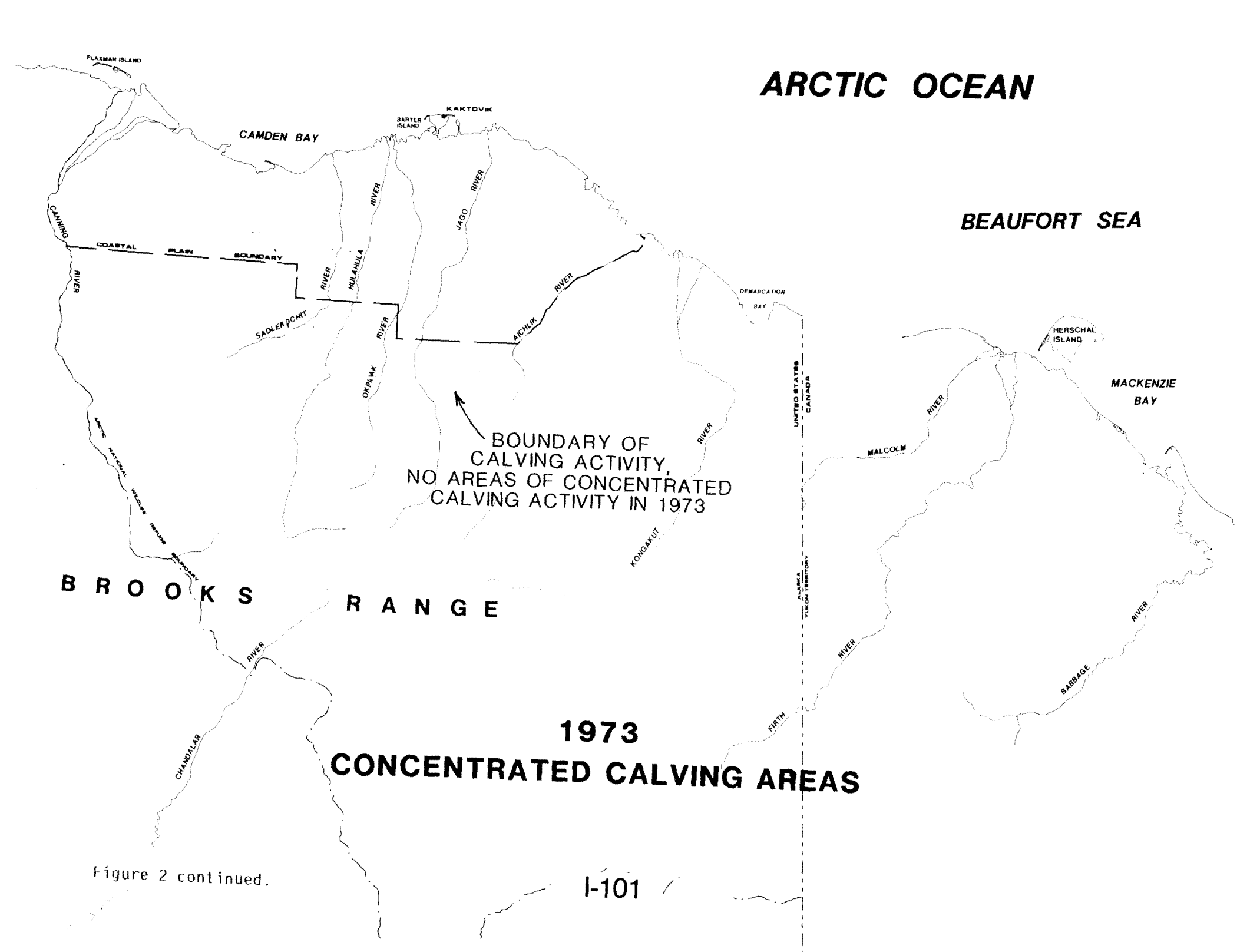


Figure 1. Areas of concentrated and general calving activity of the Porcupine Caribou Herd, 1972-1985. Solid areas were identified as being used by 'concentrations' of calving caribou in at at least one of 14 years; the solid line marks the approximate boundary of calving activity during the same period. Note that concentrated calving takes place in a broad area extending about 200 miles from east to west and from the foothills to near the coast. See Figure 2 for yearly patterns. [Based on data provided by D.G. Roseneau (1972-1981) and by U.S. Fish and Wildlife Service (1982-1985)].



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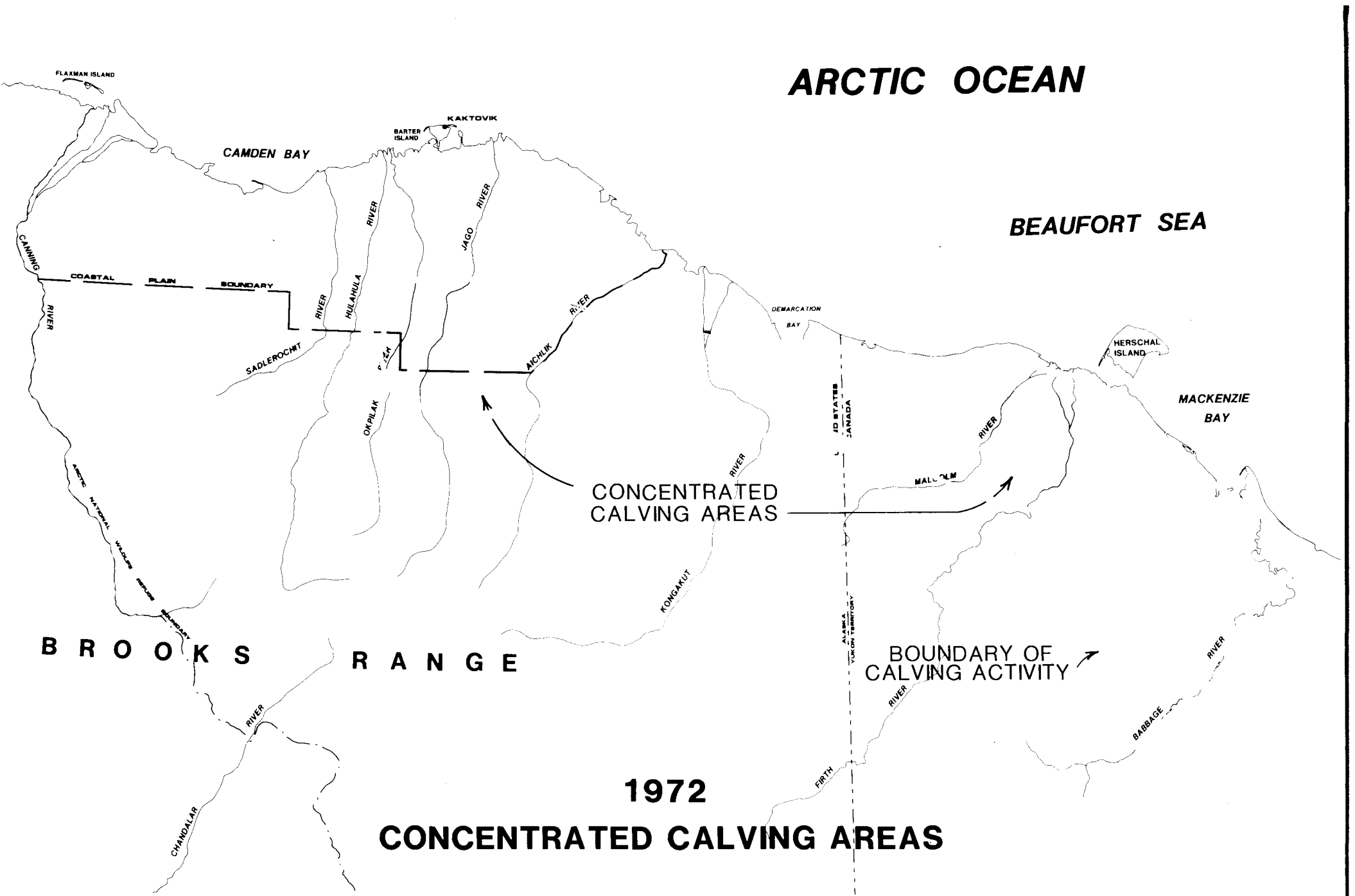
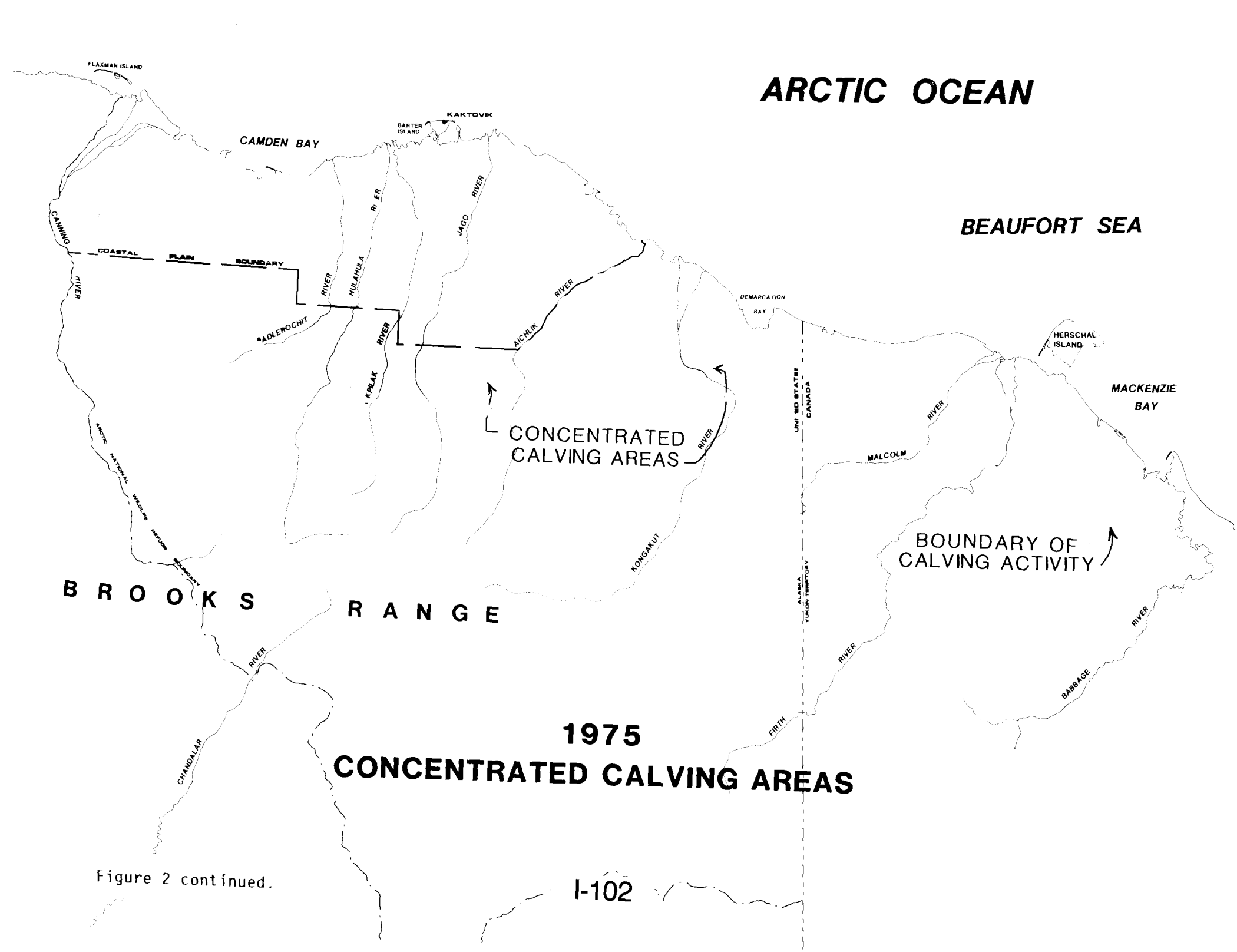


Figure 2. Areas of concentrated and general calving activity of the Porcupine Caribou Herd by year, 1972-1985. Solid areas were identified as being used by 'concentrations' of calving caribou; the solid line marks the boundary of calving activity. Note the large amount of annual variability in the location of concentrations of calving caribou. In some years (1973 and 1980) no calving concentrations were observed. [Based on data provided by D.G. Roseneau (1972-1981) and by U.S. Fish and Wildlife Service (1982-1985)].



1975
CONCENTRATED CALVING AREAS

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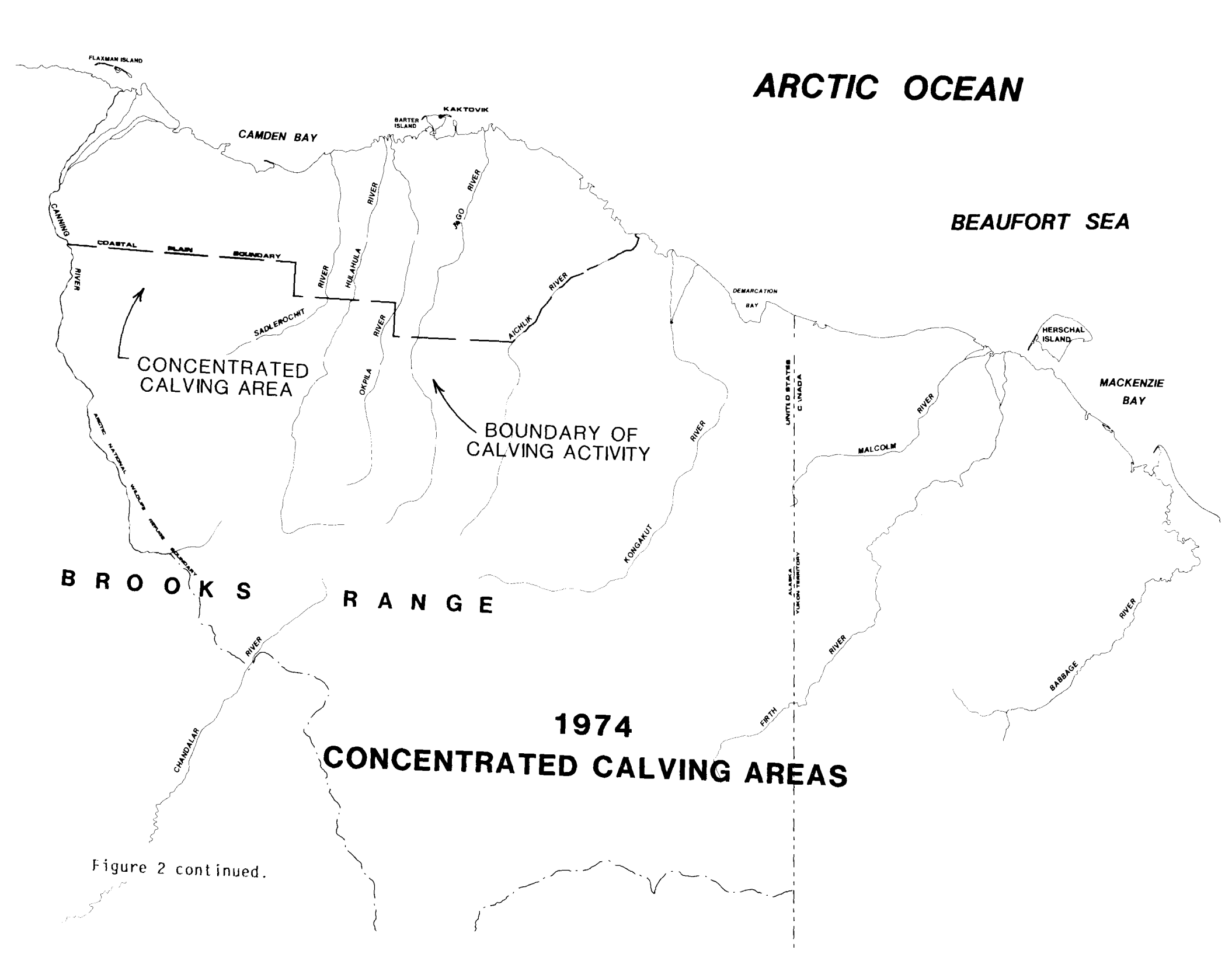

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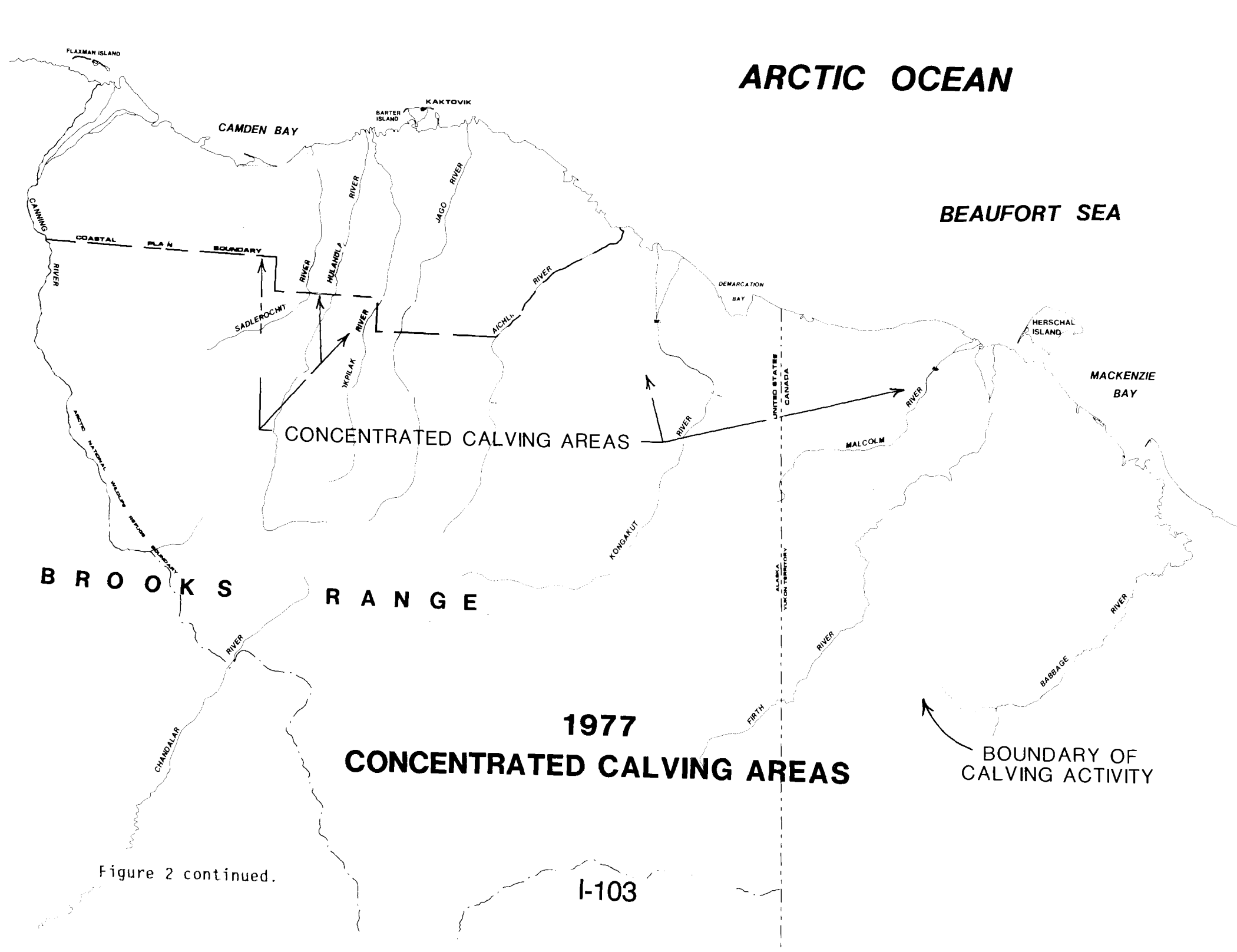

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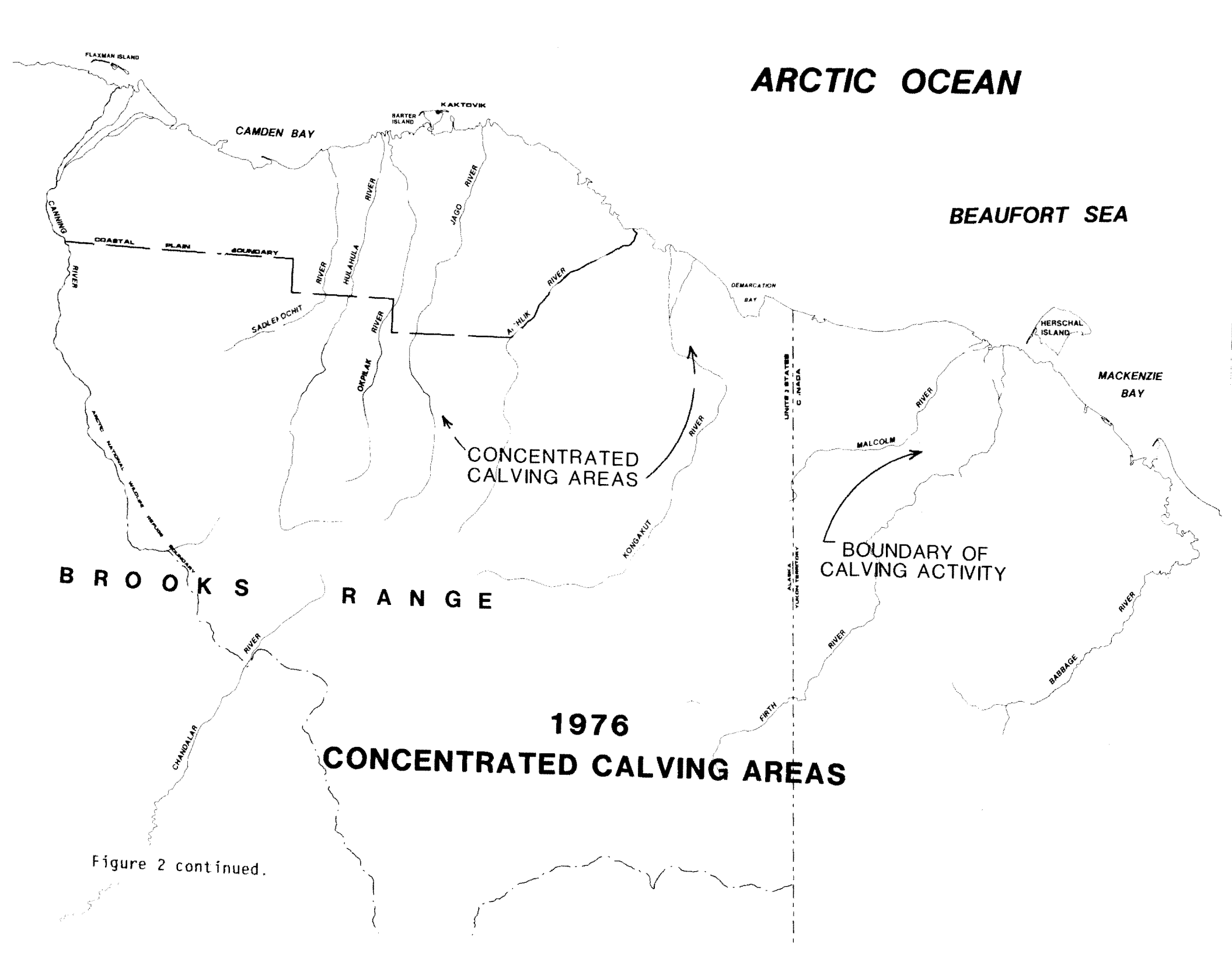

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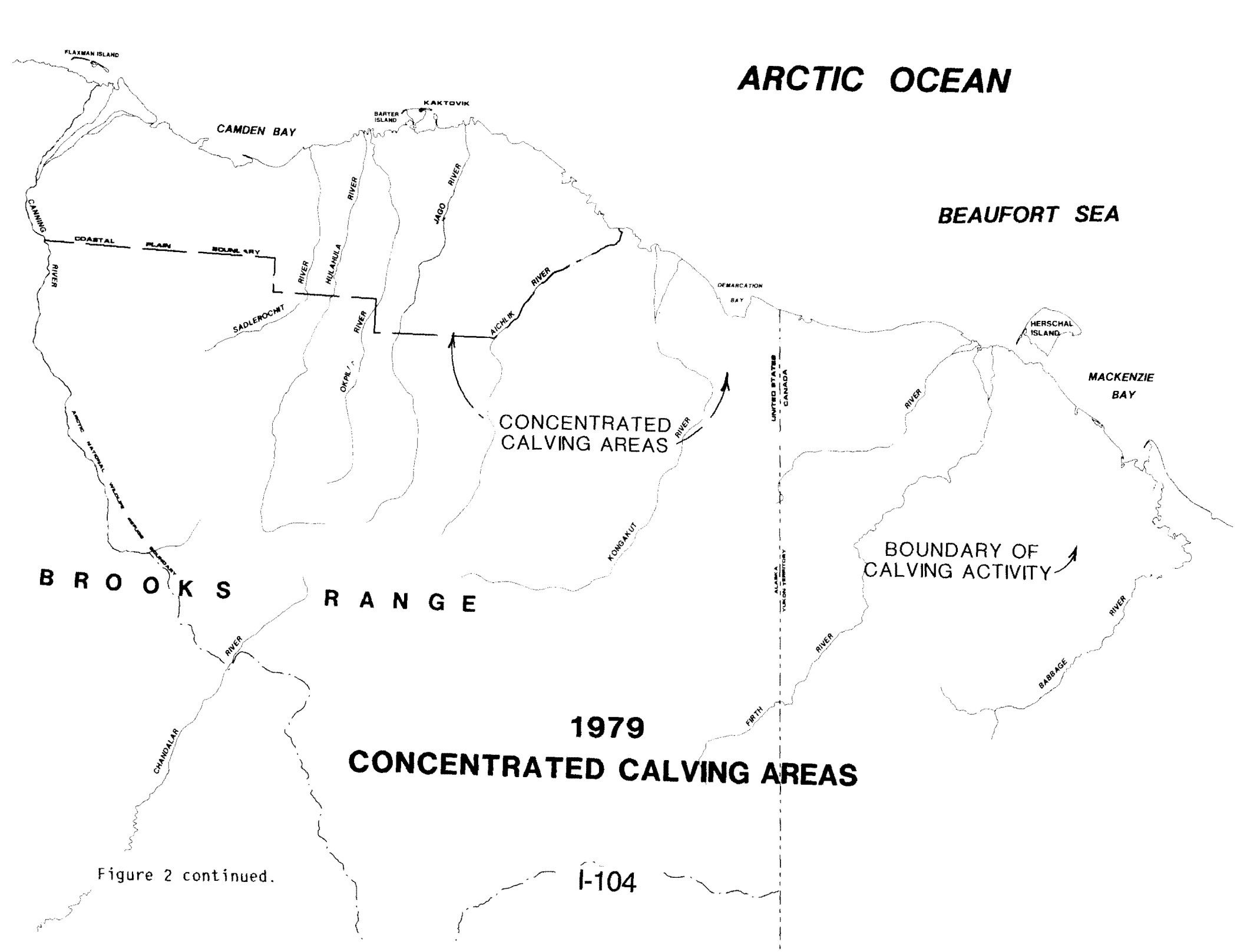

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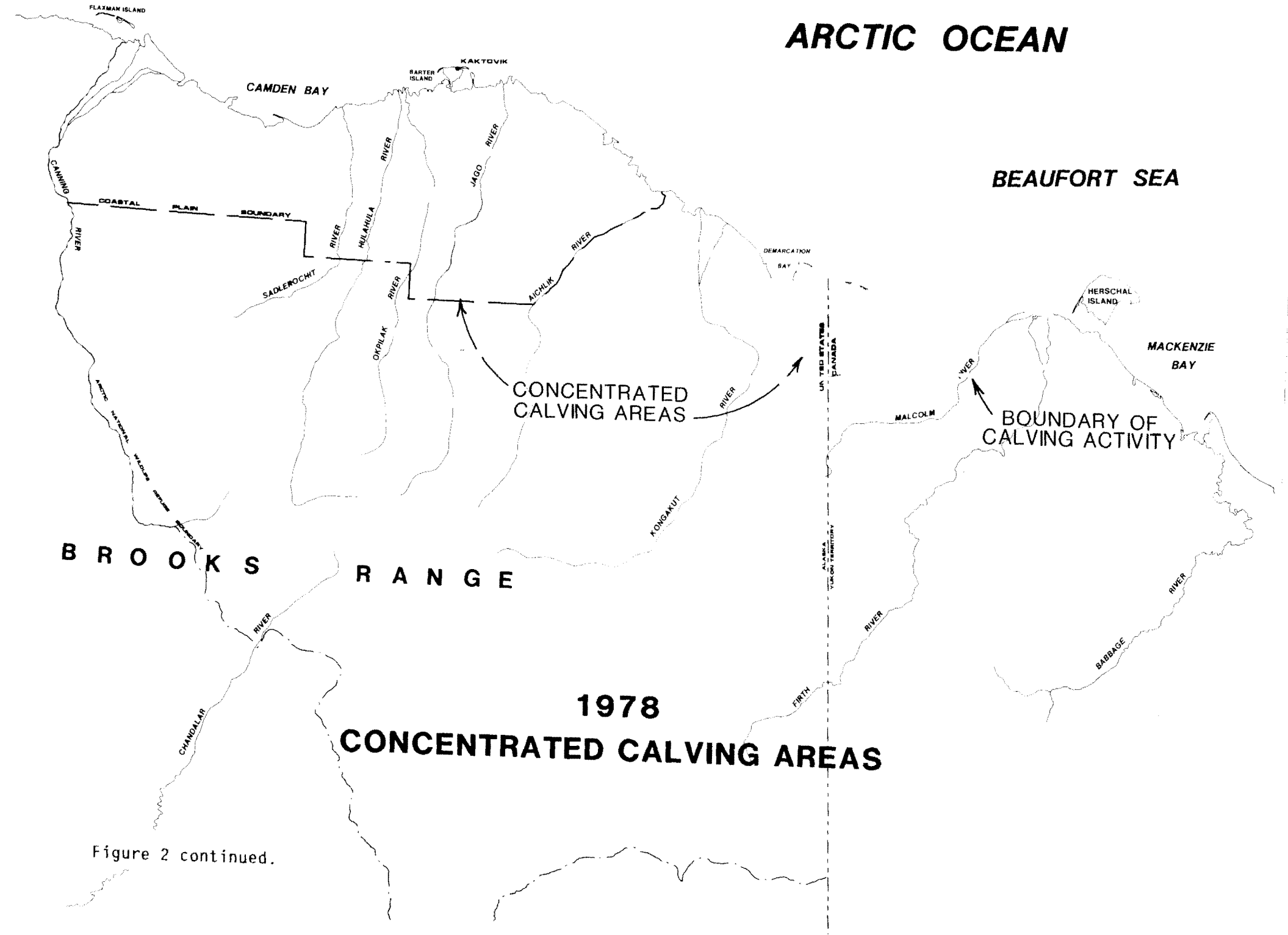

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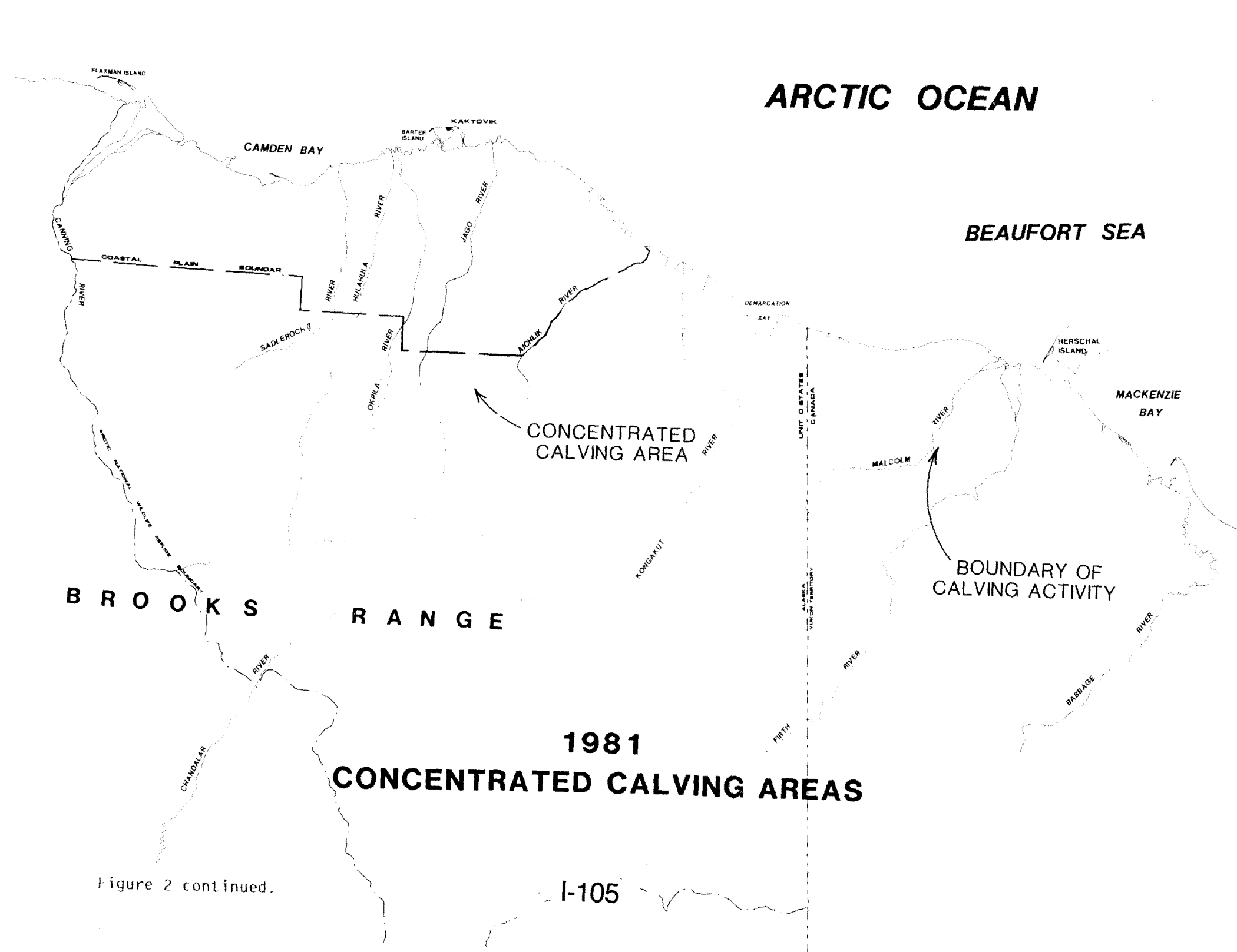

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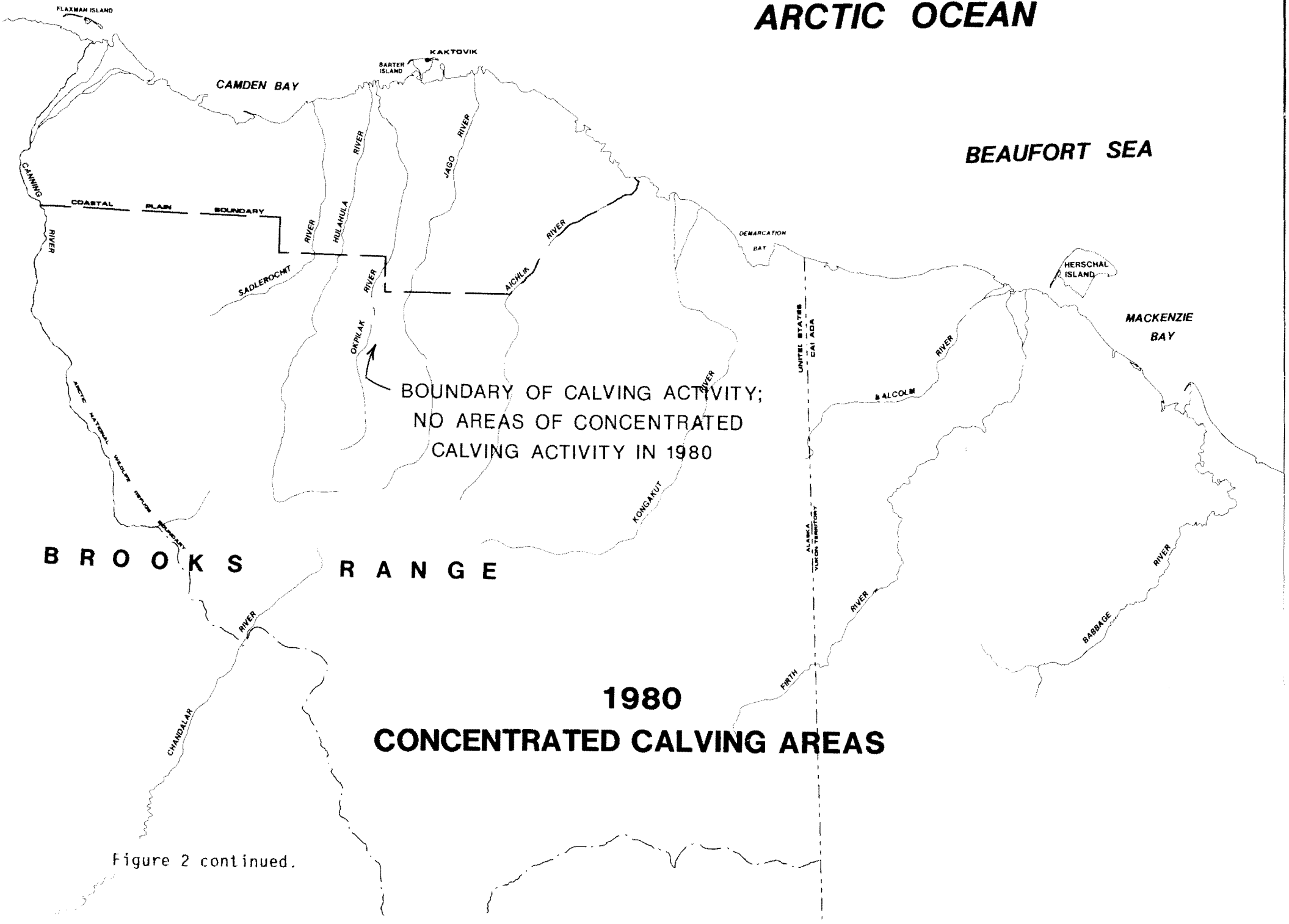

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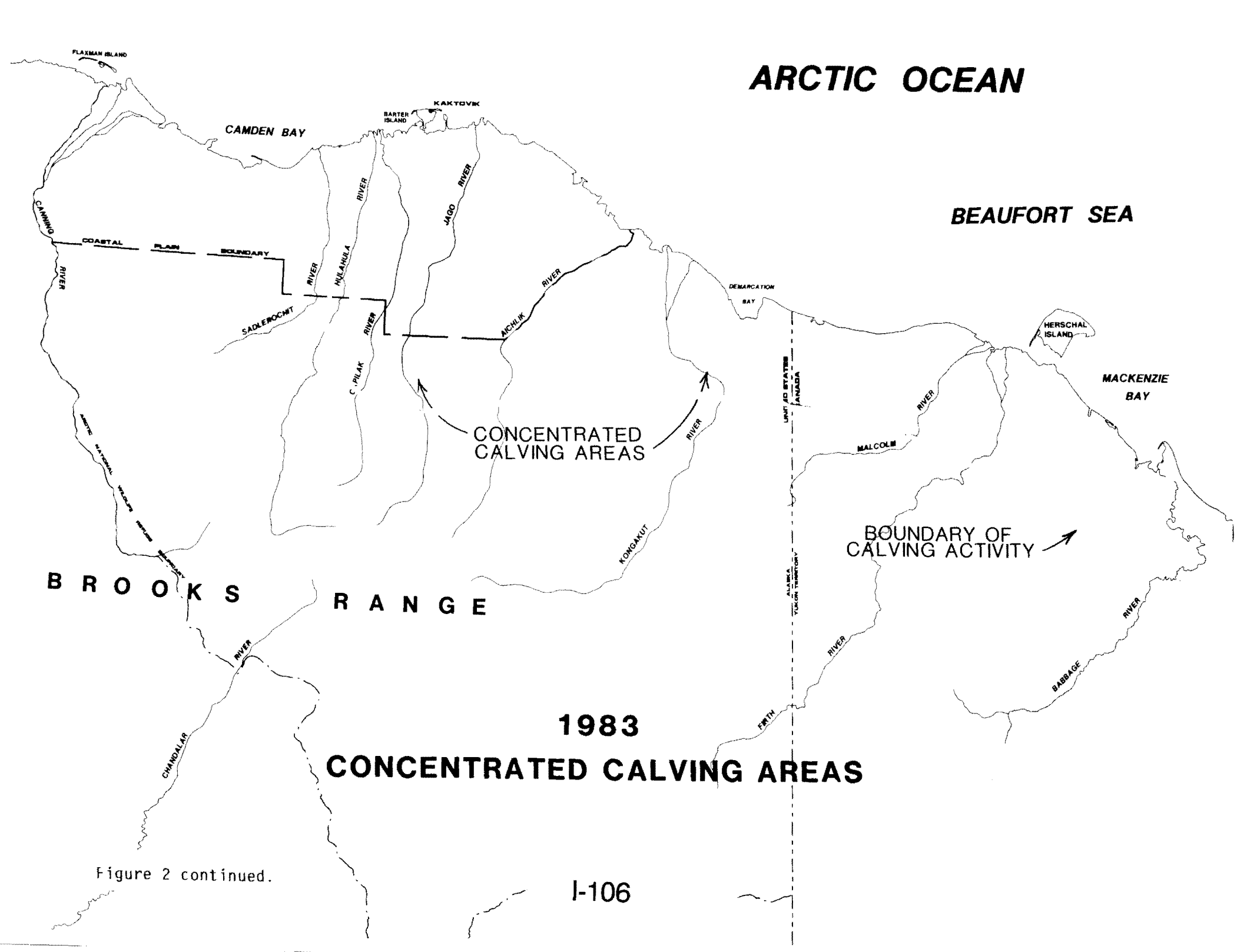

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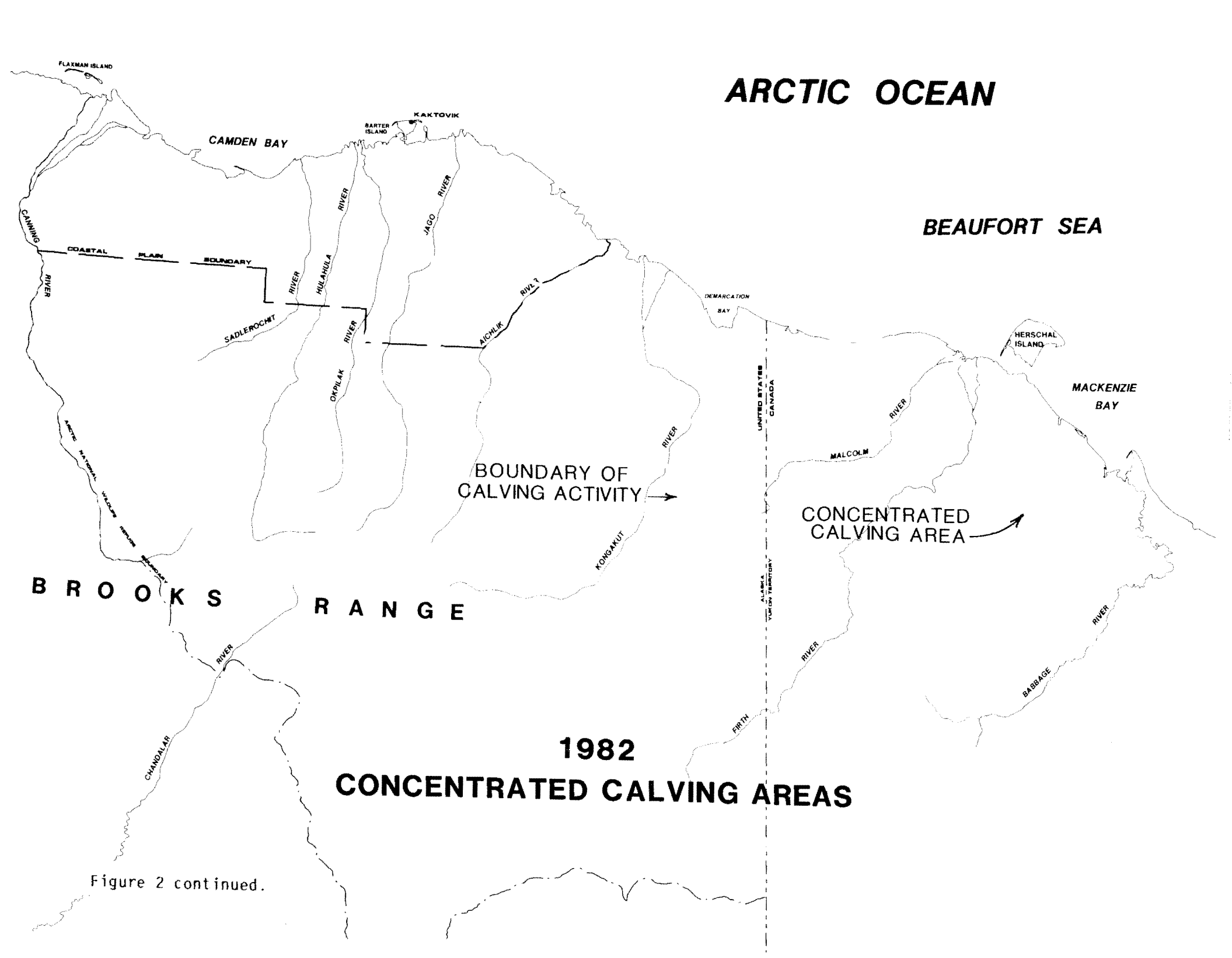

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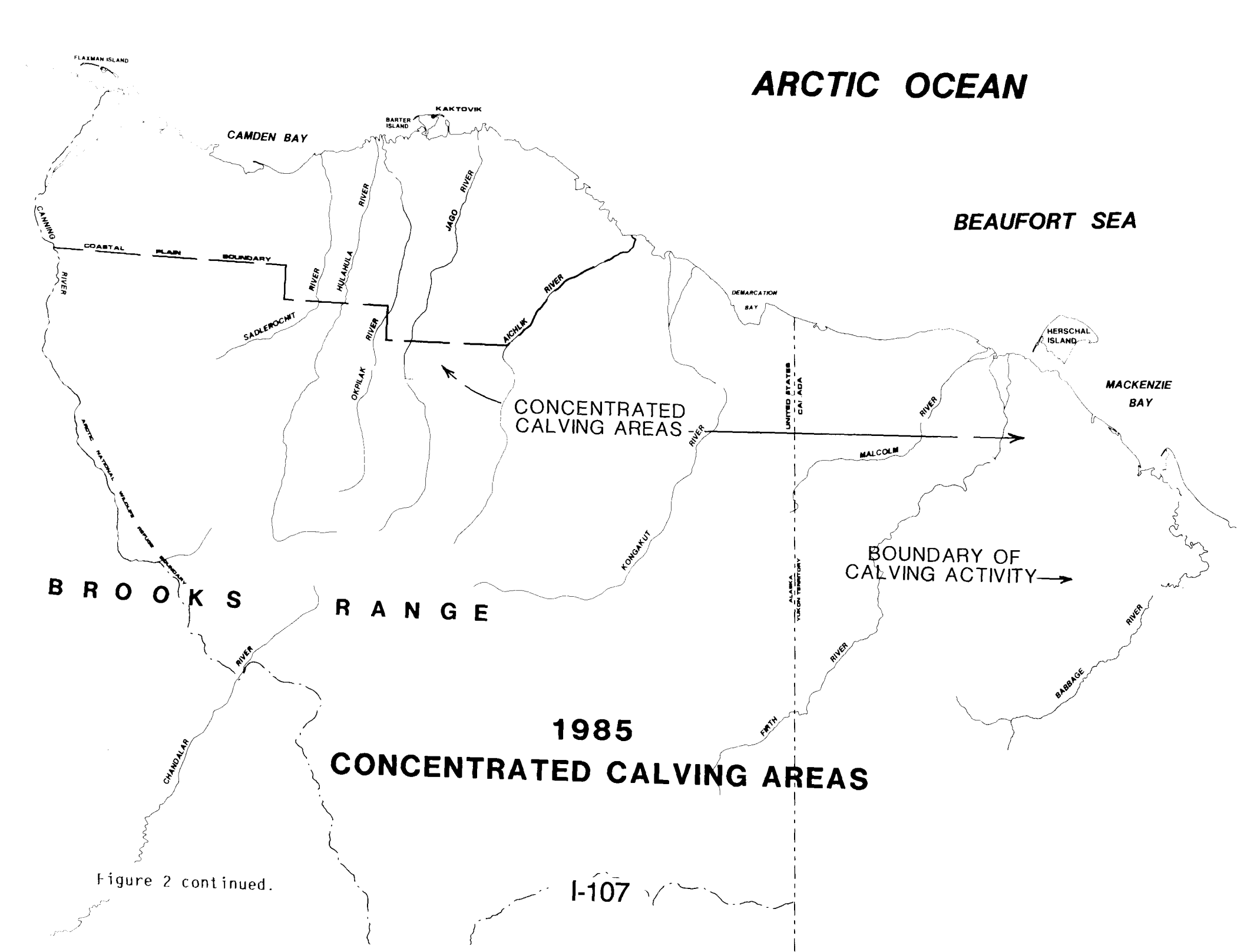

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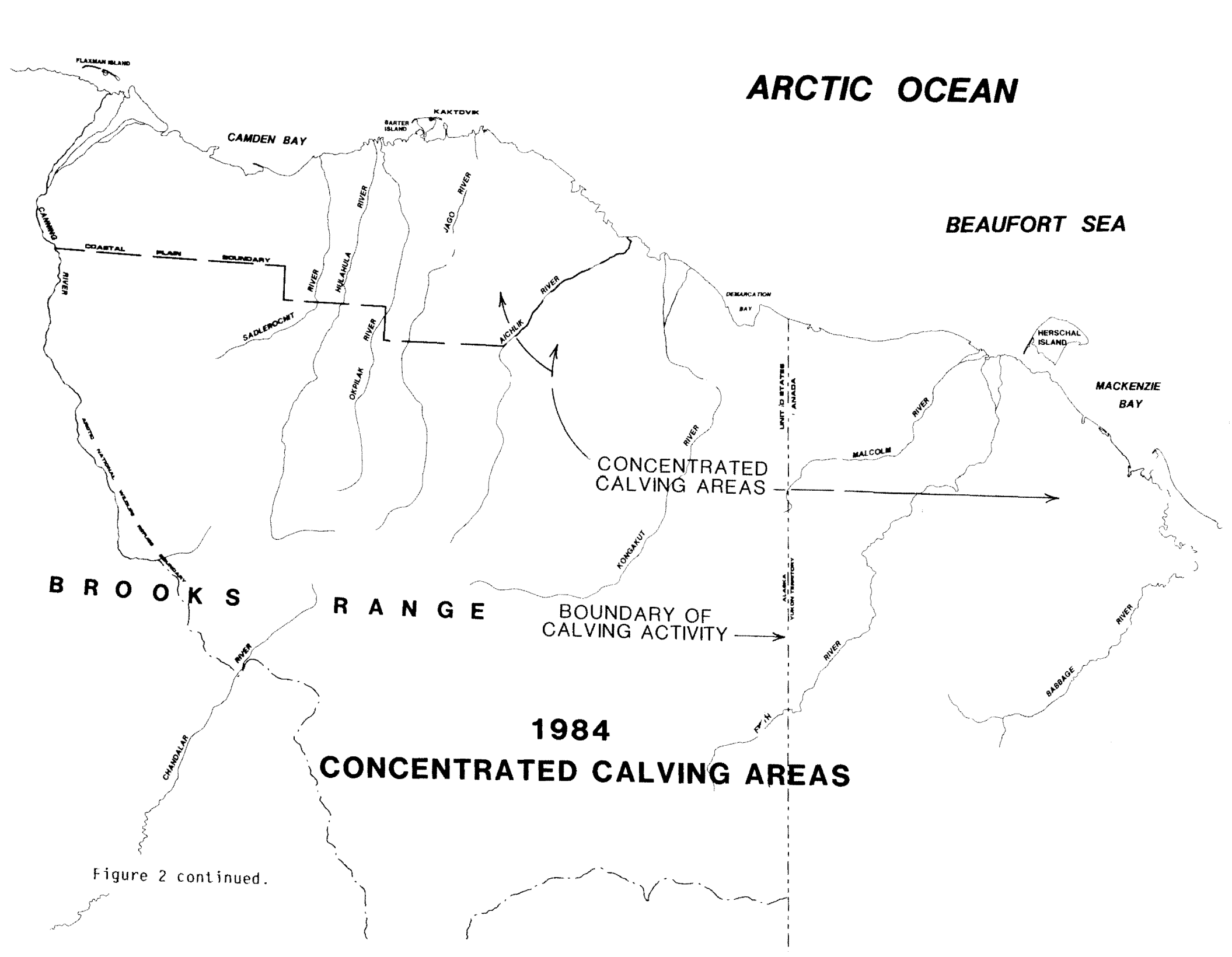

Figure 2 continued.

Yukon Territory, and may vary greatly in location and number from one year to the next, while remaining inside the herd's principal calving area. The idea of a "core" calving area consisting of a specific tract of habitat with definable boundaries is unfounded. It is reasonable, however, to delineate a broad area within which a high proportion of total calving consistently occurs every year; this area is shown in a general but accurate way in Figure 1 of the caribou section of the Initial ANWR Baseline Report (FWS 1982). There is no dependable means to predict the locations of high-density calving concentrations based on locations from past years (D. Roseneau 1986, pers. comm.), and no fixed tract of "core calving habitat" that might be lost as a result of oilfield development.

Methods: In attempting to map a "core" calving area, it is not sufficient simply to overlay general vicinities of varying concentrations of caribou cows and calves from different years and interpret a place where an arbitrary number of such areas happens to overlap as a "core" calving area. This approach, used to define the "core" area shown in Plate 2A and discussed on pp. 28 and 108, creates the misleading impression of a consistently recurring calving concentration that becomes increasingly dense towards a particular tract of land at its center, when in fact it indicates only frequency of occurrence of cows and calves in unknown and probably quite variable concentrations. The superimposed shapes differ greatly from year to year; there is no biological reason to suggest that a place where some of these shapes happen to overlap is somehow special, and certainly none to justify classifying such a location as Resource Category 1, i.e., "unique and irreplaceable on a national basis or in the ecoregion" (Table VI-3, p. 98). The proposed Resource Category 1 location, intended for an official designation protecting habitats that are rare or biologically very important, is defined solely by the criterion of overlap in at least 5 out of 14 years, or 36 percent of the years of record. This criterion has no evident biological significance and is unexplained by the authors; in fact, it appears to be arbitrary. Had a more likely criterion been used -- for example, overlap in at least 7 of the 14 years, or 50 percent -- the "core" area would be about half the size described by the authors. The lack of a logical criterion or biologically meaningful rationale for defining the area provides no justification for its proposed designation as Resource Category 1.

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The following discussion presents a more detailed overview of PCH calving concentrations and their variability within the 1002 area. It was prepared by D. G. Roseneau in response to our request for detailed information on PCH calving distribution. Mr. Roseneau was the principal investigator for the Alaskan component of the first systematic studies of the Porcupine herd and its annual cycle, distribution, and range use, conducted from 1972 through 1977.

"The draft report presents information on the distribution and locations of Porcupine herd calving concentrations that have occurred north of the Romanzof and Sadlerochit mountains between the Kongakut and Canning rivers in Alaska (which is appropriate). However, no comparative data are given for the remainder of the large international calving grounds in Alaska (i.e., between the Kongakut River and the international boundary) and Canada (i.e., north of the Old Crow Flats between the international boundary and the Blow River drainage). Also, the considerable year-to-year variation that has occurred in the distribution of calving animals within the large international calving grounds (i.e., during 1972-1985; Fig. 1, 2) is not adequately addressed. There is strong evidence (FWS 1986) that the herd has increased from roughly 100,000 animals in the early 1970s to an estimated 180,000 animals in 1986 despite these sometimes large annual shifts in calving distribution. [Comments on annual variations in calving distribution are limited to one sentence stating that the distribution of caribou on the calving grounds varies considerably from year-to-year (p. 28, col. 1, par. 3), and a brief comment that calving tends to exhibit a more northern distribution in years of early snowmelt, and a more eastern and southern distribution in years having late springs (p. 28, col. 2, par. 2).] Reporting only locations of calving concentrations found west of the Kongakut River while largely ignoring past annual variations in calving distribution does not provide a balanced perspective of the calving grounds. It de-emphasizes the substantial extent of calving that occurs outside the 1002 area in the remainder of Alaska and in Canada, and fails to illustrate that the herd has used a broad and varied region of northeastern Alaska and the northern Yukon Territory north of treeline for calving while increasing in size (Fig. 2).

"[Note: It is generally accepted that, as caribou herds increase or decrease in size, they tend to expand or contract over their range. For this reason, one should also expect the principal calving area of the PCH to expand and contract over time.]

"Information is also presented implying that there is a relatively small, specific, fixed 'core calving area' that is both critical to the survival of the herd and specifically sought out by large elements of the herd year after year (e.g., see text on p. 28, Table VI-5 on p. 107, and Plate 2A). This concept is unfounded. Caribou are a highly migratory, versatile species capable of handling a variety of sometimes harsh, rapidly changing

and often widely varying conditions in their environment. The annual variations that have occurred in wintering areas, migratory routes (spring, fall, post-calving, and early winter), calving areas, and post-calving areas of large herds are examples of the ability of caribou to utilize successfully more than just one specific, fixed area for all of these events during their life cycle.

"[Note: Papers such as Valkenburg and Davis (1986) showing annual variations in calving distribution in the Steese-Fortymile caribou herd, and Davis et al. (1985) reporting rapid growth of the Delta caribou herd despite habitat changes in its calving grounds, have not been cited.]

"Given a 15-year data set (1971-1985), it is possible to: a) define the broad limits encompassing all calving (i.e., the general calving grounds) by overlaying the data and plotting the extreme points where calving has occurred during the years of record (Fig. 1); b) define a somewhat smaller region encompassing the majority of calving (i.e., the primary calving grounds) by overlaying the data and plotting the limits of the areas that have contained the majority of calving over the years (Fig. 1); and c) recognize that, over time and from year-to-year, one or more concentrations of calving animals may occur anywhere within the boundaries of the primary calving grounds, dependent on snow conditions (including those found along spring migration routes), weather events, proximity to wintering locations (which also are variable from year to year), and herd size. It is also possible to go one step farther and determine the frequency of use of one area vs. another within the primary calving grounds by overlaying maps of known calving concentrations, as was done for the analysis presented in the draft report (Plate 2A). However, the fact that one area has been used more frequently than another by annually varying proportions of calving cows does not mean that there is one particular, small, fixed, unique 'core' area within the primary calving area that most of the animals seek out every year, and that is so critical to the herd's survival that loss of any or all of it will result in a population decline (as is strongly implied in the draft report).

"The authors estimate that the large international calving grounds include about 8.9 million acres (13,900 square miles, a reasonable estimate). They then identify a 2,117,000 acre (3,308 square mile) international area of 'concentrated calving'[1], and a small 311,000 acre (486 square mile) international "core calving area" (the equivalent of a 22 mile x 22 mile square area)[2]. About 242,000 acres (378 square miles) (78%) of the 311,000 acre core area are reported being in the 1002 area, and the remainder (69,000 acres, or 108 square miles) (22%) are apparently located east of the 1002 area in Alaska and in northwestern Canada. The portion of the 'core' area occurring within the 1002 area is illustrated by Plate 2A.

"Plate 2A tends to be misleading. The plotted concentrations were of varying densities (sometimes greater than 50 cows[sic]/square mile, sometimes less), but they were clearly discernable as concentrations in contrast to the more scattered distribution of animals in surrounding areas. The mapped concentrations also represent differing proportions of

I-109

the total cows in the herd within years, and also between years, because the herd has been growing. The overlaid data on concentrations, without density information attached, really show frequency-of-occurrence of the presence of these concentrations. However, the red areas of greatest overlap representing the presence of caribou in nine out 14 years are called areas of greatest concentration (Plate 2A), which was not necessarily the case. Similarly, the pattern of ever-darkening overlays in itself tends to suggest increasing densities, not simply greater frequencies of occurrence. The 1002 'core' area is equivalent to an area only 19.5 miles x 19.5 miles in size. There is no doubt (nor disagreement) that this and other portions of the upper Jago River drainage have been used frequently by concentrations or portions of concentrations of calving animals over the years. [The process of sublimation begins reducing snow cover in the uplands along the northern flanks of the Romanzof and British mountains during late winter and early spring. Upland areas between the Aichilik and Hulahula rivers often become relatively snow-free at about the time parturient cows begin reaching the area.] However, as mentioned above, year-to-year use has been by varying proportions of the herd's calving cows. Using only frequency information to highlight one small, fixed area in the calving grounds, and assuming that it (along with the small remaining portion of the 'core' that occurs outside the 1002 area) holds the key to increases or decreases in a large, dynamic caribou herd that gives no indication of being limited by habitat availability, is not a very desirable approach and may not be in the best interest of the herd. It is quite possible that the Porcupine herd could continue to prosper without part or even all of this area. In contrast, carefully preserving "habitat values" in this area while perhaps paying less attention to the remainder of the calving grounds will hardly guarantee that the herd will maintain its size or grow. Given past variations in calving concentration areas, likely future variations in calving areas, and the fact that many cows often continue to move westward shortly after having given birth, all of the primary calving grounds deserve to receive equal attention."

[NOTES]

[1][The 2,117,000 acre international area of concentrated calving was apparently determined by: a) plotting and overlaying all of the major concentrations of calving animals found during the nine years for which data are reported; b) drawing new boundaries encompassing any resulting overlapping concentrations; and c) measuring and summing these new areas, and combining them with measurements and sums of any remaining area.]

[2][The 311,000 acre international core calving area was apparently determined by: 1) stating that a core calving area is "...a location to which pregnant cows have shown a strong fidelity as traditionally favored calving habitat"; and 2) measuring and summing all areas within the 2.1 million acre international area in which concentrated calving occurred in at least five of the nine data years.]

B. Density of caribou in calving concentration areas

The draft report states (p. 28, col. 1, par. 3) that "areas where caribou were present during calving at a density of at least 50 caribou/square mile [during 1972-85] were identified as concentrated calving areas" (presumably referring to mainly calving cows plus a few yearlings, and not including neonates). On p. 106, col. 1, par. 4, the report further states that the 242,000-acre "core" calving area proposed as Resource Category 1 was defined specifically on the basis that "More than 50 caribou/ sq mile have been present during calving in at least 5 of 14 years (1972-85) for which detailed data exist (pl. 2A)". In reality, no known "detailed data" on calving densities from 1972 through 1977 were ever collected or have ever existed (D. Roseneau 1987, pers. comm.). Indeed, no known quantitative data of any kind on calving densities were collected during those years. Furthermore, we have been unable to confirm the existence of any quantitative data on PCH calving densities collected from 1978 through 1985. If there are quantitative data supporting the density claims, they should be made available for review.

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The principal investigator who conducted the research from 1972-1977 estimated and mapped the approximate "boundaries" of PCH calving concentration areas while observing them from an aircraft; his determinations were subjective and involved no quantitative criterion or actual counts (D. Roseneau 1987, pers. comm.). Roseneau believes that some areas that he identified as concentrated calving areas contained densities much lower than 50 cows/square mile, while others consisted of much higher densities. Apparently the first mention of the density criterion of 50 caribou/square mile was made in the final report of the Caribou Impact Analysis Workshop held in November 1985 (Elison et al. 1986). That report indicated, without documentation, that the 50 caribou/square mile criterion had been applied since 1981 (not 1972). However, there is no direct information on density of caribou on the calving grounds in any of the FWS ANWR Update Reports (FWS 1983, 1984, 1985, 1986). Therefore, we are unable to confirm that the criterion of 50 caribou/square mile was in fact used for objective identification and mapping of calving concentration areas in any year.

For 1982, however, it is possible to make a rough calculation of the density of caribou in the concentrated calving area south of Herschel Island, Yukon Territory. Whitten and Cameron (1983), on the basis of 5,900 cows that were actually counted, estimated that 23,400 cows may actually have calved within the high density area. Measuring on the inside of the thick crayon line that marks the boundary of the high density calving area on the authors' original map, one can calculate an area of about 1,000 square miles, for a density of calving cows of 23.4/square mile, not 50/square mile. Thus it is only by measuring on a small-scale map and back-calculating that it is feasible to estimate the density of cows that probably occurred in the area of concentrated calving in 1982. Data are not made available in the ANWR Update Reports to allow such calculations for 1983, 1984, and 1985.

In 1983, PCH calving distribution was studied by Whitten et al. (1984). Among their objectives was the measurement of variations in calf mortality and in calf mortality factors between core and peripheral areas. Whitten et al. make no mention of their criterion for distinguishing a "core" calving area from other calving areas. Calving caribou were located by tracking radio-collared animals, but no density data were reported.

For the 1984 calving season, Whitten et al. (1985) again conducted research on the PCH calving grounds. These workers report number of caribou seen and percent calves, but do not provide information about densities of caribou in areas of concentrated calving or elsewhere.

Nowhere in the ANWR Update Reports is there documentation of research conducted that would have permitted a density of calving caribou to have been calculated (e.g., systematic surveys, vertical aerial photographs). The term "concentrated calving area" appears to have always been subjective, never quantitative and objective.

We at first assumed, given the draft report's lack of specific information on this point, that the stated density criterion of 50 caribou/square mile (p. 28) was applied in usual fashion to parturient cows or cow-calf groups. Upon inquiry, however, we were informed that the criterion of 50 caribou/square

mile included both cows and calves (A. Rappaport 1987, pers. comm.). If the density criterion includes calves, the criterion is misleading and introduces uncertainty in comparing mapped calving concentrations shown for different years or by different workers. The inclusion of calves within the density figure surprised several biologists. [Ten of twelve biologists polled assumed that the density criterion referred only to cows.] Because of the high, variable mortality rates suffered by calves, it is usual practice to omit them from counts (e.g., counts made during photo-censuses), except where they are of particular interest (e.g., calves per 100 cows). Other workers (e.g., Parker 1972) have reported densities on calving grounds in terms of cows only.

If calves are included in counts, the actual percentage of the total that they comprise will vary depending on pregnancy rates, percent parturient cows, neonatal mortality rates, and percent calves missed during surveys (which will be greater than the percent of adults that are missed). Thus, the proportion of cows in the counts will vary considerably from year to year. The inclusion of calves in density figures also makes it impossible to compare results from studies using cows only. If one were interested in density of caribou on the calving grounds in the context of range stocking density, the numbers would be useless because calves do not graze on vegetation. Or if one wished to compute the minimum number of cows in areas of concentrated calving, the inclusion of calves would make the figure meaningless. Also, if one wished to make an inference about the number of caribou selecting a particular portion of range, the inclusion of calves in the density figure would be misleading because calves obviously do not select range areas. There are valid reasons to base index counts solely on cows. Thus, if calves and cows were included in the density figures, the results should be revised to reflect cows only.

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In summary, the draft report clearly states that the density of 50 caribou/square mile has been used as the criterion defining a core calving area. This implies that there is a clear, objective, quantitative difference separating concentrated calving areas from general calving areas. With critical examination, however, this distinction blurs. There do not appear to be any objective, quantitative data that were used to determine the boundaries of areas of concentrated calving, including the composite 242,000-acre tract

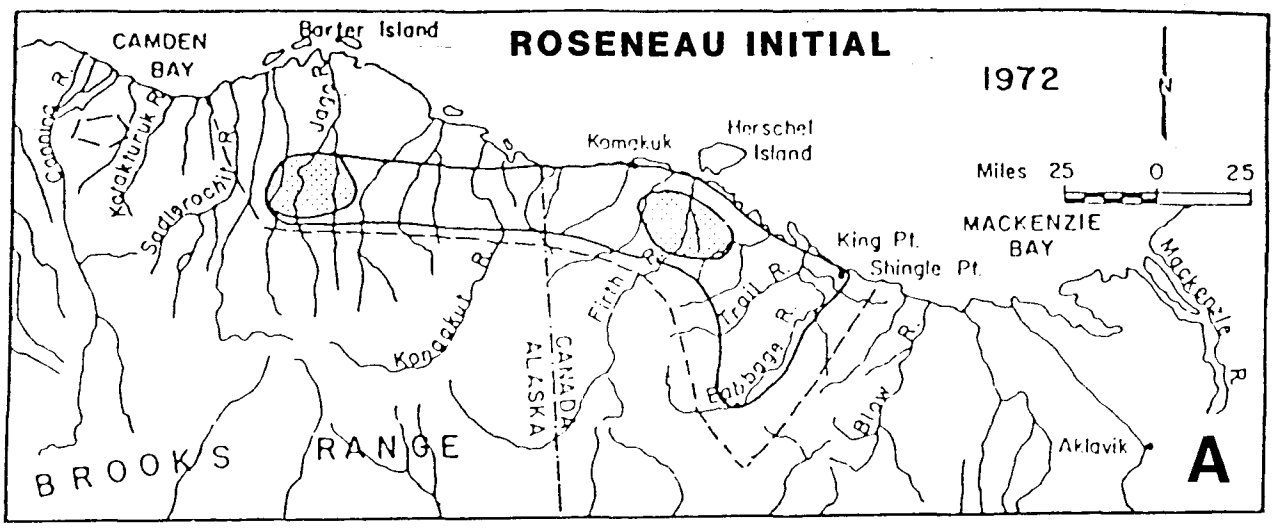
proposed for Resource Category 1 designation. The reality is that PCH calving can and does take place throughout the ANWR coastal plain from approximately the Canning River to the Babbage River. Although parts of the 1002 area are used regularly by calving caribou, there appear to be no data that meet the criteria stated in the draft report to define a "core" calving area [i.e., "More than 50 caribou/sq mi", "present during calving in at least 5 of 14 years (1972-85) for which detailed data exist"]. Therefore, no "core" calving area can be delineated without altering the criteria.

C. Size and location of calving concentration areas

There are serious limitations in the data that were available to plot the location and areal extent of concentrated calving areas, particularly for 1972-1981 (Plate 2A). Maps of calving concentrations observed in those years (Fig. 3) were prepared by D. G. Roseneau (1987, pers. comm.) to show variability in calving area locations and were never intended to be used for precise mapping of calving concentrations. The original map scale (1 inch = 50 miles) is far too small to have permitted the data to be replotted accurately to a larger scale map. [Unfortunately, much of the original data was lost in an office fire, and thus more detailed information about the location of the calving concentration areas is not available.]

Several problems have been identified with the maps of PCH calving concentration areas shown in Plate 2A. In addition to relatively small plotting errors that can be expected, there are substantial errors that have caused mapped calving areas to become larger in size, to change shape, and to "migrate" (about 16 miles in one case for 1977) (Fig. 3).

We believe that the following sequence of events probably describes what happened during the plotting of the data. First, the original calving concentration maps for 1972-1981 received by FWS from Roseneau (Fig. 3) were enlarged slightly and a base map was drawn, only slightly different from the originals provided. [Note the general similarity in style of the maps. The error of showing the Babbage River flowing directly into Mackenzie Bay rather than into Phillips Bay, the similarity of the representations of the Canning

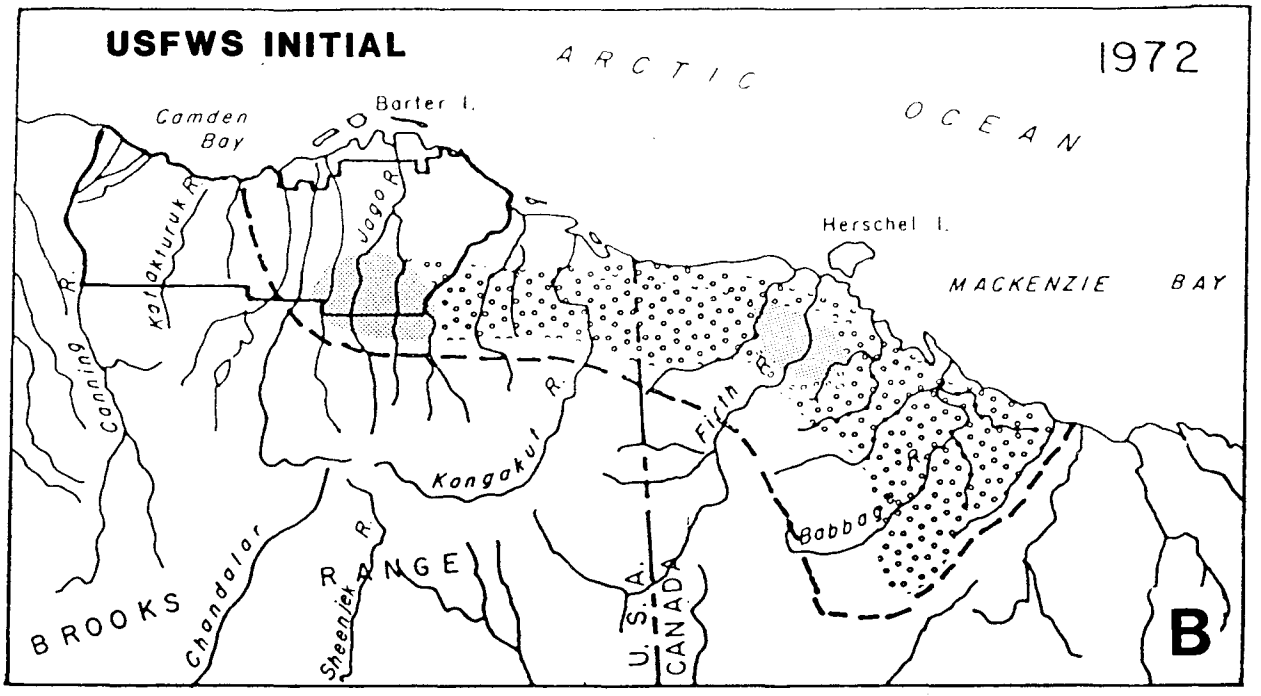


LEGEND

—— Boundary enclosing major calving activity.

---Boundary enclosing light scattered calving.

Area of major concentration of calving activity.



LEGEND

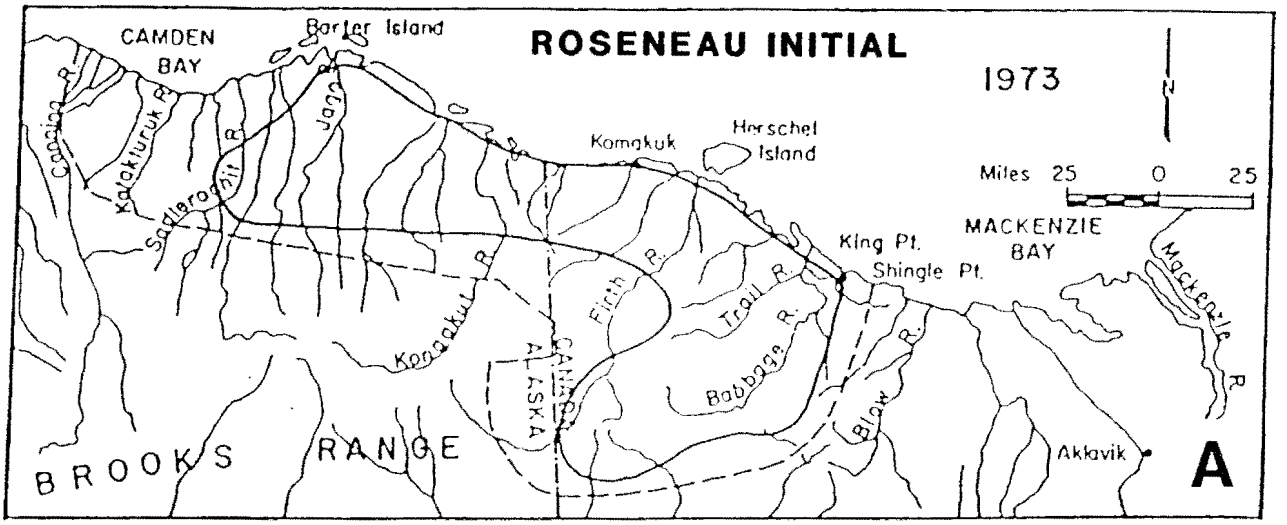
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3. Maps of distribution of calving caribou prepared by D.G. Roseneau (A) and by U.S. Fish and Wildlife Service (B) for 1972-1981. Data from 1972-1977 were collected by D.G. Roseneau, who also assembled the data for 1978-1981 from other sources. Because the original field data were lost in an office fire, the maps shown in panel A for each year are the only source of information on the location of calving caribou for 1972-1981. The USFWS apparently based maps in panel B on the originals in panel A by redrafting the map base and hand transferring the data; note that there are changes in shape and size of the areas shown in panel A compared with the original in panel A. Maps in panel B were apparently enlarged and entered into the USFWS computer data files, which in turn were the basis of the concentrated calving areas shown in Plate 2A of the draft report.

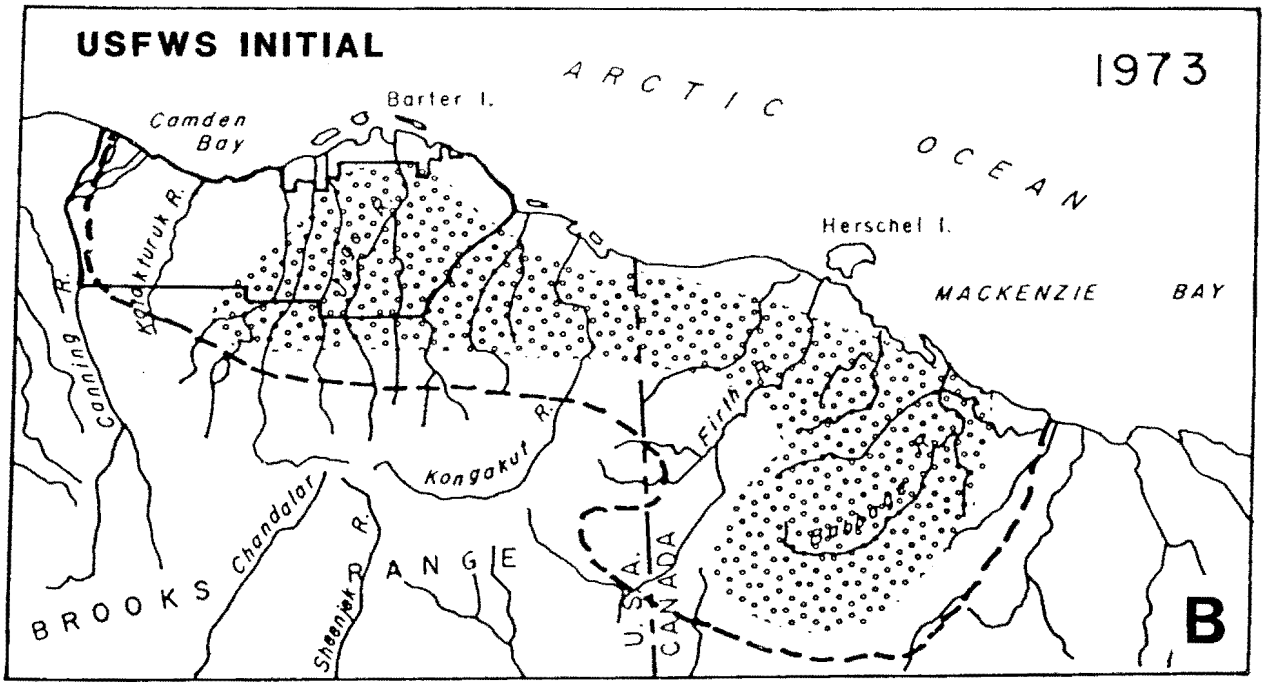


LEGEND

—— Boundary enclosing major calving activity.

– – – Boundary enclosing light scattered calving.

Area of major concentration of calving activity.



LEGEND

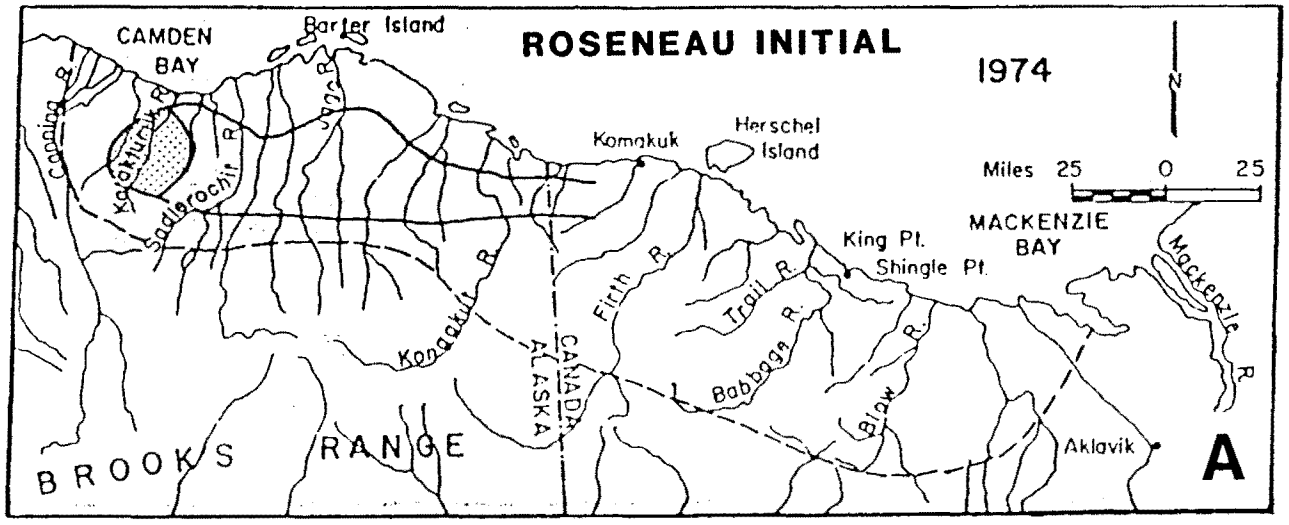
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.

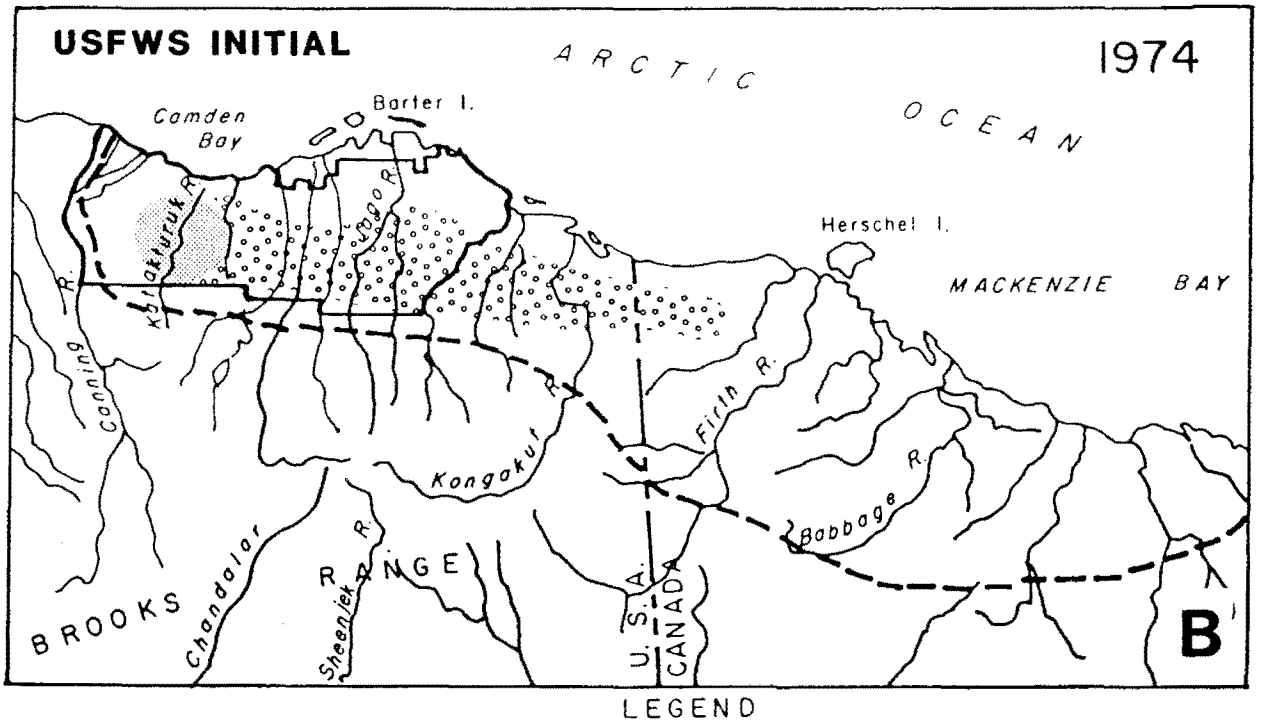


LEGEND

—— Boundary enclosing major calving activity.

---Boundary enclosing light scattered calving.

Area of major concentration of calving activity.



LEGEND

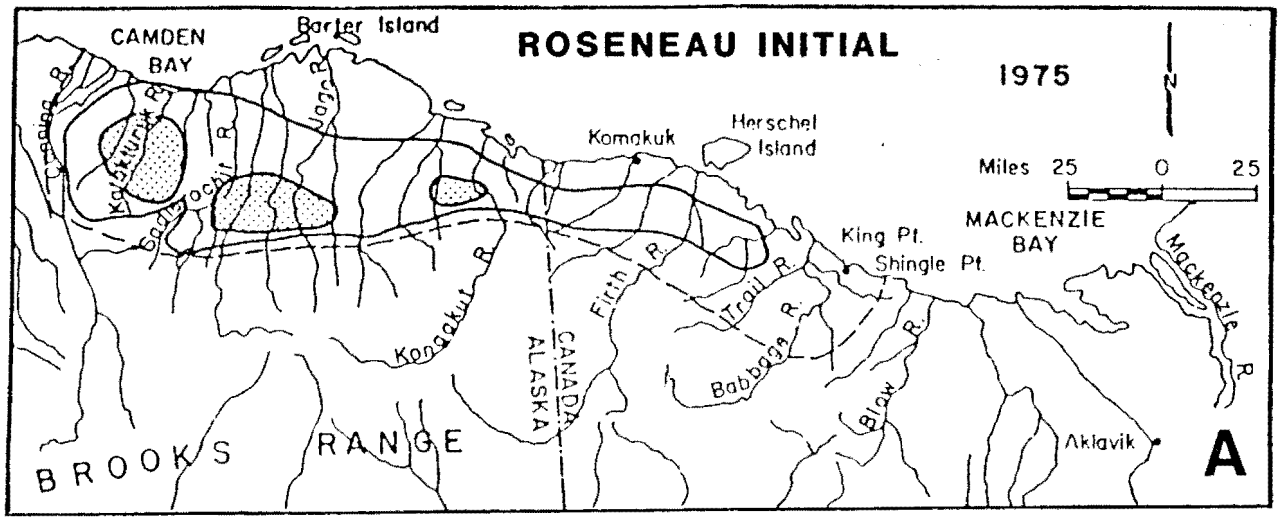
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.

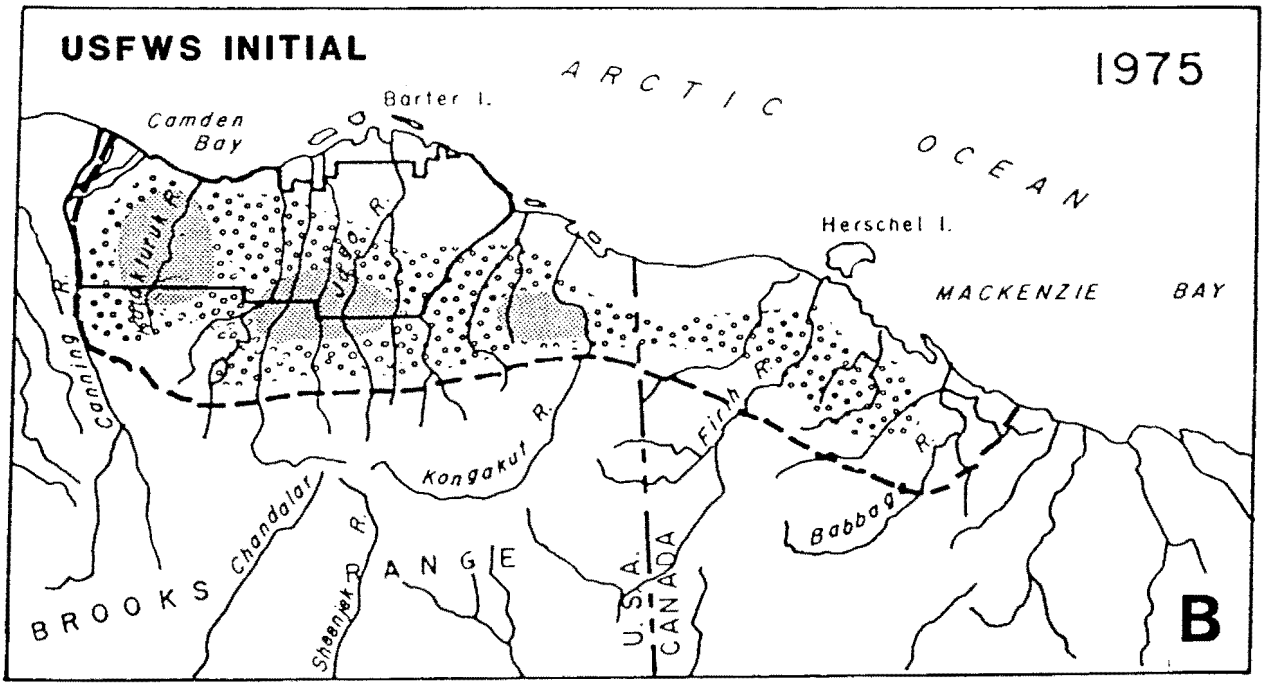


LEGEND

——— Boundary enclosing major calving activity.

– – – Boundary enclosing light scattered calving.

Area of major concentration of calving activity.



LEGEND

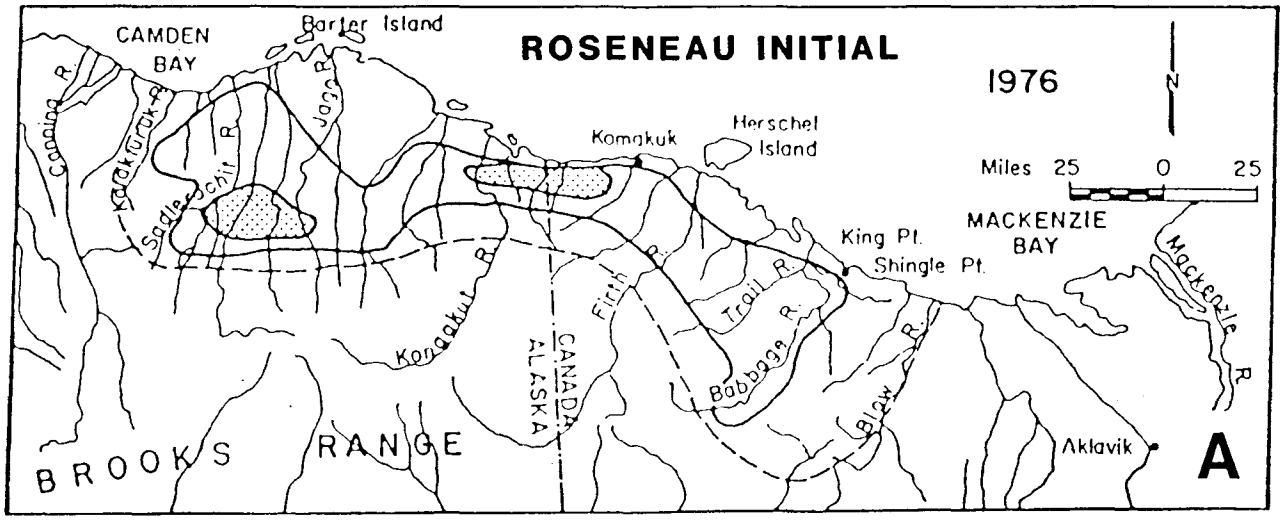
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.

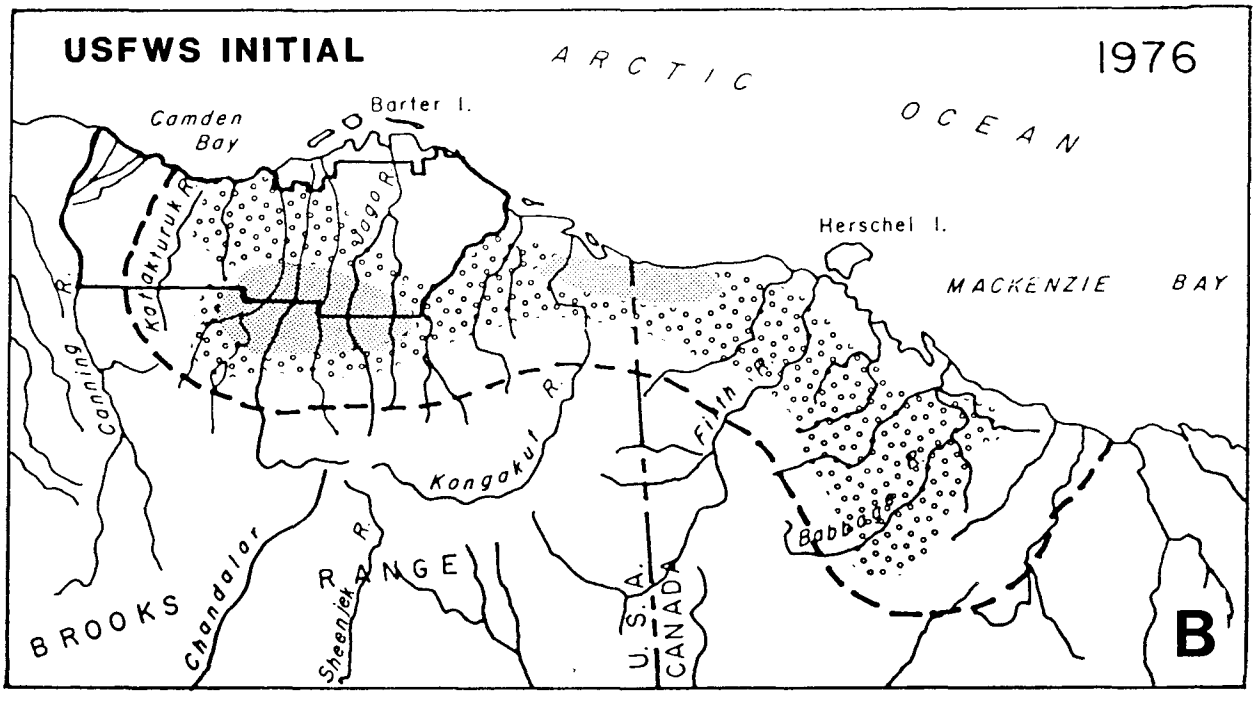


LEGEND

——— Boundary enclosing major calving activity.

- - - Boundary enclosing light scattered calving.

Area of major concentration of calving activity.



LEGEND

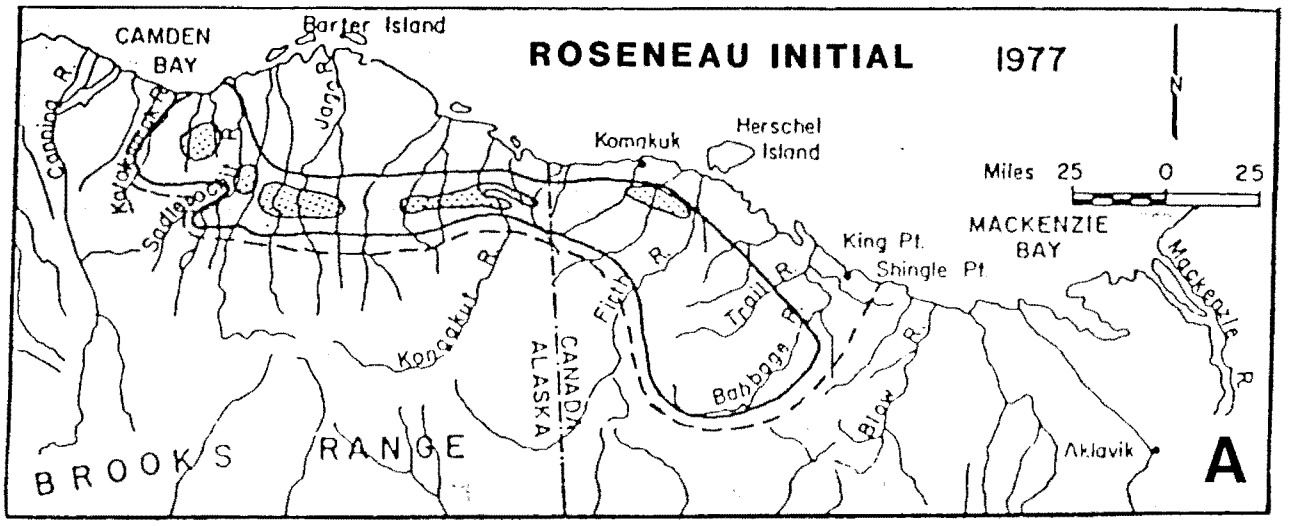
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.

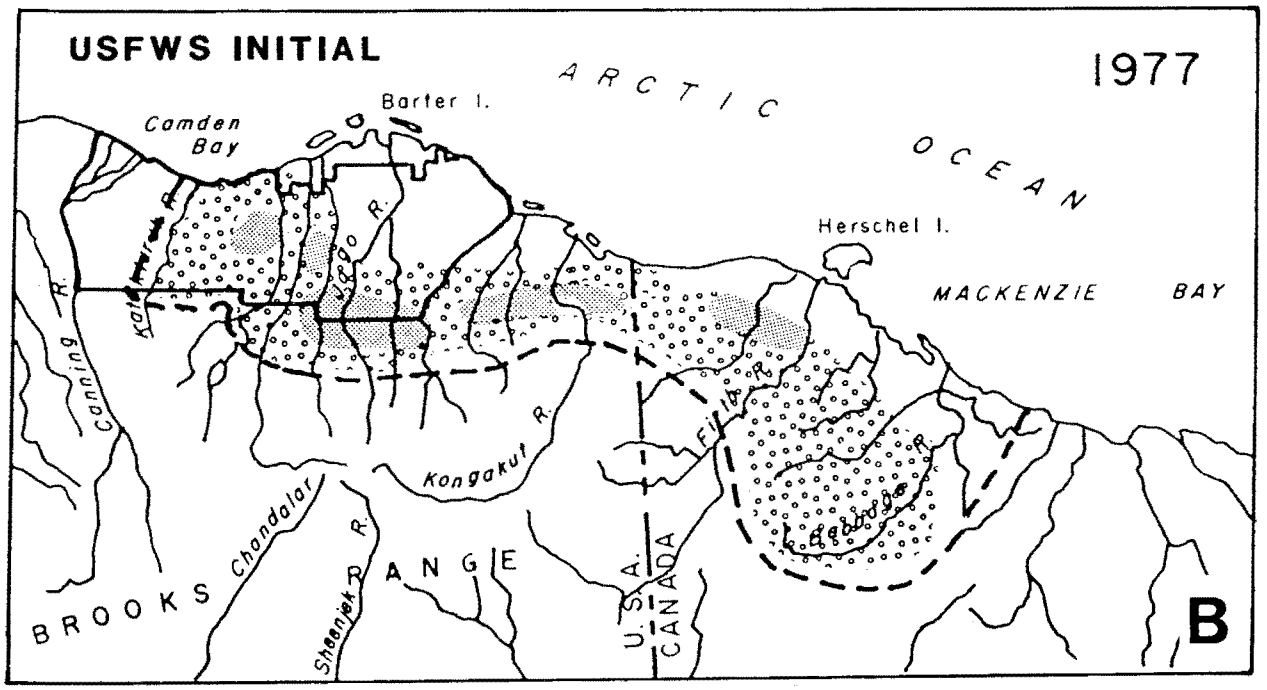


LEGEND

——— Boundary enclosing major calving activity.

– – – Boundary enclosing light scattered calving.

Area of major concentration of calving activity.



LEGEND

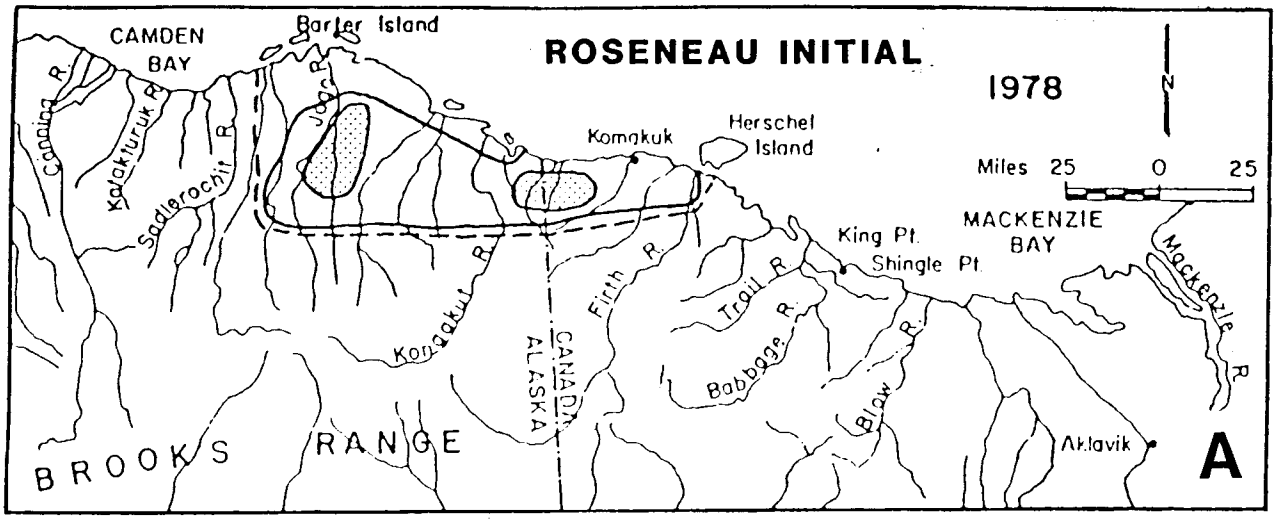
——— ANWR STUDY AREA

– – – BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.

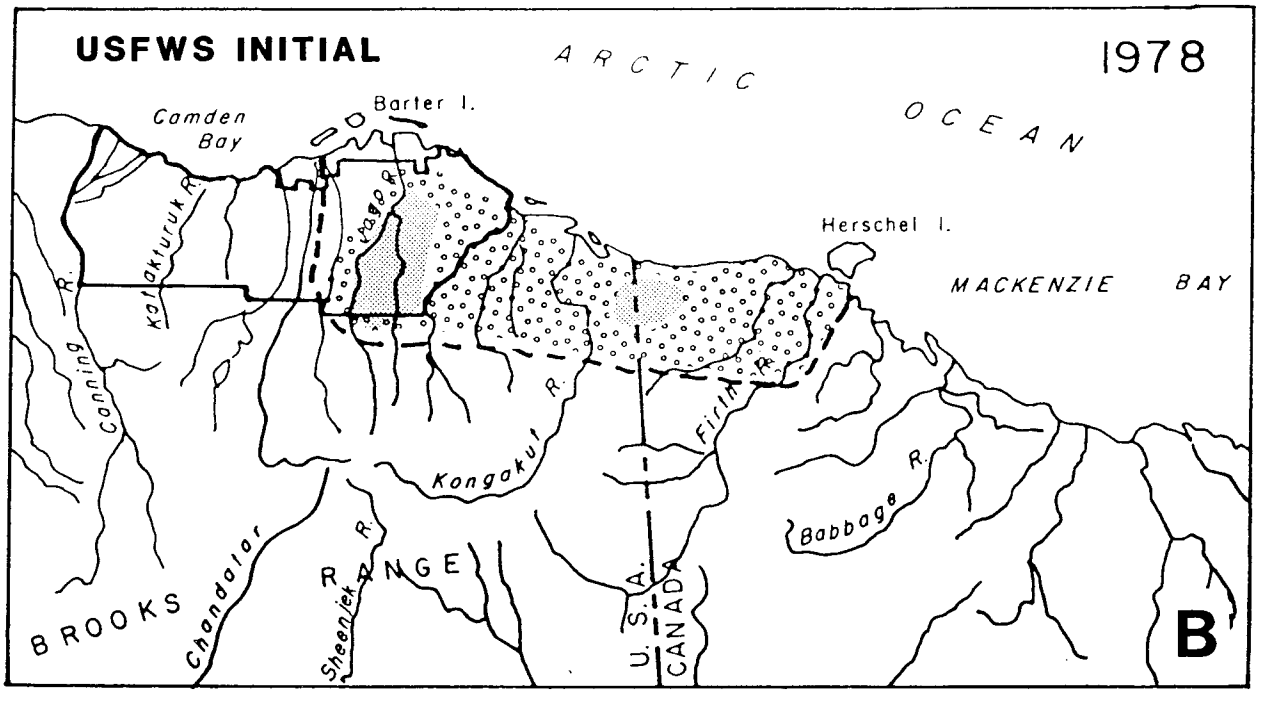


LEGEND

—— Boundary enclosing major calving activity.

--- Boundary enclosing light scattered calving.

Area of major concentration of calving activity



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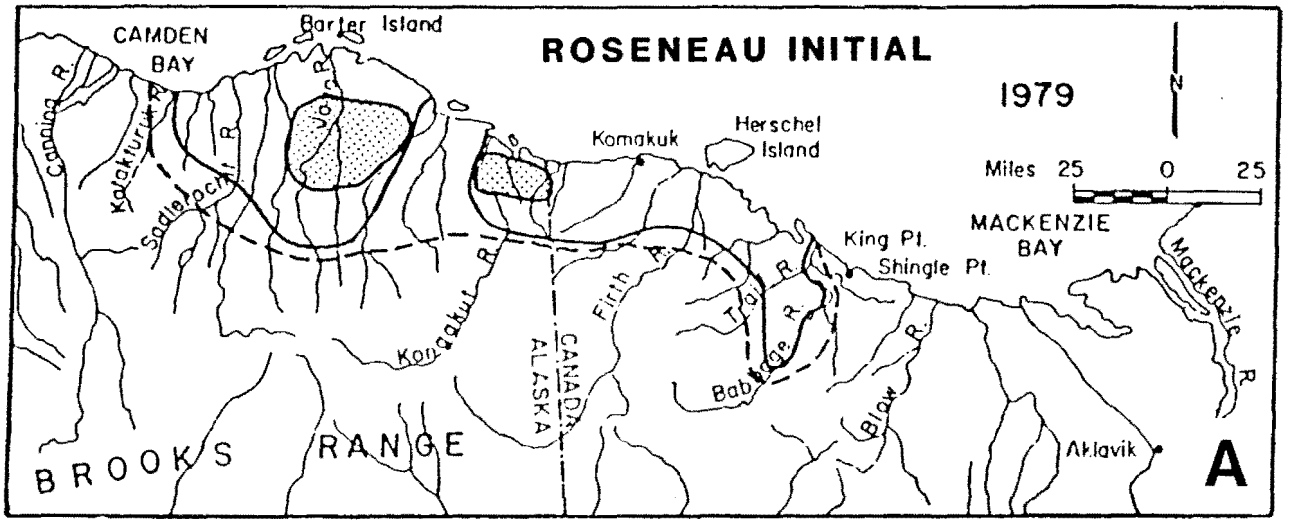
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.



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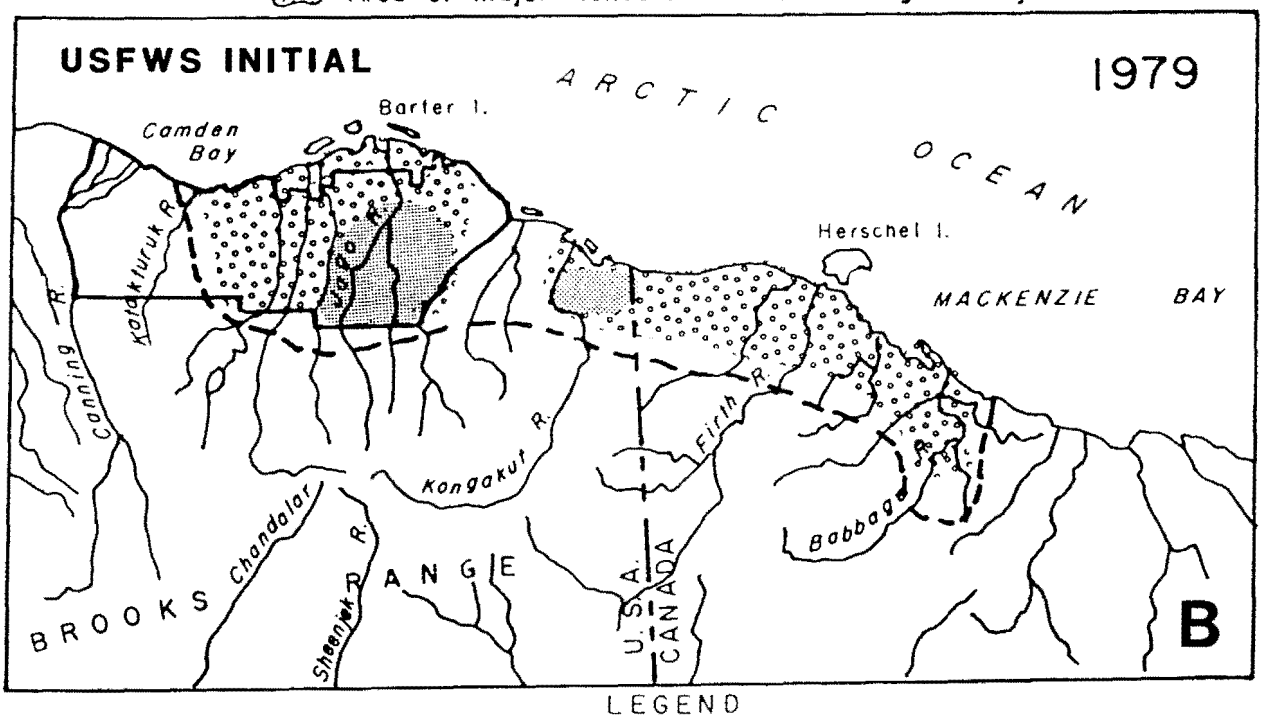
—— Boundary enclosing major calving activity.

--- Boundary enclosing light scattered calving.

Area of major concentration of calving activity



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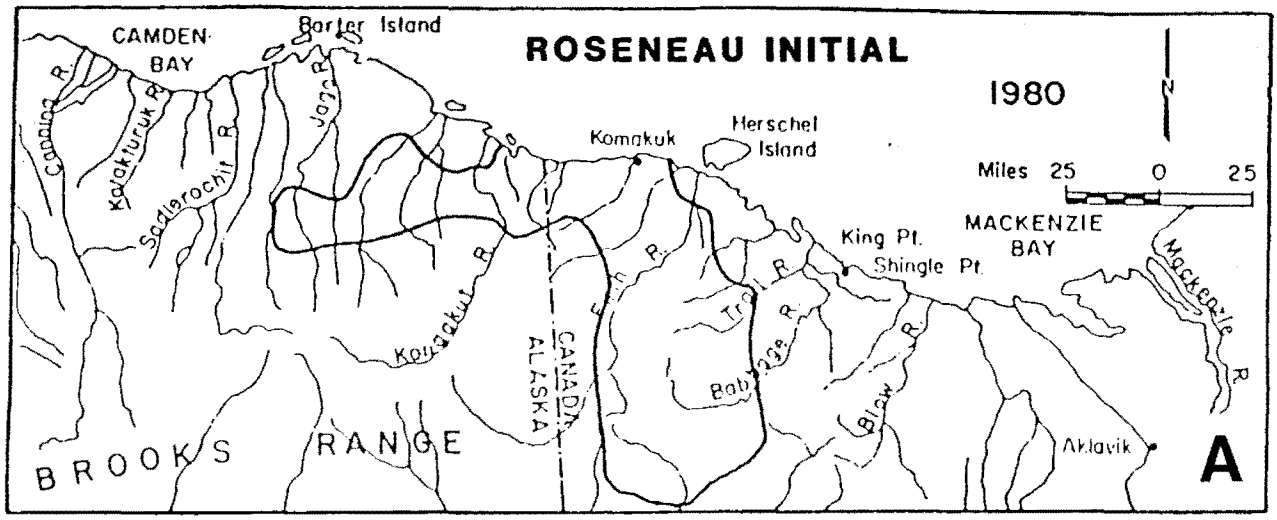
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.



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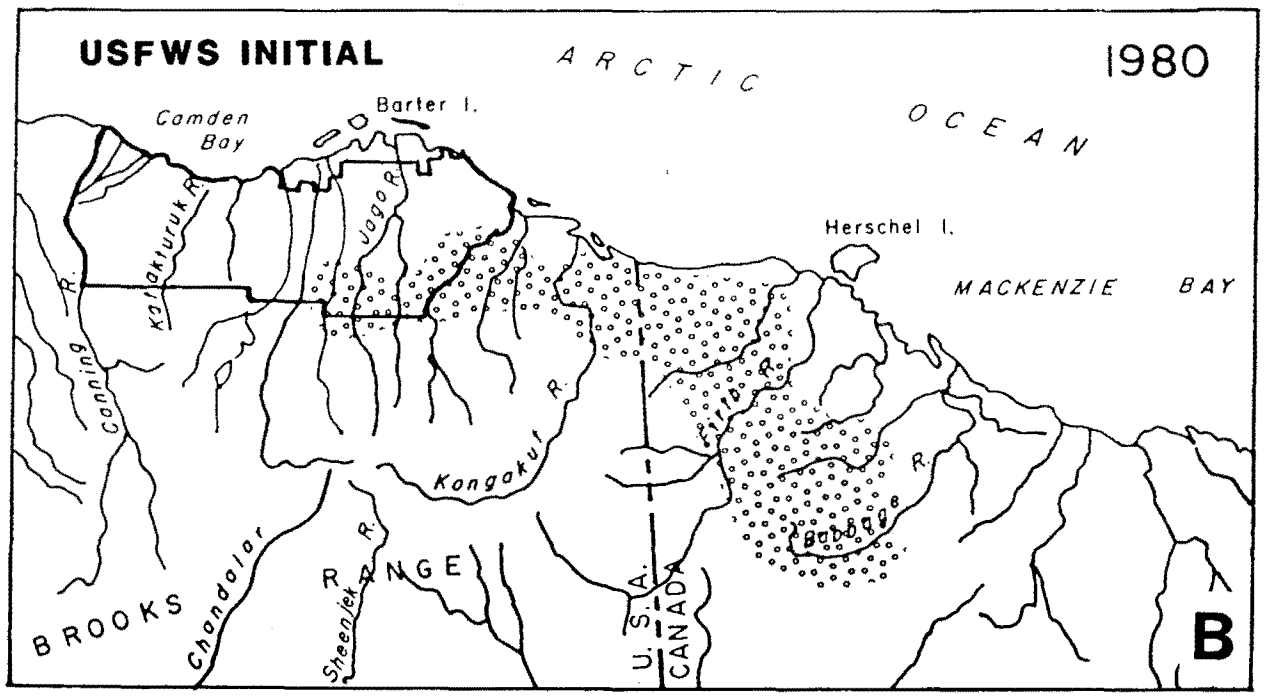
——— Boundary enclosing major calving activity.

Area of major concentration of calving activity.



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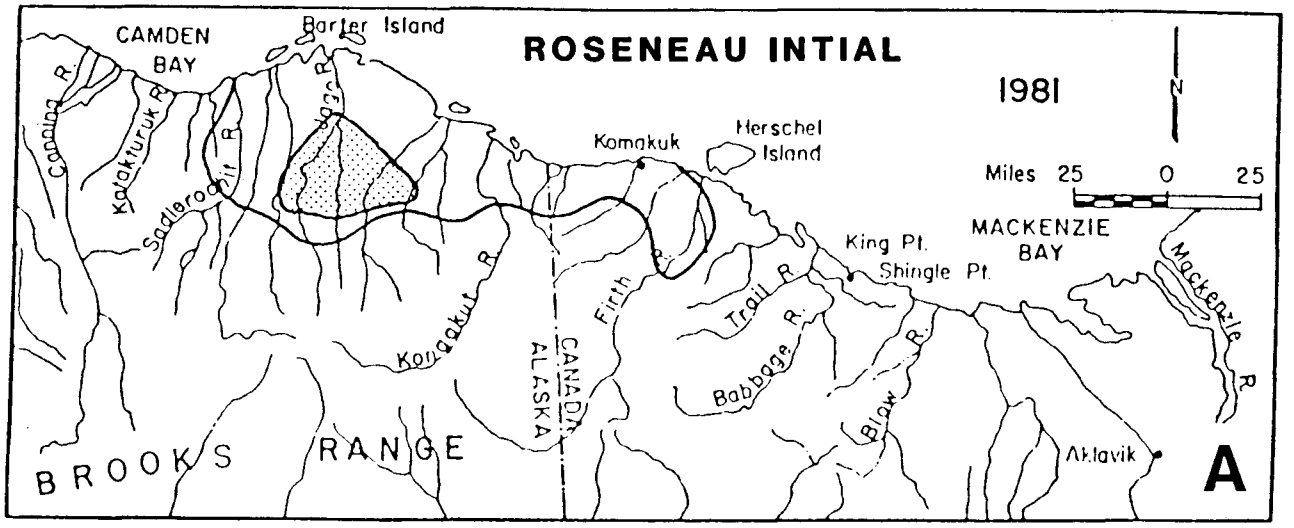
ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.



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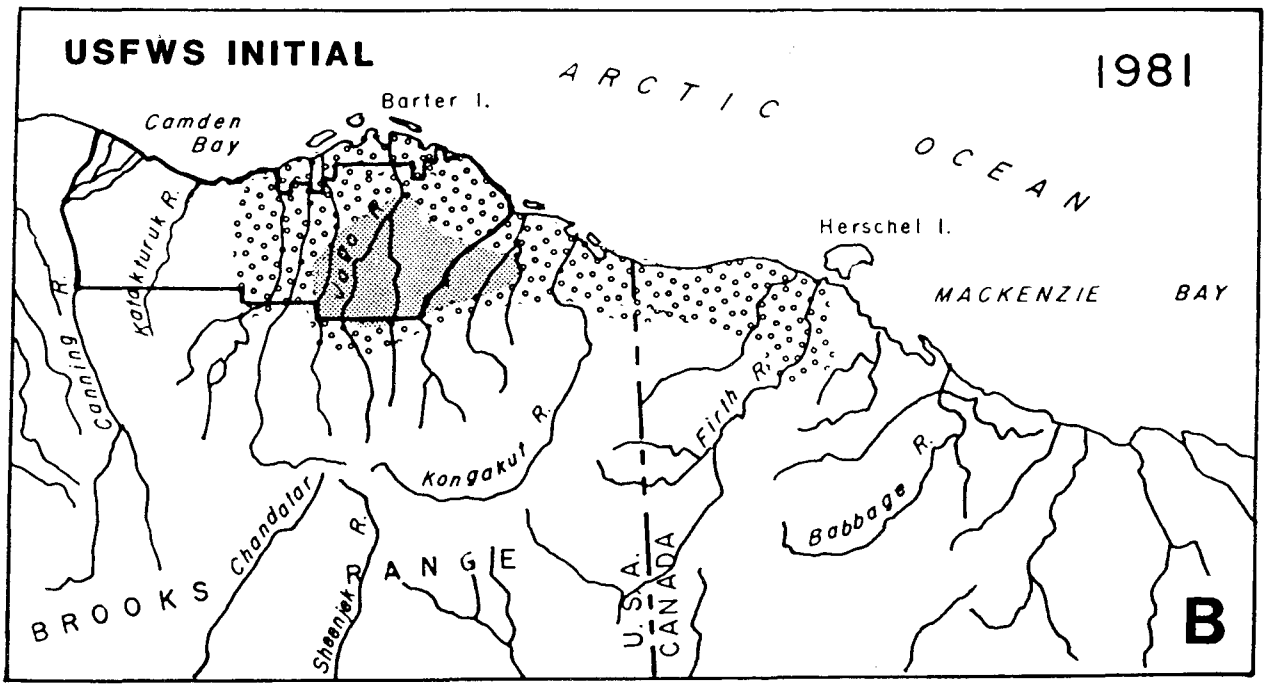
—— Boundary enclosing major calving activity.

Area of major concentration of calving activity.



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ANWR STUDY AREA

BOUNDARY ENCLOSING LIGHT SCATTERED CALVING

MAJOR CALVING ACTIVITY

AREA OF MAJOR CONCENTRATION OF CALVING ACTIVITY

Figure 3 continued.

River delta, and other features suggest a common origin of these maps.] Second, the original data from the Roseneau maps were copied by hand onto the new bases (Fig. 3). A comparison of the two sets of maps will reveal several changes in depicted calving concentration areas, some of the changes large, others small, in all years. Some of the larger changes apparently occurred in the 1977 data. Third, the replotted data were apparently transferred to 1:250,000-scale maps, digitized, and entered into the FWS computer file. Finally, the information was replotted by computer to indicate the degree of overlap and to define the "core calving area" shown in Plate 2A. of the draft report.

With the assistance of D. G. Roseneau, Standard replotted the locations of calving concentration areas using Roseneau's original small-scale maps (Fig. 2). Mr. Roseneau made additional adjustments to make the representations more accurate. We believe that these maps are the most accurate representation of the calving concentrations for 1972-1981. The revised maps have been made available to FWS at a scale of 1:250,000.

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The years 1975, 1976, and 1977 will serve to indicate the magnitude of the alterations that have crept into the draft report's analysis of locations of PCH calving concentration areas. Figure 4 shows three different representations of the same information: 1) an accurate transfer of data from the original maps (Fig. 3); 2) the version presented in the ANWR Initial Baseline Report (FWS 1982) (Fig. 3); and 3) the version from FWS computer files which formed the basis of Plate 2A in the draft report. It is clear that there are substantial differences between these three versions, and that there are significant problems associated with transferring data from very small-scale maps to larger-scale maps. The larger-scale maps (Plate 2A) cannot responsibly be used for any purpose other than to provide a general indication of areas that have received higher than average use by calving caribou in some years. It is inappropriate to state that these areas accurately represent locations where caribou were present in densities equal to or greater than 50 animals/square mile, or to designate a specific tract formed by composites of such areas as a special resource category with assumed site characteristics that are "unique and irreplaceable on a national basis".

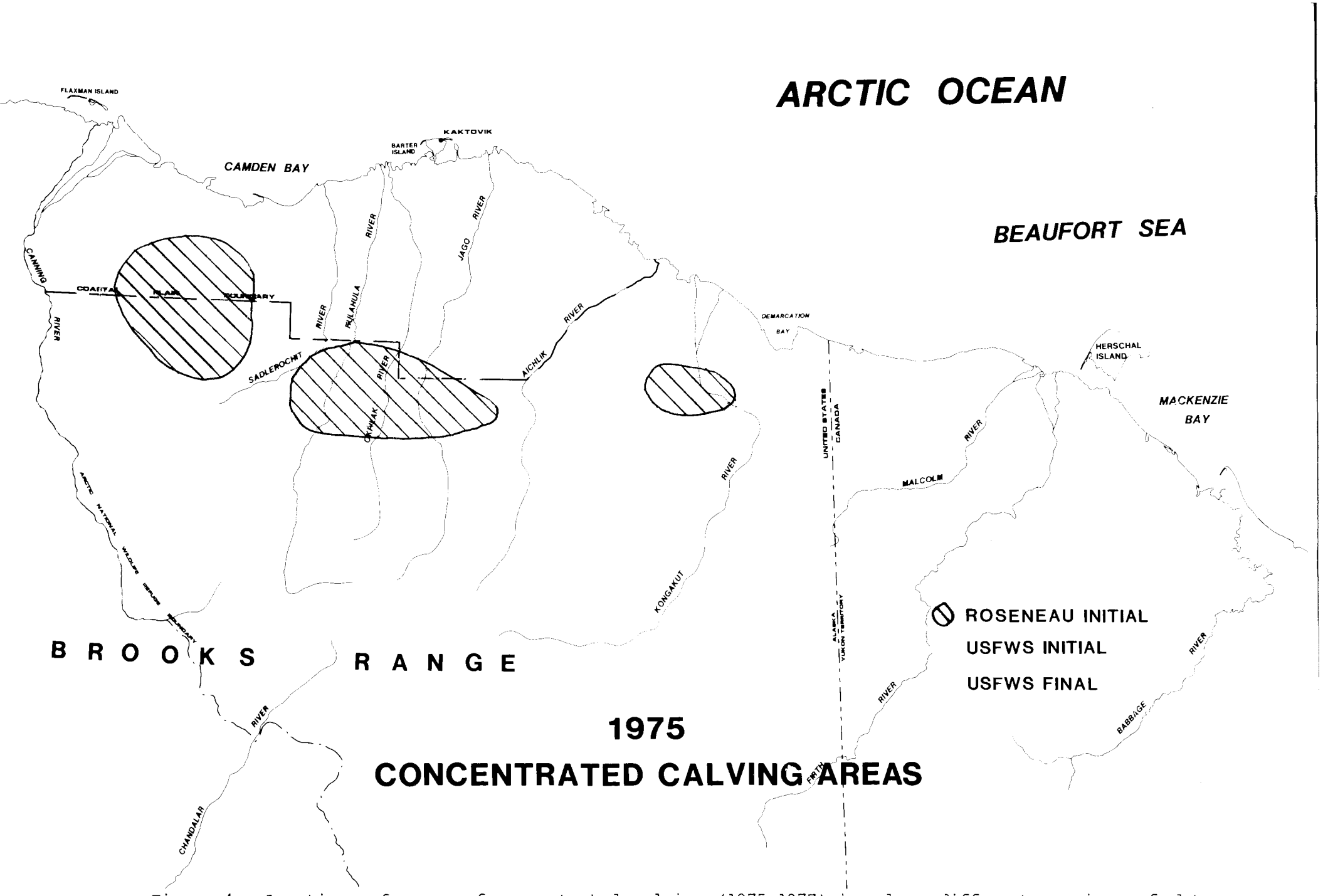

Figure 4. Locations of areas of concentrated calving (1975-1977) based on different versions of data provided by D.G. Roseneau. The data as shown in Figure 3 have been plotted, as have the data from the USFWS data files. Note the substantial differences between the locations derived from the original maps, compared with those from the Initial Baseline Report (USFWS 1982), and the final USFWS maps.

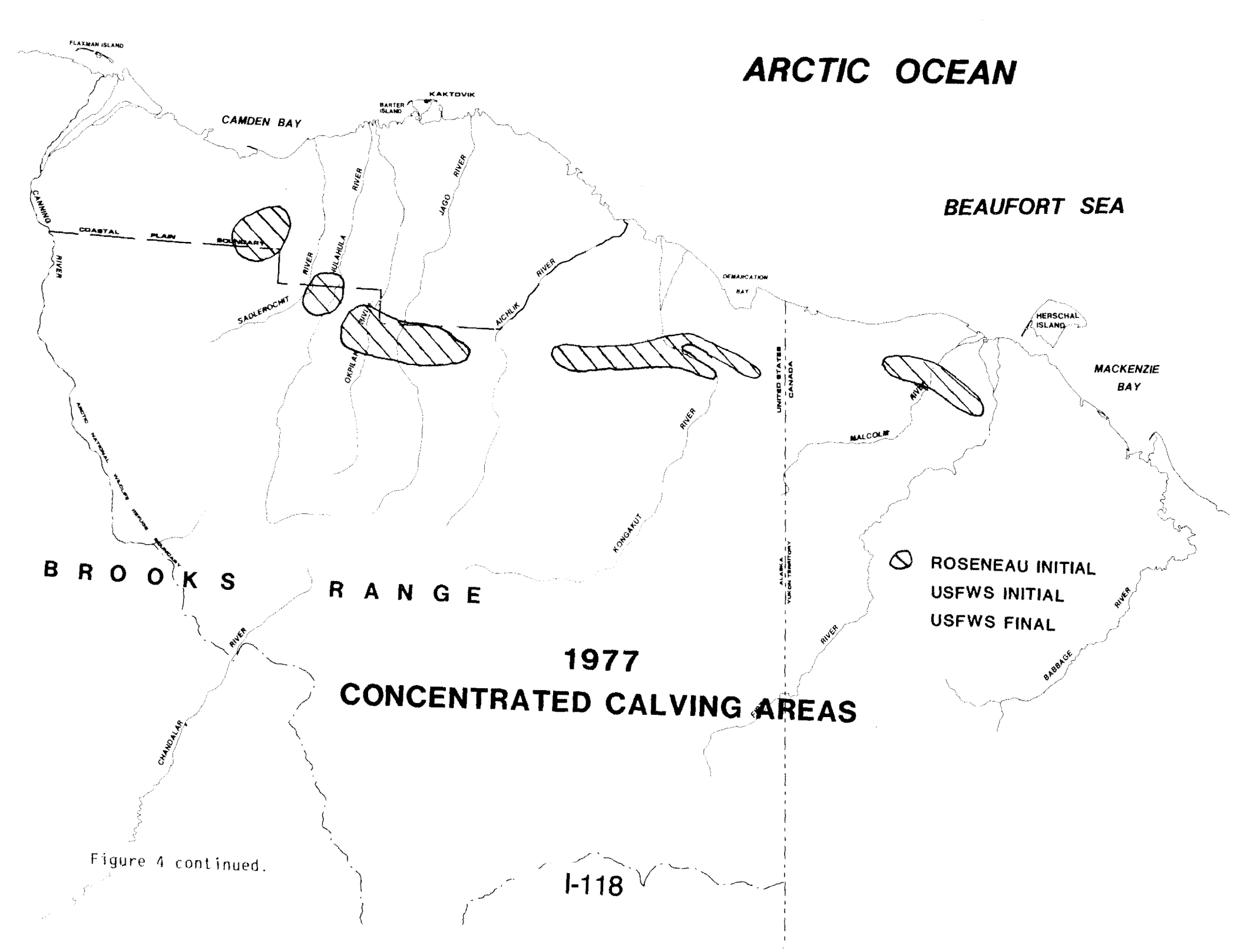

Figure 4 continued.

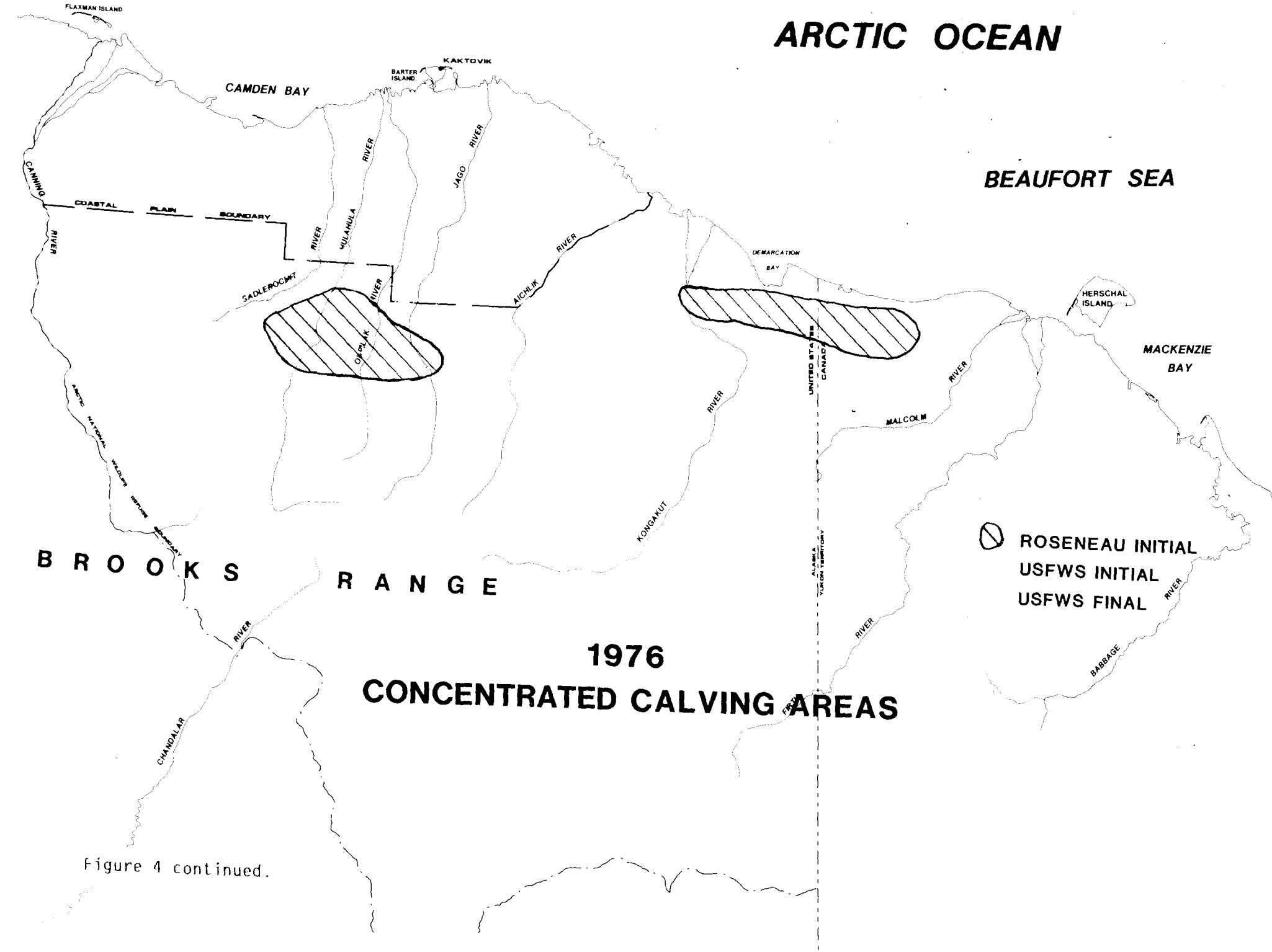

Figure 4 continued.

D. The question of insect harassment

The draft report emphasizes insect harassment and the importance of insect-relief habitat to caribou. The authors state that "The insect season is a period of extreme natural harassment and one of the primary driving forces in the annual caribou cycle" (p. 109, col. 1, par. 2).

We do not accept the latter assertion. Indeed, we believe that the preponderance of available evidence, while not conclusive, clearly indicates that insect harassment and the use of insect relief habitat are not primary driving forces in the annual cycle of caribou and do not exert a major influence on caribou aggregatory behavior or migratory movements. The following discussion of these points has been provided by D. G. Roseneau in response to our request for detailed information.

> "Certainly harassment by insects, including mosquitoes, oestrid flies and, in some areas, blackflies, has an effect on caribou. However, environmental factors, including insect harassment, are thought to be most important over the long term as evolutionary selective forces and over the short term as modifiers of daily behavior patterns, activities, and movements (e.g., Curatolo 1975)[1]. Insect harassment clearly does modify the day-to-day activity patterns, behavior, and movements of caribou, but it does not in itself serve as a primary driving force in the annual life cycle (i.e., insect harassment tends to operate on an intermittent, short-term, local level -- not at a higher level on the longer-term, larger-scale events making up the annual life cycle). Evidence that insects (especially mosquitoes) are the primary cause of post-calving caribou coming together in large aggregations just before beginning their post-calving migrations is weak. Similarly, evidence that insects (especially mosquitoes) actually cause migrations is weak. There is evidence that insects may aid in forming and maintaining aggregations, and also evidence that some insects (especially oestrid flies) play a role, possibly an important role, in encouraging caribou to disperse over their late summer ranges.
>
> "Large herds tend to be in near-constant motion and the annual cycle is characterized by periods of strong, forceful movements (e.g., spring, post-calving, fall, and early winter migrations) interspersed with periods of weaker, less directed movements (essentially pauses that include times of calving, formation of post-calving aggregations, August dispersal, and wintering). These annual movements are thought to be largely traditional in nature and largely functions of the species' gregarious habits and social behavior (e.g., Lent 1966, Curatolo 1975). Indeed, observation of the Porcupine caribou herd (PCH) suggests that this is likely (i.e., that major events, such as the actual coming together of large numbers of

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post-calving caribou and migrations, occur regardless of the presence of insects and are therefore more likely associated with the gregariousness and social behavior of caribou than with short-term modifiers such as insects).

"In 1972, mosquitoes became very abundant on the Alaskan summer range of the PCH as far north as the Beaufort Sea coast as early as about 10 June (Roseneau et al. 1974). [1972 was the year of greatest insect abundance during the period from 1972 through 1977.] Despite an early emergence of insects (primarily mosquitoes) inland and numerous warm, sunny days, the herd made no concerted effort to vacate the foothill zone (contrary to assumptions that have been made suggesting that insects regularly 'drive' caribou out of inland zones). Instead, most animals stayed inland for about three weeks after insect emergence and two weeks after calving, slowly coalescing in larger and larger groups. By about 20 June larger aggregations were beginning to form, but these growing concentrations stayed inland until 30 June (Roseneau and Stern 1974). Then, within the next two days (i.e., by the evening of 2 July, well after insect harassment began inland) most groups moved rapidly to the coast near Camden Bay where they joined, forming one massive, classic post-calving aggregation. Within 24 hours (i.e., on 3 July), the post-calving migration was well underway. The animals moved rapidly eastward a few miles south of the coast (where insects were numerous) to as far east as Barter Island, and then turned southeastward (i.e., inland) toward the Aichilik River foothills, where not only mosquitoes, but also oestrids, tended to be even more abundant. Over 40,000 animals continued east through the foothills of the lower Kongakut and Clarence river drainages and entered Canada in about seven days (i.e., by the evening of 10 July). About 30,000 other animals left the foothills, entered the coastal lowlands east of the Kongakut River, reversed direction, and returned to the lower Jago River floodplain by the evening of 10 July. The animals that entered Canada traveled steadily through the British Mountains at about 10 miles per day, usually traveling at night, and during the day were intensely harassed by insects (both mosquitoes and oestrids). During the day, the migrating animals usually paused, hill-topping and obviously making use of locally available insect-relief habitat during mid-day (McCourt et al. 1974). Regardless of periods of on-going harassment by insects, these animals soon (on 21 July) crossed the headwaters of the Blow River, arriving in the upper Driftwood drainage (where insects, including oestrids, tend to be abundant) by the last few days of the month.

"The animals that returned to the Jago River were also harassed intensely by insects. Even so, as they turned back near Demarcation Bay, they did not move the short distance to the coastline where they could have actually found relief from insects along the beaches of the bay. As they traveled westward near the coast between the Turner and Jago rivers, they were attacked steadily by swarms of mosquitoes and nose bots, and most responded in classic fashion -- e.g., shaking heads, thrusting muzzles into water or mud, occasionally jumping. They did gain some relief from harassment by trotting steadily into a westerly breeze. However, as they continued moving, they did not shift their travel corridor to the actual coastline (often only 0.5-1.0 mile away) and thus bypassed many areas

(e.g., beach-bluffs, beaches and gravel spits, shore-fast ice) clearly affording better relief. [At one point, it can be added, the investigators gave up and walked about 0.5 mile to the coast to enjoy brief insect relief for themselves before attempting to rejoin the caribou farther inland.]

"The 'Jago group' remained in Alaska for about one month. Within a few days after reaching the river, the concentration broke into smaller groups of several hundred to several thousand individuals, and gradually dispersed along the coast between Camden and Demarcation bays. During the first two weeks while these groups paused near the coast, they often made use of the local shoreline in classic fashion for insect relief. Then some animals began drifting back into Canada both coastally and inland, while many others moved inland -- through areas still containing relatively large concentrations of insects -- to the uplands near Peter and Schrader lakes, where they made use of local hilltops for insect relief before also drifting eastward into Canada.

"In contrast to 1972, conditions in 1973 were considerably cooler on the PCH's summer range in Alaska (Roseneau et al. 1974), and insects were lower in abundance that summer than in most years during 1972-1977. The differences between 1972 and 1973 help provide insight into the question of insects driving major events in the caribou annual cycle such as post-calving aggregations and migrations. Mosquitoes began emerging inland during late June, and finally became noticeable on the coastal plain during the first few days of July (initial numbers were very low). Mosquito numbers remained relatively low both inland and near the coast as late as 8 July, and did not reach concentrations resembling those seen the previous year until about mid-July, after post-calving Porcupine caribou had left Alaska. Despite the general absence of insects both in the inland foothills and on the coastal plain, post-calving movements of caribou were nearly identical to the post-calving movements seen the previous year.

"Post-calving aggregations began coalescing in the southern lowlands by about 20 June. (Caribou were distributed broadly and were already utilizing lowland areas, and had been for some time, because snowcover had been light and, despite cooler conditions, had begun to disappear much earlier than during the previous year.) By 1 July, post-calving animals were moving rapidly north to the coast between Camden Bay and Barter Island, and most of them formed a massive, classic aggregation spreading several miles inland by the early morning of 3 July (Roseneau et al. 1974). A steady, forceful, eastward migration began almost immediately: it was underway by the late morning of 3 July. The animals paralleled the coast, staying within a narrow corridor about two miles inland, and vanguard elements arrived just south of Beaufort Lagoon by early morning on 4 July. By the next day at Beaufort Lagoon, the migrating animals began moving inland away from the insect-free zone toward the foothills of the Aichilik and Kongakut drainages, where mosquitoes were still relatively scarce on hilltops, but more abundant in the valley bottoms where oestrids were also present. A massive concentration of 72,000-87,000 animals moved through the lower valley of the Kongakut

River, pausing in valleys of the Clarence drainage during the evening of 8 July, and crossing into Canada on 9 July. These animals continued moving rapidly southeastward, away from the relatively insect-free coastal plain near the international boundary and into the warmer British Mountains, where insect concentrations were considerably greater. These caribou entered the relatively warm upper Driftwood drainage by 23 July and were exposed to substantial concentrations of insects (see Doll et al. 1974).

"Thus in both 1972 and 1973, regardless of notable differences in insect emergence dates and in insect abundance between the two summers, the Porcupine herd followed the same basic, traditional pattern of post-calving aggregation and migration. In 1972, the worse insect year, most post-calving caribou stayed inland, coalescing into increasingly large groups in the presence of large numbers of insects, then moved rapidly to the coast well after insects had emerged at the coast, aggregated briefly coastally, and then turned inland, traveling for many days through heavily insect-infested regions of Alaska and Canada, and making use of local insect-relief areas while continuing to migrate farther southeastward in Canada. (Animals that turned back west into Alaska and paused near the coast also made use of locally available insect-relief habitat before moving back eastward into Canada.) In contrast, in 1973 -- a relatively insect-free year -- large numbers of caribou began coalescing inland despite an absence of insects, moved rapidly to the coast well before insects had emerged at the coast, briefly formed large coastal aggregations as insects were just beginning to emerge, and migrated enmass inland into Canada, abandoning a broad, essentially insect-free zone in Alaska in exchange for a substantially insect-infested region of Canada."

[NOTE]

[1][Curatolo (1975) stated that caribou appear to have a relatively high tolerance to mosquitoes and that mosquito harassment acts as a modifier of ongoing caribou activity. He also believed that mosquitoes have very little effect on initiating (i.e., actually causing) post-calving migrations. However, he believed that oestrids do have a role in dispersing caribou during the August (late summer) dispersal.]

E. Importance of the coast as insect-relief habitat

The following discussion was prepared by D. G. Roseneau in response to our request for detailed information.

"The authors of the draft report emphasize the importance of the coastal fringe as insect-relief habitat (e.g, see Plate 2A), and state:

> 'A greater concern, relative to the location of potential barriers under the full leasing scenario, would be inhibiting movements for the large post-calving aggregations which annually occur on the 1002 area as they move between inland feeding areas and coastal insect-relief habitats' (p. 109, col. 1, par. 2).

"The importance of the coastal fringe as important insect-relief habitat, including implications that large numbers of post-calving caribou go to the coast regularly for the purpose of using it for relief from insects, as well as concerns that the Porcupine herd might somehow be placed in jeopardy if large aggregations were prevented from reaching insect-relief habitats, are over-emphasized and are not necessarily consistent with most data (see preceding discussion). PCH caribou typically make use of a wide variety of local habitat types for insect relief, including hilltops, river bars, river banks, and floodplains, in addition to the kinds of habitat afforded by the coastal fringe (e.g., coastal bluffs, beaches, barrier islands, shore-fast ice) as conditions warrant on summer range. In most years, large post-calving aggregations have spent very little time actually at the coast. Usually, large numbers of animals gather inland, move rapidly to the coast in a few days, and then, after briefly 'stacking up' at the coast, migrate rapidly away from it after only a few more days. [This was true even in 1972, one of the worst insect years on record.] Moreover, in years when post-calving migrations generally followed the coast, most of the animals remained one or two miles inland, generally ignoring the nearby beach-bluffs, beaches, spits, and remnant shore-fast areas affording better relief from insects (although some migrating animals have used these areas during short pauses in the eastward movement). [Examples of years when migrating caribou stayed inland from coastal insect-relief areas include 1972 (for initial movements only; see exception below), 1973, 1974, 1975, and 1979.] In at least two years, post-calving aggregations did not visit the coast at all (in 1976, when many smaller aggregations formed and stayed well inland along over 100 miles of the front of the Brooks Range and northern British Mountains, where insects were generally more numerous than in the coastal zone; and in 1981, when many smaller aggregations formed and stayed inland along the Sadlerochit and Romanzof mountains).

"[An exception to the above pattern occurred in 1972, when a large element of the cow-calf segment turned back near the international boundary after being joined by many newly arriving bulls (one possible reason for the turn-around). These animals, totalling about 30,000 individuals, returned to the Jago River, and then dispersed between Camden and Demarcation bays. While pausing near the coast for about two weeks, many of these animals did indeed seek relief from insects in coastal habitats.]

"In some recent years, large numbers of post-calving caribou have remained in Alaska somewhat longer and later than during previous years. [The first instance occurred in 1977 when post-calving animals remained between the Hulahula and Aichilik rivers until about late July.] However, even in several of these years, most animals visited the coast only for relatively short times. [The few exceptions have been years when elements of the herd have turned back west as in 1972. Examples include 1977 and 1983 (a year having some similarity to 1972).] In general, based on available information, it is doubtful that even relatively major (hypothetical) losses of coastal fringe habitats would prove to be of more than minor consequence to the Porcupine herd.

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"It should be noted that the depiction of insect-relief habitat in Plate 2A is very general. Also, areas of insect-relief habitat include many of the river corridors between the Brooks Range and the Beaufort Sea; these are not shown. Not all areas that are perceived by humans to be potential insect-relief habitat are used by caribou to any great extent, and not all areas shown in the 'major insect-relief zone' of Plate 2.A are actually used by caribou."

F. The question of differences between herds

The following discussion was prepared by D. G. Roseneau in response to our request for detailed information.

"The authors indicate that caution must be used when drawing analogies between the Central Arctic herd (CAH) and the Porcupine caribou herd (PCH). We agree completely. However, the most relevant differences between the two herds involve relative herd sizes and contrasts in range geography. Other perceived differences (e.g., abilities to habituate) are likely to be of less importance. Both herd size and range geography are important considerations because they may have considerable bearing on how caribou respond to development on their ranges. As indicated in the draft report, the CAH is a relatively small herd ranging in summer north of the Brooks Range across a very broad coastal lowland and upland area extending many miles east and west. In contrast, the PCH is a very large herd ranging in summer across a much narrower coastal lowland and upland area between the Brooks Range and the Beaufort Sea. Large herds tend to undertake longer, more direct, and more forceful movements than those of small herds, and the generally widespread, weaker, and less forceful movements of the CAH must be taken into account when attempting to interpret responses to oil development, including reactions to physical structures and human activities. The much larger size of post-calving aggregations and the greater momentum and inertia of post-calving migrations of PCH animals may result in different levels of response to similar activities. These differences may not necessarily be adverse. For example, large migrating aggregations of PCH animals might be less hesitant when approaching structures, and might cross roads and pipelines more readily than has been seen near Prudhoe Bay (where information on interactions between the pipeline corridor and 'large' groups is still limited to observations of groups consisting of less than 1,000 animals; see Smith and Cameron 1985). Also, after lead animals in large groups cross potential barriers, remaining animals, including caribou in following groups, might tend to pay less attention to the perceived obstacles and continue moving along the established route with less hesitation. On the other hand, if the lead animals in large, forcefully migrating groups are deflected, it is possible that the groups might travel farther than would smaller groups of similarly deflected caribou. However, it should be understood that even very large deflections would not necessarily produce adverse effects on the caribou population."

G. Response of caribou to oilfield development

The draft report's analysis of potential effects of development on calving caribou are based primarily on conclusions attributed to a study comparing densities of caribou cows and calves before and after construction of an oilfield road on the Arctic Coastal Plain: "Dau and Cameron (1985), in what may be the most systematic study of caribou displacement by oil development, reported that maternal groups showed measurable declines in habitat use within approximately 2 miles on either side of the Milne Point road in the central Alaskan arctic" (p. 107, col. 2, par. 2). However, examination of the cited paper shows that Dau and Cameron (1985) did not refer to decreased habitat use within 2 miles of the Milne Point road, and that their study is so confounded by uncontrolled variables that it is quite impossible to make any conclusive interpretation of their results.

Figure 5 presents graphs from the Dau and Cameron paper showing the relationship between the square root of the density of all caribou and also of calves only, and distance from the road. The data points shown are the means of four years; no information about year-to-year variability is given. The data were collected by helicopter surveys conducted during the four years prior to road construction (1978-1981) and the four years following road construction (1982-1985). The intent, of course, was that the first four years' data would serve as a control against which to compare caribou distribution after the road was in place and development had begun.

Use of the square root transformation and of calculated regression lines (Fig. 5) gives the impression that caribou density was evenly distributed within 6 km of the alignment prior to construction of the road, but afterwards was low near the road and high away from it. If we take the graphs in Fig. 5 at face value, an effect relating to the presence of the road appears to continue out to at least 6 km. However, removing the square root transformation gives quite a different picture (Fig. 6). Examination of the non-transformed data leads to four observations:

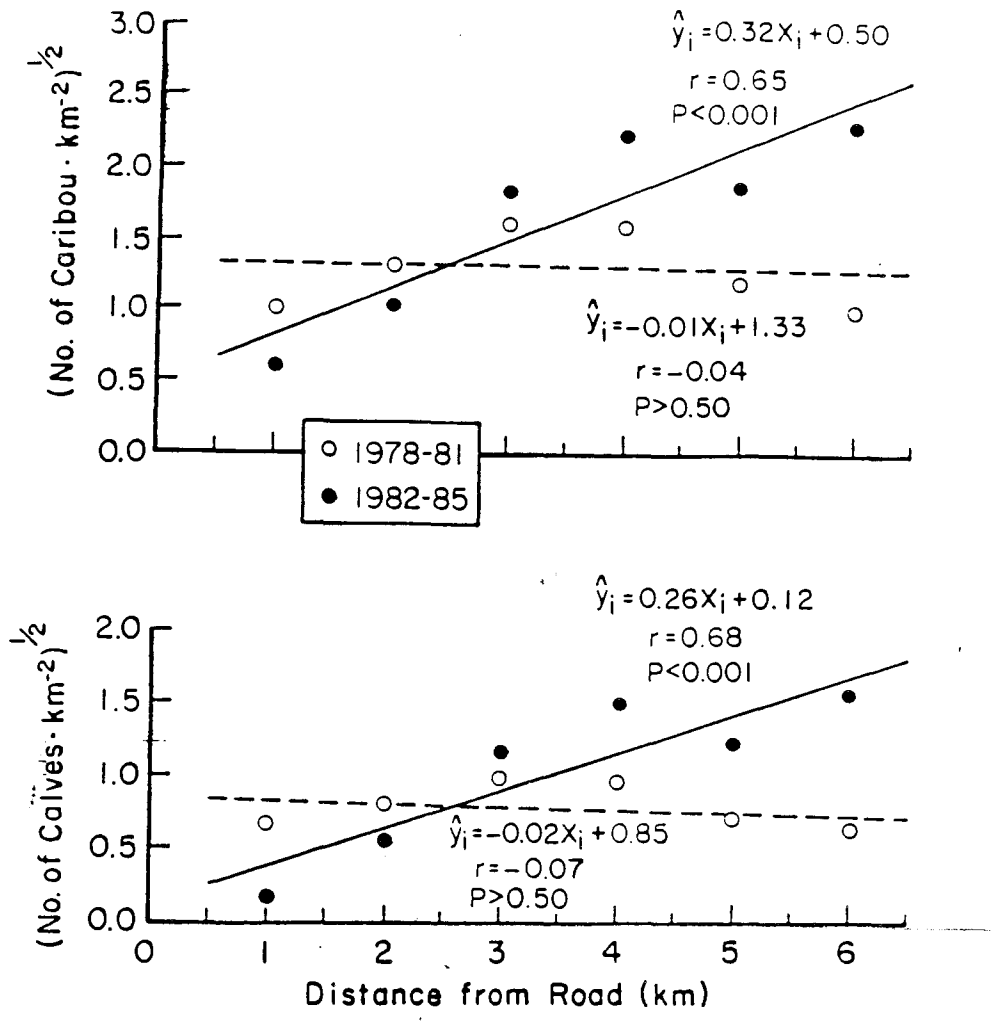

Figure 5. Graphs from Dau and Cameron (1985) showing relationship between the square root of the density of caribou to distance from the road leading to the Milne Point oilfield. Data from 1978-1981 were collected prior to construction of the road; data from 1982-1985 were collected after the road had been built. Note that the data points shown are square roots of the four-year means. Values for individual years have not been made available by the authors and consequently, the annual variability is unknown.

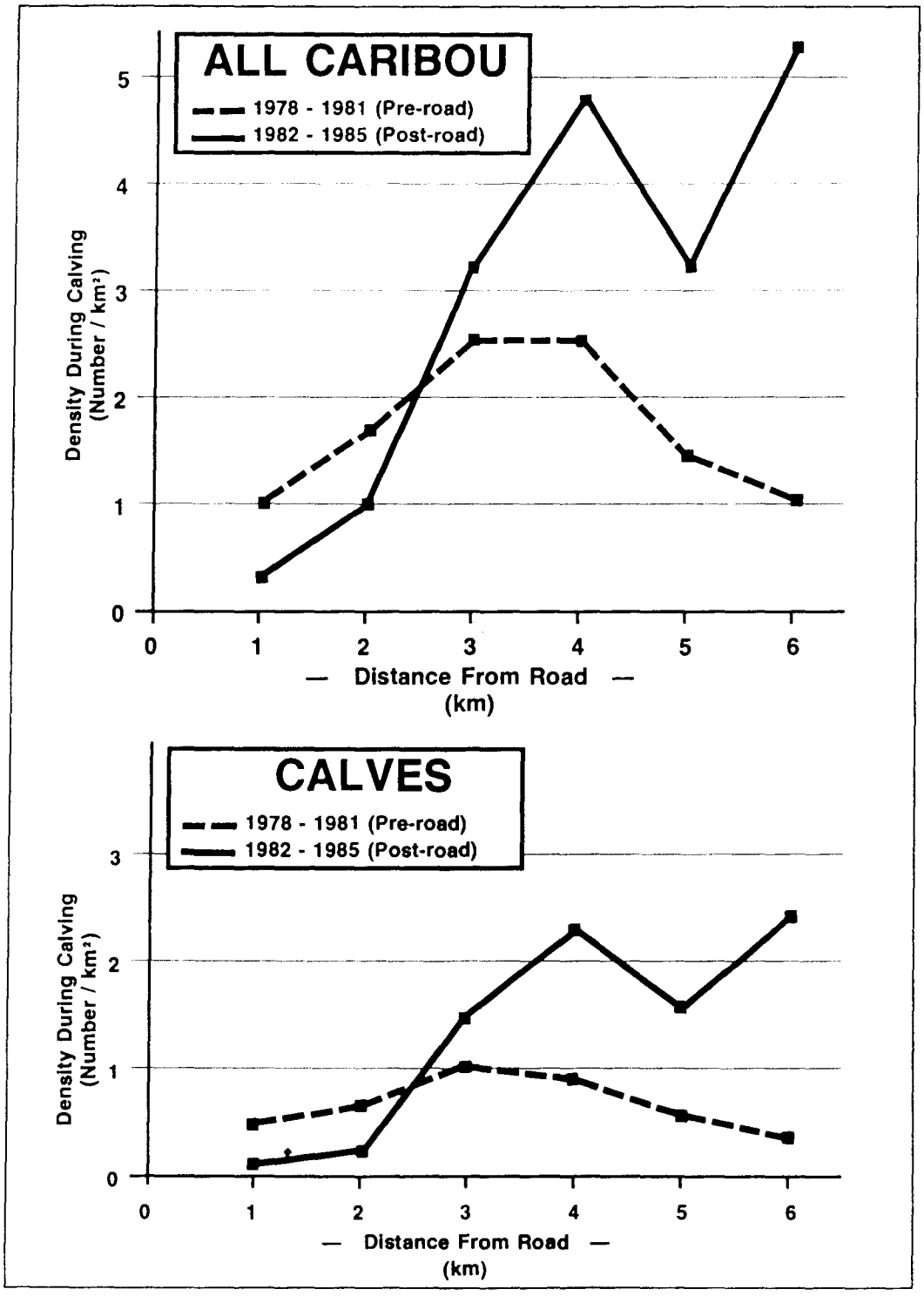

Figure 6. A replotting of the data in Figure 5 to show approximate actual values. Because the authors have not made the original data available, values were obtained by reading the square roots in Figure 5 and squaring them. Shown are the four-year means; variances are not known. [Note added in proof: R. Cameron, Alaska Department of Fish and Game, has provided the actual four-year means. They are not significantly different from those shown in Figure 6.]

1. In both four-year periods, the data from 1-3 km show the same trend, i.e. increasing density away from the road alignment. The fact that this trend existed both before and after the road was constructed suggests that some other factor (e.g., topography) may have influenced the distribution of caribou.

2. The densities shown for the 1-3 km interval are the four-year means; no information on year-to-year variability is given. Assuming that there was a normal amount of variability, it is almost certain that the data from both four-year periods overlap and are not statistically different.

3. The real differences in the data sets appear to be in the 4-6 km interval.

4. From inspection of the curves, it is apparent that there were roughly twice as many caribou in the study area (i.e., the 1-6 km zone) following road construction than before.

Finally there are two other factors that confound interpretation of the Dau and Cameron (1985) data. The authors apparently assumed that the density of calving caribou would be the same in both four-year periods. This implies an assumption on their part that 1) the population was constant in size, 2) that the distribution was essentially the same, and 3) that snowmelt and weather conditions were practically identical. In fact, the Central Arctic herd roughly trebled (i.e., from 5,000 to 15,000) in size during the period over which the study took place, and snowmelt and weather conditions differed between years, as did the distribution of calving caribou.

What explains the pattern seen in Figure 6? It is impossible to know. Dau and Cameron's (1985) study is too unclear to permit a conclusion to be drawn, and there is no scientific basis to conclude from their study that any displacement of caribou resulted from the road and associated activity. If the numbers out to 6 km are compared, it is clear that there were about twice as many caribou in the area after the road was constructed than there were

before. Clearly, it is inappropriate for the draft report to base predictions of potential caribou displacement from the "core calving area" on the Dau and Cameron study.

During the period 1981-1986 surveys of the calving distribution of the Central Arctic Herd have been conducted (RRCS, 1985; R.M. Jakimchuk 1986, pers. comm.). Figure 7 shows areas of major usuage by calving caribou. It is clear that although calving densities may be lower immediately adjacent to areas of active oilfield operations, caribou continue to calve in the region where they have traditionally done so.

The most important point is that whatever the exact response of the Central Arctic Herd to oilfield activities, the herd has grown rapidly. Clearly, and contrary to may earlier predictions, whatever the effect of oilfield activities on individual caribou, there have been no detectable population-level effects. The herd has more than quadrupled in size since development began in the early 1970s. Nor is this situation unique: several other herds are thriving in the presence of considerable human activity (Bergerud et al. 1984). The only effect of human activity that has clearly been capable of seriously lowering caribou numbers is direct mortality from excessive hunting.

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[It should be recognized that traffic in the 1002 area will be appropriately controlled during periods when calving animals are present near oilfield developments, and that construction will be timed to avoid periods when calving and post-calving caribou are present.]

7. WATER AND GRAVEL AVAILABILITY

Throughout the 1002 draft Report there are numerous references to gravel and water shortages with the implication that there are no known means by which these resources can be obtained in quantities sufficient to support exploration and development operations. The Report overstates potential problems in both cases.

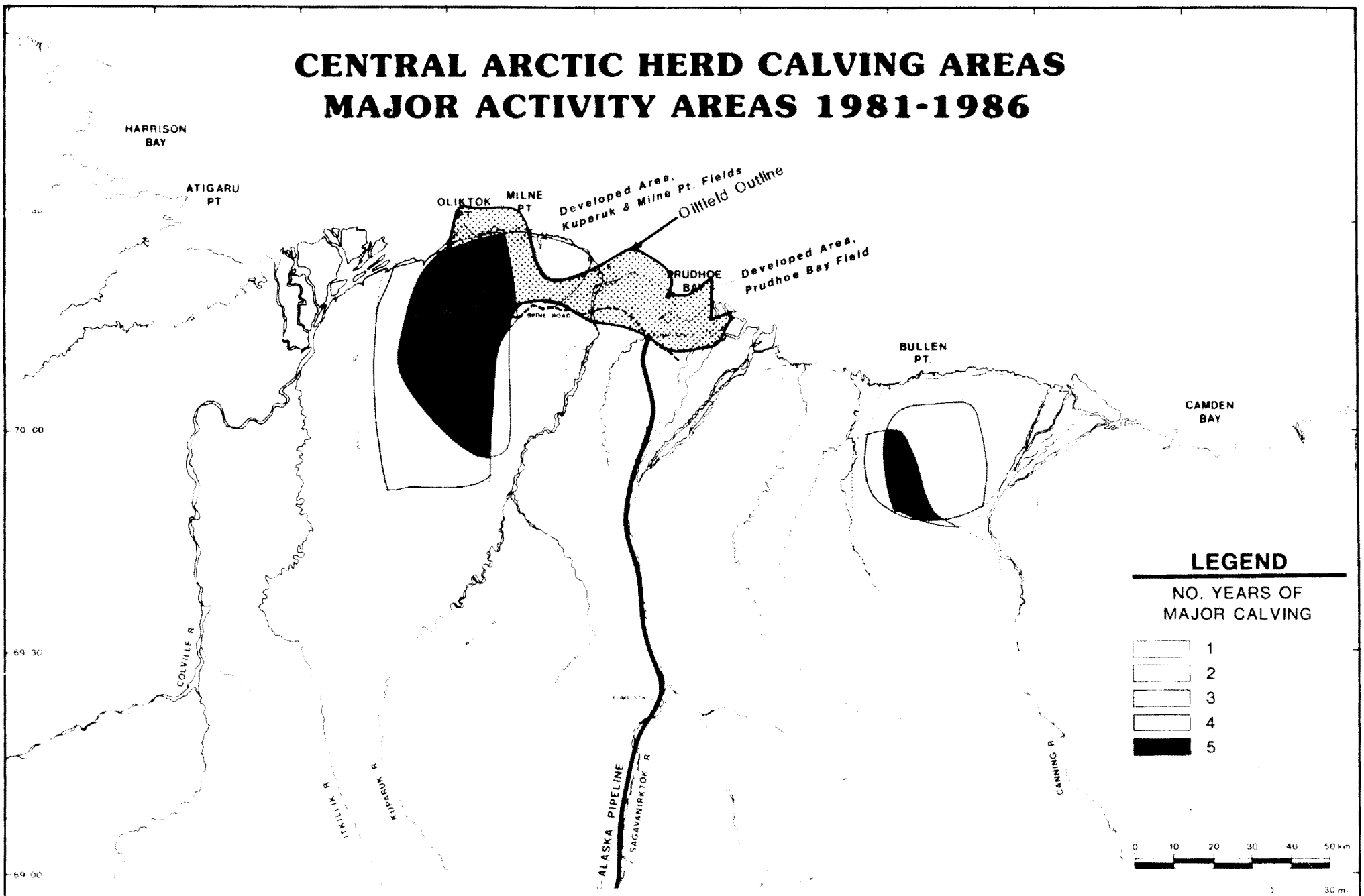

Figure 7. Locations of areas of major calving activity of the Central Arctic Herd, 1981-1986. Note the presence of calving caribou within the general area of the Prudhoe Bay, Kuparuk, and Milne Point oilfields. The Prudhoe Bay Oilfield has never been known to be used often by calving caribou, even prior to development. [Based on data provided by RRCS (1985) and Jakimchuk 1986, pers. comm.].

A. Water

Lack of readily available water resources is acknowledged, however its significance is repeatedly overemphasized. The availability of fresh water is not a problem unique to the 1002 area. Over 250 exploration wells have been drilled in the North Slope arctic desert. Methods developed to satisfy water requirements elsewhere in the arctic will be applicable to activities in ANWR. Just as water availability varies by location, solutions to providing water will have to be considered on a site by site basis. Examples of methods that will be contemplated include creating deep pools in river/stream beds, creating deep pools in lakes, desalination of sea water, erecting snow fences to trap snow which could be used with snow melters, insulating lakes to keep them from freezing to bottom, and the conversion of gravel extraction pits to reservoirs. Water availability will not limit industry's ability to operate in the region.

B. Gravel

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With respect to the availability of gravel, the information in the document is actually contradictory. On page 20 the report acknowledges that "valleys of larger streams are underlain by the large quantities of coarse sand and gravel." The Executive Summary (page 6) states however that gravel is in very limited supply. Again on page 75, it is reported that specific sources of gravel have not been identified. On page 84, the Report reads: "The availability of adequate gravel supplies on the 1002 area is uncertain." Not only do these inconsistencies require correction, but also information gathered during past geophysical surveys needs to be evaluated and reported. Geophysical operators conducting the surveys were painfully aware during their two seasons of drilling all over the 1002 area that virtually the entire region is underlain in the very near surface (75' holes) with gravel. Drill logs containing this information were available to the government as were samples from all the holes.

It is logical that this area of the North Slope harbors significant gravel resources. The Brooks Range mountains are at their closest to the Beaufort

Sea and the shorter steeper gradient streams and rivers carry a significant load of gravel throughout their length. No river such as the Colville intercepts the north-trending drainage to deprive the coastal streams of discharge and gravel load. At Prudhoe Bay, further west, gravel resources have been more than adequate to sustain both onshore and nearshore petroleum development. The basic geomorphological setting, and recent geotechnical data from the Coastal Plain, clearly lead to the conclusion that there are available gravel resources. Gravel can be utilized without significant adverse environmental impacts and is more than adequate to support major petroleum development.

8. AIR AND WATER QUALITY

Existing oil and gas development at Prudhoe Bay and Kuparuk has not resulted in any significant impacts to air and/or water quality. The existing regulatory structure affords numerous opportunities for state and federal resource agencies, in addition to the issuing agency, to review projects and make recommendations for modifications and/or permit conditions and stipulations which minimize the potential for air and water quality impacts. The existing regulatory structure is sufficient to ensure similar protection for the environmental resources in ANWR. Prior to recommending any additional regulatory authorities, a careful review of the existing requirements should be conducted to identify potential gaps, if any, in coverage of environmental concerns. Any recommendation for new authorities should be specific to these identified gaps in coverage and not duplicate existing programs, since the existing regulatory framework already is duplicative and cumbersome. This perspective is supported in the following discussion.

A. Air quality

The discussion of air quality in the 1002 Report is brief and generally correct however a thorough analyses of the multitude of air quality data available from North Slope operations is not given. Air quality data on the Arctic Coastal Plain has been consistently good, always better than national standards even downwind of oil and gas development. Emission

sources can cause a localized increase in the ambient air quality above background levels at Prudhoe Bay and Kuparuk, however federal PSD review in conjunction with atmospheric dispersion modeling studies and aerometric monitoring programs indicate compliance. The diminimus impact of the relatively large development is below the regulated emission limits of the U.S. Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC). Regional air quality has not been degraded by the existing oil and gas development.

The primary source of air emissions from North Slope oil and gas production facilities results from the operation of natural gas-fired turbines and heaters. Since the fuel used by all permanent facilities is low sulfur natural gas, the emissions of sulfur dioxides are minor. The H_2S content of fuel gas as measured over the past 8 to 10 years has varied from 10 to 15 ppm resulting in extremely low SO_2 emissions which are well within the National Ambient Air Quality Standards (NAAQS) as well as the PSD Increments. Likewise, the emissions of TSP, CO and HC are also extremely low and well within NAAQS. The only criteria pollutants emitted in significant quantities from North Slope facilities are oxides of nitrogen.

The gas-fired turbines, most of which are in the 30 to 35 MHP range, produce the majority of the NO_2 emissions. Best Available Control Technology (BACT) limits were established at the New Source Performance Standard (NSPS) limit of 150 ppm NO_2 for gas-fired turbines during PSD permitting in the early 1980's. A variety of types of turbines operating on the North Slope have been compliance tested. These turbines have met permit limits and generally produce emissions well below the required limits (See Table 2).

Ambient air monitoring was conducted on the North Slope by the Prudhoe Bay Unit from April 1979 through March 1980 to determine the ambient air quality on the North Slope of Alaska when there was approximately 600 MHP of gas fired turbine capacity and 770 MMBTU/hour of gas fired heater duty

in operation. The results of this study are summarized in the Table 3. All measured ambient air quality levels were well below the applicable National Ambient Air Quality Standards (NAAQS).

Due to PSD - permitted increases in heater and turbine capacity, two one-year ambient air quality monitoring programs, developed in cooperation with the EPA Region X and the Alaska Department of Environmental Conservation (ADEC), were begun on the North Slope during 1986 to assess post construction ambient air impacts due to oil and gas production facilities. Both the Kuparuk River Unit (KRU) and the Prudhoe Bay Unit (PBU) instituted air monitoring programs to assess the air quality at each respective unit's maximum air quality impact location as well as a location representative of background air quality levels.

In the PBU the station placed at the maximum ground level impact receptor is directly downwind from a facility that operates thirteen 35 MHP gas-fired turbines, the largest single concentration of emission sources on the North Slope. Data acquired to date from this monitoring effort has not identified air emission levels even approaching NAAQS. Table 4 summarizes the preliminary data from the two ongoing monitoring programs.

In summary, there is sufficient air quality data demonstrating that oil and gas production activity on the north slope does not detrimentally affect arctic air quality and that north slope facilities are well within the NAAQS.

TABLE 2

Measured Turbine Emission Levels

At Prudhoe Bay, Alaska

Turbines	Capacity	Allowable NO_x Rate		Actual NO_x Rate	
		ppm (@15% O_2)	lb/MMBtu	ppm (@15% O_2)	lb/MMBtu
Ruston-RB 2500	2.5 MHP	150	0.56	73	0.27
Ruston-RB 5000	4.9 MHP	153	0.57	83	0.31
GE-MS 5001	25.0 MHP	150	0.56	66	0.25
GE-MS 5001P	34.0 MHP	167	0.62	102	0.38
GE-MS 5002R	33.5 MHP	208	0.77	181	0.67
GE-M 5352	35.0 MHP	173	0.64	100	0.37
GE-M 3142(J)	14.6 MHP	162	0.60	121	0.45
Cooper Rolls - RB 211-24	29.1 MHP	205	0.76	146	0.54
Solar Mars	13.0 MHP	198	0.74	135	0.50
Solar Centaur	3.95 MHP	164	0.61	98	0.36
Sulzer	7.7 MHP	150	0.56	143	0.53

Table 3

Measured Pollutant Levels (ug/m^3)

At Prudhoe Bay, Alaska

from April 1979 through March 1980

Pollutant	Monitor Location: Drill Site 9	Monitor Location: Well Pad A	National Ambient Air Quality Standards: Primary	National Ambient Air Quality Standards: Secondary
Nitrogen Dioxide				
1 Hour Maximum	84.0	125.0	---	---
Annual Arith. Mean	3.5	4.0	100	100
Ozone				
1 Hour Maximum ++	113.0	113.0	235	235
Annual Arith. Mean	51.0	47.5	---	---
Carbon Monoxide				
1 Hour Maximum +	3430.0	3120.0	40,000	40,000
8 Hour Maximum +	946.0	856.0	10,000	10,000
Annual Arith. Mean	133.0	171.0	---	---
Sulfur Dioxide				
3 Hour Maximum +	13.0	25.3	---	1,300
24 Hour Maximum +	9.5	9.3	365	---
Annual Arith. Mean	0.4	0.5	80	---
Total Suspended Particulates				
24 Hour Maximum +	112.0	294.0	260	150
Annual Geo. Mean	6.7	11.4	75	60

Source: Radian Corporation, 1981.

\+ Not to be exceeded more than one per year.

++ Ozone standard is attained if the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than one.

Table 4
Ambient Air Monitoring Results
North Slope Alaska
1986

Prudhoe Bay Unit Ambient Air Monitoring Results

	October	November	December	First Quarter
Maximum Impact Site				
Central Compression Plant				
O_3 (ug/m^3)	49	54.9	51	51
NO_2 (ug/m^3)	15	13.2	15	15
SO_2 (ug/m^3)	7.9	7.9	7.9	7.9
Background Site				
Well Pad A				
O_3 (ug/m^3)	52.9	56.8	56.9	54.2
NO_2 (ug/m^3)	7.5	7.5	7.5	7.5

Kuparuk River Unit Ambient Air Monitoring Results

	July	August	September	First Quarter
Maximum Impact Site				
Kuparuk River Unit CPF-1				
O_3 (ug/m^3)	37	37	39	35
NO_2 (ug/m^3)	17	15	9	11
SO_2 (ug/m^3)	2.6	2.6	2.6	3
Background Site				
Kuparuk River Unit DS1-F				
O_3 (ug/m^3)	39	35	49	37
NO_2 (ug/m^3)	6	9	2	4

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B. Water quality

The existing regulatory framework applicable to exploration and development activities provides for a comprehensive review of essentially all phases of every project and ensures adequate consideration of environmental concerns, especially those related to protection of water quality. For example, if one wanted to construct a gravel pad and reserve pit in a wet tundra area and drill a well on that pad, the following permits, authorizations, plans and approvals would be required before the construction could proceed (Note that this is not an exhaustive list of the potential requirements, but a sample of the types of permitting procedures typically required):

1.) Federal (U.S. Army Corps of Engineers)
Section 404 Discharge of Dredge or Fill to Waters of the U.S.

The Corps has asserted Section 404 jurisdiction over wet tundra (as "Waters of the U.S") since 1979. This section of the Clean Water Act requires that a Public Interest review be conducted including an evaluation of the project against the 404 (b)(1) guidelines promulgated by the EPA. These guidelines contain specific consideration of water quality concerns.

The Fish and Wildlife Coordination Act provides for the formal involvement of applicable federal resource agencies in reviewing and providing comment on federal actions such as the Corps' 404 permit. Therefore, at a minimum, the Fish and Wildlife Service, EPA and National Marine Fisheries Service are given the opportunity to provide comments and recommendations regarding this permit. In addition, the EPA has ultimate veto authority over Corps 404 actions.

If the project being permitted is determined to be "major", the National Environmental Policy Act (NEPA) may require the

preparation of an Environmental Impact Statement (EIS), such as was the case with the Endicott Development Project. (An oil field 20 miles northeast of Prudhoe Bay.)

2.) State (Alaska Department of Environmental Conservation)
Section 401 Water Quality Certification for the Section 404 Permit.

The State has formal review and approval authority for actions such as the Corps' 404 Permit described above. One mechanism is through the 401 Water Quality Certification process. The Corps' must receive 401 certification before the 404 permit can be issued. This process provides for consideration of the project in terms of its effect on State Water Quality Standards and contains a mechanism for issuing a conditional certification. That is, the State can affix stipulations regarding reserve pit construction and operation to the 401 certification to provide for protection of surface water quality.

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3.) State (Division of Governmental Coordination [DGC])
Alaska Coastal Management Program (ACMP) Consistency Determination

The State recently developed new permitting procedures which provide for a comprehensive State review of projects involving a Federal and a State permit, or two or more State permits. These procedures provide formal involvement of the Departments of Natural Resources (DNR), Fish and Game (ADFG), and Environmental Conservation (ADEC). The Division of Governmental Coordination (DGC) within the Office of Management and Budget (OMB) acts as the coordinator for the State review process. Additionally, the new program regulations provide for formal involvement of the affected Coastal Management District, in this case the North Slope Borough (NSB).

The ACMP contains specific policies and procedures regarding the evaluation of the environmental effects of a given project. Alaska uses the mechanism of conditional consistency concurrences--a project may be deemed consistent if certain stipulations are incorporated. This provides an additional regulatory mechanism for the State to respond to environmental concerns regarding potential surface water impacts.

All of the above permits, reviews and mechanisms for affixing stipulations for a given project result basically from the one requirement for a 404 permit. This one regulatory requirement triggers two federal and two State review mechanisms and affords a comprehensive review of any potential surface water problems from the proposed project. In addition to this suite of requirements, the following are additional regulatory requirements for the same given project (Again, this is not an exhaustive list of the potential requirements):

4.) Federal (Bureau of Land Management [BLM])
Exploratory Drilling and/or Development Plan Approval
Permit to Drill, Deepen or Plug Back

The application requirements for these permits and plan approvals include the preparation of numerous plans describing how the construction of facilities will proceed, how various waste streams will be handled, how the site will be rehabilitated. Additionally, an oil Spill Prevention, Containment and Countermeasure (SPCC) Plan is prepared and submitted with the application. The SPCC plan addresses the environmental setting of the facility, potential sources of oil/hydrocarbon discharges, location and description of response equipment, preliminary restoration plans, handling of spill cleanup materials.

5.) State (DGC)
ACMP Consistency Determination

The BLM permits/approvals described above require an ACMP Consistency Determination. This program and its implementation were discussed previously.

6.) Federal (BLM)

Authorization for Disposal of Produced Water

Water produced from oil and gas wells must be disposed of in accordance with approved authorization from the BLM.

7.) State (DGC)

ACMP Consistency Determination

The BLM authorization described above requires an ACMP Consistency Determination. This program and its implementation were discussed previously.

8.) State (ADEC)

Solid Waste Disposal Permit

The State has produced new regulations tailored more specifically to the drilling fluids disposal issues than in the past. These new regulations are nearing promulgation and include consideration of the differences created by the presence of permafrost. The focus of the new regulations will be on efficient fluid management practices to reduce the volumes of water in the reserve pit. A more specific monitoring program will be required for the detection of potential seepage problems.

It must be recognized, however, that there are existing regulations requiring a Solid Waste Disposal Permit for a disposal site such as reserve pits. Although the new regulations are more specific regarding information requests pertinent to reserve pits, the existing regulations require substantial information submittals including, but not limited to, the following:

- o Description of the proposed development and operating procedures and ways that water pollution will be controlled

- o Evaluation of the site's leachate generation and water pollution potential based on waste quantity and type, site geology, hydrology, and other physical conditions

- o Discretionary requirement for the determination of surface water quality near the proposed site.

Thus, reserve pits have been regulated in the past and are becoming subject to more specific requirements that are tailored to the special conditions required for reserve pits in permafrost areas.

9.) State (DGC)

ACMP Consistency Determination

The Solid Waste Disposal Permit, like the other State permits mentioned previously, would require an ACMP Consistency Determination that provides a mechanism for affixing additional stipulations and requirements on the construction and operation of the reserve pit. This determination would involve the Departments of Environmental Conservation, Natural Resources, and Fish and Game, the Division of Governmental Coordination and the North Slope Borough.

10.) Federal (EPA)

NPDES Permit for Wastewater Discharge to Surface Waters

The National Pollutant Discharge Elimination System is a permitting system for point source discharges of wastewater to surface waters of the U.S. This program is administered by the EPA.

11.) State (ADEC)

401 Water Quality Certification for the NPDES Permit

The State must issue a certification that the Federal permit would not violate the State Water Quality Standards.

12.) State (DGC)

ACMP Consistency Determination

The NPDES Permit and the State 401 Water Quality Certification mentioned above are both subject to the ACMP Consistency Determination requirements discussed previously.

13.) North Slope Borough (NSB)

Development Permit

The North Slope Borough's Land Management Regulations require a development permit for oil and gas activities.

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In addition to the above listing of requisite permits and authorizations for the relatively simple example of a single drill pad, there are numerous programs, processes, methods and procedures that regulate other aspects of the construction/production of this facility. There will be the listing of environmental protection requirements that will be imposed as conditions for allowing the ANWR to be leased. Also, there will be the listing of environmental protection requirements that will be imposed as conditions of the lease sale ("Notice to Lessees"). Not mentioned specifically above are the state and federal environmental protection programs covering oil spills and hazardous substances control (Toxic Substances Control Act [TSCA], Comprehensive Environmental Response, Compensation and Liability Act [CERCLA], Hazardous Substances Control Act), the Migratory Bird Treaty Act, the Endangered Species Act, the Resource Conservation and Recovery Act (RCRA).

The simplified example of a single gravel drilling pad also does not include considerations for what it would take for permits and authorizations for the necessary gravel and water sources, and access to the pad. A thoughtful and careful analysis of the existing regulatory framework for oil and gas exploration and development activities should be undertaken prior to formulating any recommendations on additional regulatory authorities.

SPECIFIC COMMENTS

CHAPTER 1 - PURPOSE AND NEED FOR THIS REPORT

p. c. ¶. l.*

INTRODUCTION

9 2 3 This paragraph discusses the recreational and aesthetic values of the Coastal Plain and implies that it is more "unique" than any other coastal area of the Arctic. The Coastal Plain does provide varied wildlife viewing scientific and recreational opportunities; but so do many other arctic areas. Care should be taken not to be so subjective as to classify the aesthetic value of this area "unique" without qualifying that every region along the coast is "unique" in its own right. The Coastal Plain figures prominently both as a possible source of major oil and gas supplies and as a means to assuage man's yearnings for the aesthetics of solitude, scenery and wildlife. (See comments on p. 45, c. 2, ¶ 5-6.)

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This same paragraph mistakenly implies that the 1002 area is valued for it's threatened arctic peregrine falcon habitat. In fact it provides only minimal, and very poor habitat for the peregrine falcon.

10 1 1 2-3 The information available on both the resource potential of the region and the wildlife resources is extensive. The nature of the decision to be made obviously demands careful and

*NOTE: Comments are listed by page, column, paragraph, and line.

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dispassionate assessment of the knowledge gained from six years of concentrated study. It is our opinion that even though the caribou sections need reworking (see our general comments) this is an adequate document on which to judge the issue of leasing.

BASELINE STUDY OF FISH AND WILDLIFE RESOURCES

11 1 3 It would be more accurate to describe the baseline work performed by the Fish and Wildlife Service (FWS) as inventories rather than studies. These inventories provided an extensive basis for what we believe to be a thorough, and for the most part, a reasonable description of the coastal plain ecosystem and assessment of scenarios of development. To do the impact analyses, FWS has necessarily drawn from many scientific and technological studies carried out elsewhere in the arctic, as recognized by the bibliography. In a few areas, however, conclusions are based on one or two studies that have not been critically reviewed when other studies, some peer-reviewed and published, were available. This is of particular concern with respect to the caribou impact analysis. Very significant decisions regarding the leasing of ANWR will be based on this report. It is imperative that FWS critically examine all the relevant information on which their impact analyses are based, and where appropriate, modify their predictions of environmental consequences.

See both our general and specific comments on caribou. We strongly believe that there is sufficient justification, based on the less-than-scientific nature of some assumptions and the less than critical examination of some of the research cited, for FWS to rewrite the sections dealing with caribou.

STANDARD FOR ENVIRONMENTAL PROTECTION

12 2 We fully support the concepts of avoiding and minimizing environmental impacts to the greatest extent possible which are

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embodied by the FWS Mitigation Policy. The Mitigation Policy as a whole, however, is not an effective standard for protection of wildlife in the arctic. The foundation of the FWS Mitigation Policy is the management of habitat as a means of protecting and managing the productivity of fish and wildlife populations. 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. The policy is particularly inappropriate in the arctic where habitat has not been shown to be a limiting factor for most species, and this is particularly true with respect to caribou.

The only biologically effective approach to assessing and mitigating effects of development on wildlife is, first, to determine systematically how project activities and structures will alter population-limiting factors for each species of concern, and second, to apply mitigative measures that avoid or offset project effects on those limiting factors. If an automatically applied habitat-based approach happen to be effective for a species, this is because one or more population-limiting factors happens to involve habitat, not because there is anything uniquely important about the quantity of real estate available, per se. (see our general comments for a more complete discussion.)

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12 2 1- 13 1 2 In addition to identifying the FWS Mitigation Policy as the standard for impact analyses and mitigation recommendations, this section simply lists some of the major State and Federal regulations that would apply to exploration, development and production. The list should be much more extensive so that the reader has a clear understanding of the degree to which environmental protection is already guaranteed. Our general comments on water quality discuss some of the incredible number

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of comprehensive regulatory programs governing oil and gas operations.

To assess adequately the potential environmental effects of leasing in the 1002 area (and necessary mitigation measures), it is essential that the report review, in detail, the regulatory framework and related permitting programs that regulate oil and gas activities. A legal analysis should be completed to determine which, if any, environmental concerns are not addressed by existing laws and regulations. This analysis should be incorporated in the evaluation of environmental consequences. At a minimum, such a review should include:

1. major permitting programs for each stage of petroleum development;

2. environmental protection measures built into those programs;

3. the authority of regulatory agencies to regulate oil and gas development to ensure environmental protection; and

4. the regulatory management schemes and experience of oil and gas activities in other wildlife refuges (e.g. Kenai National Wildlife Refuge).

Although the report states that the existing regulatory mechanisms are incorporated in the evaluation of potential environmental consequences, the worst-case predictions imply the contrary, i.e. a regulatory vacuum. It is essential for the reader and for the writers of the draft LEIS to appreciate how the regulatory framework works, especially on the North Slope of Alaska, in order to understand the environmental safeguards already provided. This would also eliminate the need for many of the proposed mitigation recommendations that

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duplicate either standard engineering practice or that are included as standard permit stipulations under existing regulatory programs.

[It is worth noting that OCS Lease Sale Environmental Impact Statements explicitly assume the safeguards of the existing regulatory framework in impact projections. Thus the need for any additional stipulations are more easily assessed and justified.]

ADDENDUM

13 bottom — It will be important in the Final LEIS to address the conveyance of approximately 20,000 acres to the Kaktovik Inupiat Corporation (KIC). Subsequent ANWR boundary changes will have to be reflected on reference maps. The importance of the exchange to the KIC shareholders and area residents should also be addressed.

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CHAPTER II - EXISTING ENVIRONMENT

PHYSICAL GEOGRAPHY AND PROCESSES

15 2 3 1 — An oil seep has also been identified at Brownlow Point.

17 1 1 6 — Are there not data available from Deadhorse?

19 1 2 4 — typo: unusually

20 2 4 — We concur that there are numerous sources of gravel in large quantities. The extensive gravel finds discovered during the two winters of geophysical exploration should also be discussed.

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WATER RESOURCES

21 1 3 1 Since this draft report makes an issue of limited water resources, a map indicating the location of major water sources, including any depth or flow information should be made available and included in this section or an appendix.

22 1 2 2 The word "must" should be changed to "may" as there are several different methods which can be used to obtain water in ANWR without having to rely solely on marine waters. The sentence should read: "...the adjacent marine waters may be viewed as a water source."

22 1 3-4 Following is a new paragraph we suggest adding to the end of the section on Water Resources and before "Erosion and Mass Movement":

Although naturally occurring sources of fresh water for exploration and developmental use are scarce in the 1002 area, this is true throughout the North Slope. Methods by which water has been successfully extracted include:

(1) Excavating deep pools in river and stream beds;
(2) Excavating deep pools in lakes;
(3) Insulation of ponds to prevent freezing;
(4) Desalination of sea water;
(5) Erecting snow fences to trap snow which could be used with snow melters;
(6) Converting gravel extraction pits to reservoirs.

23 1 3-6 This section on air quality is well written. It would be beneficial, however to clarify that all emission sources on the North Slope hold valid air permits from State and Federal agencies and are complying with emission limitations and ambient air quality standards. In fact, emissions fall well

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below the limits set by EPA and ADEC. Air quality on the Arctic Coastal Plain is consistently good.

BIOLOGICAL ENVIRONMENT

VEGETATION

23 2 4 1-8 Thlaspi arcticum (arctic pennycress) has been under review for official designation as a threatened or endangered plant species since Murray (1980) first listed it. As a consequence, virtually every North Slope EIS produced since that time has conscientiously accorded it a token paragraph, although the species has never been legally protected. There has been no case that we are aware of in which arctic pennycress has been suggested to be threatened by development. Having reviewed the status of this species for the past six years, FWS should be in a position to (1) make a decision as to whether the species will or will not be legally protected by official designation as threatened or endangered, along with appropriate justification; and (2) provide a map showing its distribution at proper scale and in sufficient detail to assist decisions regarding potential development. What are the "Thlaspi arcticum stations" shown in Plate 1A? Do these represent specific areas where the species is known to occur? What legal status is proposed for these "stations"? Will development be prevented there even if the species in question is not legally protected? **Please provide clear and explicit explanations on these matters.**

25 2 2 14-18 This sentence is misleading. The way in which the sentence is constructed, implies that unvegetated floodplain islands differ from vegetated islands in that the latter have developed soils. This is sometimes true, but vegetated islands in early successional stages often have no developed soils and are

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p.	c.	¶.	l.	
				identical to unvegetated islands with respect to substrate composition.
25	2	2	21-22	As an extension of the previous comment we suggest changing the beginning of the sentence to: "Soils, when present, consist of...."
26	1	6	5	Remove final s from "soils".
26	2	4	21	Should "macro-invertebrates" be "micro-invertebrates"?
27	1	1	5-7	The boundaries of the Sadlerochit Spring Special Area shown in Plate 1A do not conform with the text description and appear to exaggerate the size of the Special Area. Because exploration activities are prohibited on a site-specific basis, the site boundaries should be clearly portrayed for the reader. A detailed and accurate map of the Sadlerochit Spring Special Area, either USGS topographic or photo-based, should be provided at 1:63,360 or other appropriate scale.
27	2	2		The list of International Treaties should be amended to include the recently initialed "Agreement Between the Government of Canada and the Government of the United States of America on the Conservation of the Porcupine Caribou Herd".

CARIBOU

27	2	5		The information on herd size needs to be put in perspective. We suggest including the following: The Porcupine Caribou Herd (PCH) is currently the sixth largest herd in North America. It is surpassed in size by five other herds which are also increasing in size: The Western Arctic Herd (Alaska - now about 220,000-240,000), the George River Herd (Canada - about 600,000 in 1984), the Kaminuriak Herd (Canada - about 320,000), the Beverly Herd (Canada - about 285,000 in 1984) and the

p. c. ¶. l.

Bathurst Herd (Canada - about 385,000 in 1984). [See Williams and Heard 1986, Heard and Calef 1986]

28 1 1 1-4 There will always be some degree of uncertainty in estimating the size of any population of wild animals. Sufficient data are available, however, to show that the difference between the population estimate from the early 1970s (approx. 100,000) and the current estimate (180,000) reflects population growth and not simply improved (or different) estimation techniques.

28 1 3 The Porcupine herd calves in many locations which vary from year to year within its international calving grounds. Areas in the general vicinity of the Jago River are indeed used for calving by **some** Porcupine caribou in most years, **along with many other areas inside and outside the 1002 area boundaries**. However, no comparative information is given for other calving areas throughout the remainder of the large international calving range. Reporting only calving concentrations within the 1002 boundaries while not showing the other areas used for calving in Alaska and Canada, and calling it "the core calving area", creates a false impression that this particular location is consistently used by the vast majority of parturient cows in the herd and is somehow much more important than other calving areas. The term "core calving area" should not be used to describe what is simply one of many annually varying calving concentration areas. **The discussion should be revised and expanded to provide a more accurate perspective**. [See "core calving area" discussion in General Comments.]

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It is not apparent that concentrated calving areas were in fact defined objectively as having a minimum of 50 caribou/sq. mi. Actual supporting data must be made available if the stated definition (50 caribou/sq. mi. in 5 or more of 14 years) is to be applied.

p.	c.	¶.	l.	
28	2	1	2-3	"Most caribou migrate to reach the calving grounds of the 1002 area from Canada..." misleadingly implies that the majority of the Porcupine herd migrates to the 1002 area expressly to reach calving grounds located there. The statement should be revised to read: "Most caribou calving within the 1002 area migrate there from Canada...."
28	2	2		Snow ablation is the key term here, and should not be confused with "early" and "late" springs (which imply warmer and colder temperatures than average). For example, during the winter of 1971-1972 snowfall was heavy and in the spring of 1972 PCH calving took place inland in the foothill zone in spite of a very warm, early spring. The deep snow cover found across the lowlands initially restricted the caribou to inland areas. Even after the snow disappeared, the caribou remained inland and did not move to the Coastal Plain to calve. In contrast, snowfall was quite light during the winter of 1972-1973, and in the spring of 1973 calving was widely dispersed throughout both the inland uplands and northern coastal lowlands in spite of a much cooler, later spring. The shallow snowcover found in the lowlands did not initially restrict the caribou, and was soon gone in spite of the much cooler weather.
28	2	3		It is significant that the estimates of cows calving in various areas are extrapolations from relocation of radio-collared cows. Given the findings of Cameron et al. (1985) that at least 30%, and preferably 50%, coverage is needed during line-transect counts of animals to reduce sampling errors to reasonable levels, extrapolations based on only a few dozen radio-tagged cows may be highly inaccurate. It is an untested assumption that the radio-collared animals are evenly distributed throughout the PCH each year; they were not evenly distributed at the time of the original tagging. These extrapolations should be supported by other survey data, or

p.	c.	¶.	l.	
				more information on ranges and variances should be provided. The use of such gross extrapolaticns is potentially misleading.
28	2	4		The comment about disturbance of cow-calf pairs within the first 24 hours of the calves' lives is more appropriate to the Environmental Consequences section.
29	1	1-2		These two paragraphs are somewhat contradictory in that paragraph 1 states that "post-calving movements show considerable annual variation", while paragraph 2 states that "The calving/post-calving area is an important identifiable habitat that has been used repeatedly...".
29	1	2		The calving/post-calving area is important, and is relatively small compared to the herd's range, but it also includes more than just the 1002 area and use within it has varied considerably over the years. It should be stated that approximately 1/3 of the calving/post-calving area falls within the 1002 boundaries. Without this clarification, the draft report infers that the 1002 area alone is the "important, identifiable habitat" referred to here.
29	1	3		The importance of insect-relief habitat is overemphasized. Post-calving PCH animals have formed dense aggregations regardless of the presence of insects. It is true that caribou respond to insects and seek relief from insects (and get it in a variety of habitat types), but data on movements of post-calving caribou to and from the coast do not always correlate with the presence of insects. It is true that movement to the coast is often rapid. If caribou are forced there by insects, however, and the purpose of their going is solely to seek relief from harassment by insects, they apparently have an ability to store up enough "relief" within just a few days to last them for several weeks. They often leave potential insect-relief areas along the coastal plain

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after only one or two days. They then migrate inland to an area, which is often considerably more insect-infested. If remnant groups are left, or migrating elements of the herd reverse direction for some reason, these groups then often do use coastal insect-relief habitat. (D.G. Roseneau, 1987, pers. comm.)

29 1 4 It is very unlikely that access to insect-relief areas is "critical" to productivity. If it were, one questions whether many caribou would be present today. It is true that in most years the post-calving caribou leave Section 1002 lands and ANWR by mid-July. This migration has occurred in years when insects have been very abundant and in years when insects have been nearly absent. In several years, (e.g. 1972, 1973, 1974, 1975 and 1979) the caribou have left relatively insect-free coastal areas for more heavily insect-infested zones in the British Mountains and northeastern Old Crow Flats. In at least 2 years (1976, 1981), post-calving aggregations did not visit the coast at all, but remained well inland.

29 1 5 The Governments of Canada and the United States have recently initialed a joint agreement on the conservation of the PCH, that will have direct implications on activities in ANWR. As a practical matter, this agreement will carry great political weight on PCH issues. It is important that the Department of the Interior fully evaluate the legal obligations and authorities established by this Agreement in the Final LEIS. The implementation of the conservation section of the Agreement should be fully explained in light of both current U.S. laws and regulations protecting the species, and specific stipulations proposed in the draft LEIS for the 1002 area. In particular the authority and function of the newly created advisory board needs to be described in detail. Additionally, Chapter VI, Environmental Consequences, should be revised to reflect the protection afforded the caribou by the Agreement.

p.	c.	¶.	l.	
29	1	6		This paragraph presents conflicting harvest statistics without explanation. it is suggested that the total annual harvest is 200-1000 at Arctic village, 25-75 at Kaktovik, plus an average of 1700 from Canada. Taking the larger figures, one obtains a total of 2775. However, LeBlond (1978) is cited as estimating an annual harvest of 3,000-5,000. These figures should be reconciled. It should also be noted that Kaktovik residents believe harvest and herd size will not be affected by leasing or its associated exploration and production, provided existing environmental regulations and practices remain in effect.
29	2	1	1-2	More recent estimates put the Central Arctic Herd (CAH) at approximately 17,000 in 1985 (Carruthers and Jakimchuk 1986).
29	2	1	3-7	The range of the CAH has included areas south of the continental divide in the past (e.g., elements of this herd wintered south of the divide in winters 1971-1972 and 1972-1973). During the winter of 1973-1974, these animals began wintering north of the divide (some records suggest they have done this in the past). [See Child 1973, Roseneau and Stern 1974, Roseneau et al. 1974.]
29	2	3	3-4	Very few CAH animals were seen calving in the 1002 area during the early and mid-1970s (often none). This appears to be a relatively recent event and is probably associated with increasing herd size. (See Roseneau and Stern 1974, Roseneau et al. 1974, Roseneau et al. 1975, Roseneau and Curatolo 1976)
29	2	3	6-9	At the oil industry/government caribou seminar held in Girdwood, Alaska, in October 1986, it was concluded that there was no evidence that calving had ever been a common occurrence in the Prudhoe Bay region, even prior to oil field development. In fact, some CAH caribou calve in the Kuparuk/Milne Point areas where oil fields have been

p.	c.	¶.	l.	
				developed. The inference that caribou cannot calve near petroleum development should be removed.
29	2	4		Summering by CAH animals east of the Canning River also appears to be on the increase. Post-calving CAH animals made incursions into portions of this area in the early and mid-1970s, but their stay was relatively brief. Wintering by CAH animals also began increasing east of the Canning River after the mid-1970s.
29	2	5	1-3	This sentence repeats information given on p. 29, col. 1, par. 6, lines 3-6. Consolidate.
29	2	5	3-6	The text should note that the majority of PCH caribou taken for subsistence by Kaktovik residents are obtained inland from the coastal plain in the spring, and not within the 1002 area. Summer harvest along the coast is very minor.

MOOSE

30	2	3		It is important to emphasize that most of the moose harvest takes place outside the 1002 area and should, therefore, remain unaffected.

WOLVES

31	2	1		It is important to emphasize that most of the wolf harvest takes place outside the 1002 area and should, therefore remain unaffected.

ARCTIC FOXES

31	2	2	2	Arctic fox dens are typically in dry tundra communities, especially dry microsites such as mounds, low hills, and south-facing ridges (see Chesemore 1967, 1969 and review by Underwood and Mosher 1982).

p. c. ¶. l.

POLAR BEAR

33	1	3		Information is given on the size of the Beaufort Sea population (2,000 individuals), but no perspective is offered as to the number of bears that might comprise the segment of the population normally occurring in the ANWR region of the Beaufort Sea.
33	1	4	8	The phrase "...where 1-2 dens were found in 4 of the 5 years..." is ambiguous. We suggest revising as follows: "...where 1-2 dens were found in each of 4 years during the 5-year period between winter 1981-82, when the FWS..." etc.
33	1	4	13-14	"At least 15 dens were located in the 1002 area, 1951-85 (pl. 1E)." Plate 1E shows only 12 locations actually within the 1002 area, plus the 5 locations on the sea ice. We suggest revising this sentence to: "At least 15 dens were identified within or near the 1002 area, 1951-85 (pl. 1E)."
33	1	4	14-15	Revise sentence to: "Another five dens have been located on sea ice near the 1002 area."
33	1	5	1-2	On Plate 1E, boundaries of the confirmed coastal denning areas at the Staines and Canning rivers and at Marsh and Carter creeks seem to encompass inappropriately large areas relative to the identified den locations. It would help to explain in the text that the boundaries have been drawn to include associated areas of bluff habitat similar to that in which the dens were found (assuming that this is the case).
33	2	6	1-4	"Large numbers of polar bears may occur...". The use of "may" introduces ambiguity here. It would be clearer to say "Large numbers of polar bears have concentrated seasonally in some years along the coast..." if this is the case.

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BIRDS

34 1 5 5-6 Glaucous gulls have been reported to overwinter near the village of Kaktovik in recent years (W. Audi, Audi Air Inc., Kaktovik, 1986). This species should be added to the list of birds that occasionally overwinter. There is speculation that the availability of food at dumps and near marine mammal carcasses have enabled more gulls to overwinter in northern Alaska in recent years.

34 2 1 2 Bartels (1973) is an obscure and outdated reference; other more relevant work (e.g., Divoky 1978b, Bartels and Doyle 1984, Bartels and Zellhoefer 1983, Johnson et al. 1975) should also be cited as documentation for this statement.

34 2 2 8-9 "Smaller numbers are present until freezeup in late September or early October." Is this meant to imply that large numbers of birds use the lagoons after freezeup in late September-early October?

34 2 3 Productivity in lagoons generally is not higher than in adjacent offshore areas. Almost all primary production (and consequently secondary production) is derived from offshore marine waters (Campbell 1981, Schell et al. 1983, Schell 1984). The lagoon systems are important concentration areas for feeding waterbirds because prey tends to be more available in these shallow waters and because the birds can find protection from wind, waves and ice behind the spits and barrier islands.

SWANS, GEESE AND DUCKS

35 1 3 4 Although the majority of these birds are from Banks Island, it should be remembered that several tens of thousands and several thousands of snow geese also come from two other colonies in

p.	c.	¶.	l.	
				Canada--Anderson River delta (10^4 birds) and Kendall Island (10^3)--and several hundred come from the one colony in Alaska--Sagavanirktok River delta (10^2 birds).
35	1	3	6-7	This statement is very intriguing. Have these few hundred birds that appear to occupy this small pocket of habitat been examined closely to see if they are neck-collared, i.e., are from the Sagavanirktok River Delta population, rather than the Banks Island population?
35	1	3	11	The maximum estimate of 325,000+ snow geese present in ANWR was not in 1976, but in 1978 (see Oates et al. 1985: Table 3, for a review of data from 1973 through 1984).
35	1	3	23-24	The snow geese feed extensively on the roots of several species of Eriophorum (cotton grass). During fall, these plants transfer energy (in the form of carbohydrates) from the leaves and stems to the underground roots (where energy reserves are stored over the winter in order to support initial above ground growth the following spring). These high energy roots dominate the diet of fall staging snow geese in the 1002 area.
35	1	4	6-7	Evidence from Canadian studies (Koski 1977a,b; T. Barry 1986, pers. comm.) indicate that these birds indeed do migrate east to the Mackenzie Delta and then south through the Canadian prairie provinces and into the western U.S. (Pacific and Central Flyways). Brant, however, fly west along the Alaskan Beaufort coast, then south through the Chukchi and Bering seas before arriving at Izembek Lagoon (Alaska Peninsula) to feed/stage for the fall flight to California and the west coast of Mexico.
35	1	4	11	This point is not documented. Although there are several reliable sources (Martin and Moitoret 1981, Derksen pers. comm.

p.	c.	¶.	l.	
				1986), no documentation is presented here for this very important piece of information.
35	2	2	3-4	This information is poorly documented. See Martin and Moitoret (1981), Richardson and Johnson (1981) and Johnson et al. (1975) for details of bird migration schedules along the Beaufort Sea coast.
35	2	3		This information is poorly documented. See Spindler (1978a,b, 1984), Brakney et al. (1985:309-361), Johnson (1984a), Johnson and Richardson (1981, 1982), Johnson et al. (1975).
35	2	4		This is very important information about spring and summer harvest of waterfowl, apparently by Kaktovik residents. It is important to underscore this harvest, especially because it may affect populations of brant and greater white-fronted geese, which are already severely depressed in the Pacific Flyway as a result of overhunting (see review paper by Raveling 1984).

SEABIRDS AND SHOREBIRDS

35	2	5	11-12	Sabine's gulls typically nest in thermokarst marsh complexes at other locations along the Alaskan Beaufort Sea coast. It is very surprising to read that the Canning River delta is the only location in the 1002 area where they nest.
35	2	5	13	Black guillemots nest in abandoned buildings, in piles of drums, among driftwood and other debris on the barrier islands and spits along the Beaufort Sea coast. The wording here -- "Black guillemots breed only on the coastal beaches." -- is somewhat misleading.
36	1	1	1	Jaegers, especially parasitic jaegers, chase down adults as well as the young of small birds.

p. c. ¶. l.

RAPTORS

36 1 3 Gyrfalcons often begin frequenting nesting cliffs in March (e.g., courtship at the cliffs, etc.), and it is recommended that "...the first week of April..." be changed to "the first week of March. Rough-legged hawks are also closely tied to microtine populations and often vary considerably in local abundance.

36 1 3 3 The reference to the peregrine falcon infers that this threatened species is commonly present across the entire coastal plain. In fact, as it is pointed out on p. 38 of this draft report, only a few peregrines are found in the 1002 area and none is known to nest there. It is especially important with a species that is legally protected as "threatened", that the report not be misleading.

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36 2 1 5-7 During fall, do the ptarmigan move south, back into the Brooks Range, from whence they came the previous spring? In other words, are the movements of ptarmigan cyclic--north onto the coastal plain in spring and summer and south into the mountains during fall and winter? This would seem to be a reasonable adaptation, but since no documentation is given its hard to tell if this is speculation or fact.

FISH

36 2 4 1 The word "extreme" is not appropriate here. Its use implies something dramatic such as 'no mouth'. The term "extreme" would more accurately describe fish that live at great depth, in very hot water, air-breathers, live bearers, and those that 'fly'.

36 2 4 5-7 It is misleading to state that '...populations are easily affected by environmental change...' Arctic anadromous fishes

p.	c.	¶.	l.	
				have adapted to the particular constraints imposed on them (e.g. as a long-lived species with capability of repeat spawning, they can withstand the loss of a year-class). [See discussions by Craig (1987) and Craig and McCart (1976).]
36	2	6		Though some arctic cod may spawn in nearshore waters, they are also thought to spawn and overwinter over vast oceanic regions; thus, in a population sense the nearshore zone is not an "important" spawning and overwintering area for this species. It is incorrect to say that "The nearshore waters are important spawning and overwintering areas". Those species of fish that are of greatest concern to man for commercial, subsistence, or sports fish reasons neither spawn nor overwinter in nearshore waters.
37	1	Table		This table implies (from the heading) that the Sadlerochit River supports a population of pink salmon. However only a single pink has ever been caught in this drainage (Craig and Haldorson 1986, Smith and Glesne 1982).
SOCIOECONOMIC ENVIRONMENT				
39	1	2		Some Porcupine caribou are regularly taken by residents of Aklavik (where harvests have been on occasion, large), Arctic Red River and Ft. Macpherson in the Northwest Territories, Canada.
40	1	3		The caribou harvest figures given here differ from those given on p. 29, c. 1, ¶ 6.
42	2	2		It should be noted that although the NSB Coastal Management Plan has been approved by the State, it has to be approved by the Federal Government before it is effective. To date, it has not been approved.

p.	c.	¶.	l.	
43	1	2		Subsurface ownership is not clearly explained. Information in this paragraph appears to conflict with information regarding subsurface rights discussed in the section titled Land Status.
45	2	4		To provide a perspective on the relatively limited recreational usage of ANWR, it would be appropriate to compare these figures with other areas of the State.
45	2	5-6		It is good that this section discusses aesthetics as a separate
46	1	1-4		issue. Aesthetics is the basis for much of the opposition to leasing in the 1002 area. It is important for this reason to separate aesthetic feelings from biological issues and conclusions.
				It is also worth mentioning that without Coastal Plain oil, the aesthetic experience of wilderness that is perceived to be the alternate goal to development will be available only to an elite few. It is also reasonable to remember that the tens of thousands of Americans and other visitors who have enjoyed a once-in-a-lifetime trip to the North Slope in the past decade have done so because of the development of Prudhoe Bay. Prudhoe Bay has not destroyed their arctic experience, it has made it possible, unique, and memorable. A small point, but one worth recording.
46	1	1		This section regarding aesthetics states that, "With the exception of the two abandoned DEW Line sites on the coast, the entire 1002 area could meet the criteria." This statement ignores the use of the area by Kaktovik residents.
46	1	2		It is not clear that the 1002 area is the most biologically productive part of ANWR. <u>The basis for such a statement must be fully explained and documented</u>.

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p.	c.	¶.	l.	
46	1	4		It is an overstatement to say that the aesthetic value of the 1002 area was temporarily reduced as a result of seismic exploration. Two surveys (1983/84 and 1984/85) were conducted in winter during little or no daylight with insignificant environmental effects.

CHAPTER III - ASSESSMENT OF OIL AND GAS POTENTIAL AND PETROLEUM GEOLOGY OF THE COASTAL PLAIN

49-73				Standard endorses the resource estimates as within a reasonable range, given the database available. As an addition, it might be helpful to include a detailed explanation of the resource calucation for the best documented prospect to illustrate the approach to a single building block in the overall resource estimate.

PRESTO MODEL INPUTS

70	2	3		The authors are to be complemented in explaining this aspect of "risk". Indeed additional explanation of risk and the marginal probability utilized in the Alaskan and National contexts would further enhance the reader's understanding of why the Coastal Plain ranks first in hydrocarbon potential of unexplored areas in the U.S.

CHAPTER IV - DEVELOPMENT AND TRANSPORTATION INFRASTRUCTURE

EXPLORATORY DRILLING

75	1	3	9-11	We fully support the caution provided here that until there have been exploratory and confirmation wells drilled, all resource estimates must be considered uncertain. Too often people want to attribute greater capability to geophysical

p. c. ¶. l.

technology than it warrants. It cannot be overemphasized that without drilling wells, the true oil and gas potential of the 1002 area will never be known.

75 2 1 5-9 It is incorrect to state that sources of gravel have not been identified. The drilling that was done during the two winters of seismic surveys indicated that virtually the entire region is underlain with gravel. All information from those surveys, including the sample cores, is available to the government for examination.

Additionally, this paragraph states that water sources are not readily available. Although this is correct, it should be clarified that this is common throughout most of the Arctic and has been successfully dealt with many times. Over 250 exploration wells have been drilled in the North Slope arctic desert.

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75 2 4 The exploration experience in NPR-A is worthwhile reviewing in this context. A variety of plays were tested in the 1970s program with a wide range of target depths. It is not necessarily true that a 12,000 foot exploratory well can be drilled in a single season. Further, the presumption that wells which cannot be drilled in a single winter season will require a multi-season effort should be evaluated on a case-by-case basis. If significant adverse impacts to wildlife can be avoided, then exploratory operations should be allowed to continue through the summer.

The costs of suspending and later reentering a well are very high for operational and logistical reasons. The recently drilled KIC well, for example, well cost approximately $50 million. If exploratory wells in ANWR continue to require 2 seasons and remain in the $50 million dollar range, the number of exploratory wells industry can afford will be limited. If the full potential of the area is to be realized, costs must be

p. c. ¶. l.

kept within reason. The only way to do this with deep wells is to allow year-round drilling.

76 1 2 This paragraph should be rewritten to reflect the variety of options for mobilizing construction equipment and drilling rigs to exploration locations within ANWR. The assumption that exploration rigs would typically be transported to the drill site by Hercules 130 aircraft is not necessarily valid. Overland access could be utilized for most sites.

Heavy construction equipment is used to prepare the wellsite for the drilling operation and to prepare an airstrip for aircraft making crew changes, material supply, and if necessary, transport of a drilling rig and related equipment. Construction equipment may be transported to exploration locations by low-ground-pressure vehicles, or by trucks using ice roads. Once the equipment and crews arrive on site, construction begins for the drilling pad, airstrip and ice roads to water sources and pad construction material. The drilling pad can be constructed of a material excavated from the reserve and flare pit, ice, gravel-foam-timber, or other possible combinations with gravel being the preferred material due to thermal stability.

76 2 Although naturally occurring sources of fresh water for exploration and developmental use are scarce in the 1002 area, this is true throughout the North Slope. Methods by which water has been successfully extracted include:

(1) Excavating deep pools in river and stream beds;
(2) Excavating deep pools in lakes;
(3) Insulation of ponds to prevent freezing;
(4) Desalination of sea water;
(5) Erecting snow fences to trap snow which could be used with snow melters;

p.	c.	¶.	l.	
				(6) Converting gravel extraction pits to reservoirs.
76	2	3		The exploration pad described here is somewhat outdated.
76	1	4		There are not separate camps at exploration sites for construction and drilling operations. The paragraph should read: ....The construction/drilling camp contains sleeping and eating accommodations for approximately 75 people, communication equipment, power generator units, storage space, shops, and offices. The last sentence in the paragraph pertaining to the construction camp should be deleted as it is not applicable.
76	1	4	8	An important aspect of the construction/exploratory drill camps has been omitted from this section. When discussing the physical equipment, no mention in made of built-in containment devices, (collection and drip pans) and impermeable protectors (such as impermeable pit liners). These are a planned and constructed part of all exploration and development facilities. Containment devices are placed under the vast majority of the equipment, work areas and structures, where there is any potential for leakage and/or spillage from fuel and chemical storage tanks, piping, skid facilities etc.
76	1	-5	1	The reserve pit designs may or may not (and frequently do not) include an excavated pit. The pit for an exploration site may be a temporary surface pit.
76	1	5		The purposes of the reserve pit are numbered incorrectly, and item (1) is misleading. It should instead read as follows: (1) to contain the used drilling muds, completion fluids and

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"cuttings" from the well, and (2) to contain formation fluids originating from a "kick".

76 1 6 The size of the reserve pit described in the draft document for a single exploration well is much larger than what has been found to be required for multiple development wells drilled in Prudhoe Bay. This paragraph should be rewritten as follows:

Reserve pits for a single exploration well are built to contain approximately 5 bbls. of fluid per foot of hole drilled. A 12,000 ft. well would typically require a 60,000 bbl. reserve pit having dimensions approximately equal to 150 ft. x 150 ft. x 15 ft. deep. A 200-foot-square flare pit is excavated at the corner most distant from the drilling rig, in case it is needed for gas flaring during testing. The ice-rich material excavated from the reserve and flare pits may be used to level the drill pad or stockpiled for later use in pit reclamation following well abandonment.

76 1 Bottom This paragraph should be added between the paragraphs at the bottom of column 1 and top of column 2.

Following site preparation of the exploration location a drilling rig and related equipment is mobilized and rigged-up. Rigs can be moved to ANWR locations several different ways. The preferred method is to transport the rig and related equipment using Hercules C-130 cargo planes. A typical rig move would require, on average, 150 C-130 flights. Another method would be to barge a rig and related equipment to a coastal location during the summer months and move it to the exploration location in the winter by trucks using ice roads. A third, but more expensive alternative, would be to haul the rig and related equipment over tundra during the winter using low-ground-pressure vehicles towing sleds.

p.	c.	¶.	l.	
76	2	1	11-17	This paragraph mentions the lack of water resources in ANWR which is over stated and has already been discussed in previous sections. The water requirements to drill an exploration well as stated here are misleading. The water requirements referenced in this paragraph for drilling an exploratory well can be deleted and replaced as follows: ("The water requirements for drilling an exploratory well are approximately:")

(1) 414,000 gals/mile of ice road construction and 4,200 gals/mile for daily maintenance

(2) 2,500,000 gals/Hercules airstrip construction and 2,100 gals for daily maintenance (Note: The volume figure required for construction could be reduced if the airstrip was built on a frozen lake.)

(3) 25,000 gals/day rig and domestic usage

Water for the above requirements could be obtained from one of the following sources or a combination of the sources. See possibilities listed previously under page 76, column 2.

76	2	2-4	These three paragraphs (Three possible scenarios despite water shortages are: items 1-3) can be eliminated because the information has already been presented in previous paragraphs.
76	2	5	This paragraph should read:
77	1	1	.... One mile of ice road measuring 30 ft. wide and 6 inches thick generally requires about 414,000 gals. of water...except with a minimum thickness of 6 inches...

A change from 1.5 acre-feet to the 414,000 gals. figure is required to stay consistent with previously discussed

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information. We suggest including road width and thickness to give the reader an idea of the road's dimensions.

A 6-inch thick tundra ice airstrip is acceptable for use according to Pool Arctic Alaska personnel. Pool Arctic has had significant experience in airlifting arctic rigs in Alaska.

77 1 2 The initial portion of this paragraph should be rewritten to clarify the operation as follows:

Drilling operations begin by installing the rig over the well location. Differential settlement due to thawing of the pad or surrounding permafrost from rig operations is minimized by laying timber under the rig so that cool air may circulate keeping the foundation as cold as possible. Actual well operations begin by augering a hole for the conductor casing 50 to 100 ft. below ground level. Conductor casing is run and cemented in place and diverter equipment installed. The well is spudded and the hole is drilled to a competent geological formation, usually to a depth of about 2,000 ft...

77 1 5 7 The term "arctic packed" will not be understood by people unfamiliar with arctic drilling terminology so it should be replaced as follows:

....Also the well is freeze protected with a low freeze point fluid and suspended...

77 1 5 11 The word "nonfreezing" should be replaced with "low freeze point" to read as follows:

....the low freeze point fluid in the upper part of....

77 2 1 In addition to sharing roads and airstrips, delineation wells can often share drilling pads and be drilled directionally, further reducing surface impacts.

p.	c.	¶.	l.	
77	2	3		While it may not be appropriate to include a detailed discussion of the existing regulatory framework here, inclusion of such a section elsewhere in this report is essential. There is a tendency in EIS documents to ignore the existing regulatory framework leaving the impression that oil and gas development proceeds in a regulatory vacuum once leasing takes place.

PRODUCTION

78	1	4		Even a prediction of 10 years from the time of leasing to the time of production can be considered overly optimistic under the best of circumstances. The likelihood of optimum circumstances is small indeed. Given the lengthy permit acquisition process for exploration and especially development, and the possibility of indiscriminate seasonal operating restrictions, fifteen years could easily pass from the time of leasing to first production.
78	1	7	4	Replace "surface location" with "gravel pad" as single surface location in drilling terminology relates to a single well location. The sentence should read: ....Directional drilling allows multiple wells to be drilled from a single gravel pad (fig. IV-1)...
78	2	2	4	Eliminate the reference to a 2,000 ft. kickoff point and replace it with "kickoff points as shallow as 500 ft" to reflect Prudhoe Bay operating experience. The paragraph should read as follows: ....drilled with an angle of deviation between 0° and 45° from kickoff points as shallow as 500 ft....

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p.	c.	¶.	l.	
79	1	1	3	Well spacing should range from 40 (not 50) to 320 acres.
79	1	3	9	Based on major production scenarios and enhanced recovery, the useful life of production support facilities is likely to be 40 or 50 years rather than the 20-30 years of main production.
80	1	3-4		Regarding water options, enhancement of existing lakes and river oxbows is another alternative that has been used in Prudhoe Bay Unit, (PBU) (e.g. ARCO's Colleen Lake). This also enhances fish and wildlife habitat by providing year-round deep water sources.
80	2	3	3	Small development areas would likely import the necessary fuel rather than construct an on-site crude-oil topping plant. Arco has one crude oil topping plant at Prudhoe Bay, which supplies a portion of the fuels utilized in PBU, however, a large quantity of fuel including unleaded gasoline is shipped in tanker trucks to the slope. In addition, the annual sealift frequently brings large fuel barge shipments, a portion of which is provided to the arctic villages.
80	2	4		This paragraph should be rewritten to include the area coverage mentioned in the subsequent paragraph, and to delete references to gathering facilities and flare stack which are located on a separate pad. It should read: ....The layout of a pad during drilling operations typically includes the following: drilling camp, fuel and water storage, one or two drilling rigs, drilling supplies, reserve pit, flare pit and production facilities, covering 20-35 acres.
80	2	5		"A pad thickness of 5 feet requires 160,000-285,000 cubic yards of gravel." should be deleted as the pad dimensions are not specified. It is difficult to quote volume requirements for gravel as the number of wells, the wellhead spacing, reserve

p.	c.	¶.	l.	
				pit size and production facility area requirements should be specified. This paragraph should begin as follows: "The drilling camp is similar...."
81	1	1	4	The reference to removing solids to a government-approved site such as an abandoned gravel pit or an offshore dump gives the impression that all solids must be removed which is incorrect. It should be rewritten to read as follows: ....disposal well. Hazardous solids and solids containing hydrocarbons must be removed to a government-approved site, such as an abandoned gravel pit.
81	1	1	6	Offshore dumping is not acceptable for hazardous solids and hydrocarbon bearing solids. Reference to it should be deleted (line 6). Additionally, the reference to a flare stack (line 6) should be deleted since it does not belong in this paragraph.
82	1	3	12-14	Given the certain and dramatic decline in production from existing North Slope fields before any new production from the 1002 area could possibly be made available, it is farfetched to discuss the construction of a new trunkline from Prudhoe Bay to Valdez.
82	1	7		Differential settlement can be monitored.
82	2	3	8	The concept of using existing gravel roads, pads and fill is practiced extensively throughout the PBU for flowline containment planning. In the case of actual spills, it has proven very useful. Maps are maintained and updated every year showing the local drainage around each pad and flowline in the Western Operating Area (WOA) of the PBU as part of Standard's contingency plan. Culverts and flowline casings can be identified and blocked to contain spillage or control flow in an area.

p.	c.	¶.	l.	
83	1	Fig IV-4		The five-foot clearance should be to the underside of the pipeline insulation, not the underside of the support beam (and/or pipe shoe). Gravel roads would typically have side slopes of 2:1 (not 1.5:1) which would be more typical for work pads.
83	2	2	7	The placement of values based on predetermined maximum quantity originated from negotiation stipulations rather than federal regulation (49 CFR 195.260).
84	1	1	14-15	Information on the extensive amount of gravel present throughout the region has been made available to the government as a result of the two winters of seismic surveys that were conducted for the purposes of evaluating the oil and gas resource potential. An evaluation of this information will show the statement here that "the availability of adequate gravel supplies on the 1002 area is uncertain" to be incorrect.
84	2	2	10-16	We suggest changing the wording as follows: "...contingency plan that, as a minimum, addresses all Federal Department of Transportation, Environmental Protection Agency and USCG and State Department of Environmental Conservation regulations." Siting six specific items of contingency planning in a resource assessment that are not consistent with federal and state requirements leads to confusion when stipulations are promulgated. Further, the operator may have difficulty complying with the specifics of the stipulation while adhering to existing laws and regulations in preparing and implementing a plan. "Site specific clean-up techniques" could be interpreted as very restrictive and of limited value if applied in the strictest form because of the variety of spills that are possible given the infinite variety of weather and ground conditions. Responses to what actually occurs could in fact be hampered by present plans which specify too much detail. If some specifics are desired, the paragraph could continue as

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follows, "...the regulations address: spill prevention and leak detection, spill detection, response and clean up. Notification procedures to all appropriate agencies, and restoration including remedial actions."

84 2 3 1-3 Leak detection systems for arctic use have limited capabilities. We suggest adding available arctic engineered and designed in line 1 between "include" and "automatic".

84 2 3 6 Aerial surveillance has limited application on the North Slope where ground access is available. PBU uses ground access for the flowlines throughout the field. Security and operator surveillance occurs daily.

85 1 3-5 A marine pipeline east-west (offshore) to transport ANWR crude
85 2 to TAPS is not a feasible option. Although the technology of offshore Arctic pipelines is advancing, their use will probably be confined to transporting offshore crude to shore. The report should only consider onshore pipelines.

85 2 4 1 Are automatic block values really the best design option for subsea pipelines?

85 2 4 6 Access for repair and maintenance during the "ice season" would be difficult. Recommend replacing "would not be possible" with "would be difficult"

CHAPTER V - ALTERNATIVES

ALTERNATIVE A - FULL LEASING OF THE 1002 AREA

89 1-2 We strongly support the Department of Interior's proposed recommendation that the entire 1002 area, Alternative A, be authorized for oil and gas exploration and production. Full leasing of the 1002 area is consistent with the national

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interest and can be accomplished without any deleterious effects on the area's wildlife resources.

ALTERNATIVE B - LIMITED LEASING OF THE 1002 AREA

91 1-2 Alternative B is based on the speculative premise that a traditional "core" calving area exists and is necessary for the maintenance of a healthy caribou herd. As discussed in our general comments, this concept is not supported by the literature and, in fact, the data shows considerable annual variability in the location of calving concentrations. We believe there is sufficient new, or not previously considered information available to FWS to justify reevaluating the concept of a "core" calving area, in which case Alternative B will also have to be reexamined.

ALTERNATIVE C - FURTHER EXPLORATION

92 1 We strongly oppose this alternative. Further exploration of this nature would make no positive contribution to the national energy situation. It would not find oil, and it would not provide enough new geological information to effect substantively any decision on leasing. Surface and regional geologic information already confirm that the area has oil potential. A critical evaluation of this potential will not happen until there is leasing. On-structure drilling is the only means by which the presence of oil can be verified and evaluated from a commercial perspective.

It is also important to recognize the cost of operating in the Arctic and the constraints those costs will place on the extent of industry's exploratory efforts. The object of expensive exploratory drilling should be to find oil. Off-structure drilling will not enhance our knowledge sufficiently to justify the time, the expense, or the delay in the ultimate benefit of

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producing oil in ANWR. Alternative C is simply an expensive means of delaying the ultimate decision of whether or not to lease the Coastal Plain.

ALTERNATIVE D - NO ACTION

ALTERNATIVE E - WILDERNESS DESIGNATION

p. 92 through 94 Neither Alternative D or Alternative E would allow for confirmation of information indicating that substantial petroleum reserves exist in the 1002 area. These alternatives preclude reasoned planning for future national energy requirements and deny the nation the positive benefits that could come from oil and gas production on the Coastal Plain.

CHAPTER VI - ENVIRONMENTAL CONSEQUENCES

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ALTERNATIVE A -- FULL LEASING

CONSEQUENCES OF EXPLORATORY DRILLING

95 2 3 8-14 The described procedure by which environmental consequences were determined is inadequate for the following three reasons.

1. Wildlife use areas shown on Plates 1-3 are vague and general, and are mapped at an extremely small scale. Although they may be helpful in providing the public with a general idea of wildlife use areas within the 1002 region, these maps are not appropriate to support a professional analysis. If -- as stated in the subject text -- the maps shown in Plates 1-3 were indeed used to develop an assessment of potential development effects on wildlife, the results can have no real usefulness. If larger-scale, location-specific maps were used, the text should be revised to say so.

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2. Even if more specific wildlife use maps were used, overlaying them with the full and limited developement scenarios shown in Figure V-1 was pointless because, as the following paragraph (p. 95) states, "Alternatives A and B depict hypothetical infrastructures", and "any prediction as to the various stages of development at any given time on the 1002 area would be highly speculative and perhaps misleading". Moreover, the development scenarios shown in Figure V-1 are extremely schematic and drawn at a very small scale. Yet the text states that overlaying these two scenarios with the equally vague wildlife use maps "allowed measurement of direct habitat loss or alteration. Determinations were then made as to the nature and magnitude of direct and indirect habitat losses, disturbance, mortality, and other potential effects." It is difficult to see how such measurements, especially determinations of disturbance and mortality, could have been made using the described approach, or how any substantive conclusion could have been reached. The described assessment approach can only shake the critical reader's confidence and casts doubt on all biological conclusions reached in Chapter VI.

3. Finally, and most important, the text implicitly assumes, for reasons unstated, that predicting "direct and indirect habitat losses" is a biologically appropriate means of assessing probable development effects on wildlife inhabiting the 1002 area. This relates to the simplistic idea, discussed above, that overlaying maps of general wildlife use areas with hypothetical oilfield layout plans is a valid basis for predicting a wide range of effects on wildlife. In reality, habitat change is only one of many factors that can affect fish and wildlife populations. In the Alaskan Arctic, where habitat availability has not been shown or convincingly suggested to limit most animal species (and is likely to do so only in the cases of overwintering fish and some bird species that combine (1) highly exclusive nesting territories with (2) nesting range

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limited exclusively or predominately to the Arctic Coastal Plain), a habitat-based approach to assessing potential effects of development on wildlife may miss the mark entirely. Where habitat availability is likely to be an important factor in limiting the productivity of a species -- e.g., arctic and red-throated loons (Davis 1972, Johnson et al. 1975, Bergman and Derksen 1977, Derksen et al. 1981) or dunlin (Holmes and Pitelka 1986, Holmes 1970) -- loss or alteration of habitat is one of several factors that can be appropriate for predicting development-related effects on the species in question. For species where there is no evidence that habitat availability is or is likely to be a population-limiting factor -- e.g., caribou (Bergerud 1986, Bergerud et al. 1984) -- a predominately habitat-based approach is clearly inappropriate. This is especially true when factors unrelated to habitat (e.g., predation or human harvest on winter range in other geographic areas) are ignored or de-emphasized as a result of applying an across-the-board habitat-based approach to all species.

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95 2 4 8-9 We would agree that the consideration of three simultaneous developments represents a worst case scenario and in actual fact is extremely unlikely. As a result, the environmental consequences predicted on the basis of this three development scenario are highly speculative and overstated. They have not, however, received the benefit of proper qualification. It is incumbent upon the authors to include appropriate caveats and cautionary statements throughout this chapter to avoid any misunderstanding that the environmental consequences are statements of facts.

97 1 3 6-7 As discussed in our general comments, we believe application of the FWS Mitigation Policy to be inappropriate precisely because it does focus "especially on losses of habitat value". We do not mean to imply that habitat is not vitally important to all

wildlife populations. But, from the standpoint of providing realistic impact analyses and effective protection for animals in the arctic, the focus should be on population management and the mitigation of variables that are known to influence animal movements and behavior. This position is supported by Mulé (1982:131) who states that, "habitat assessment for (these) large herbivores would be more effective and meaningful if the populations were examined as the primary units of study."

Mulé (1982) conducted a study to evaluate the appropriateness of wildlife habitat assessment techniques in Alaska. The study, funded by FWS through the Institute of Arctic Biology, University of Alaska, Fairbanks, was based on the assumption that to mitigate effectively the impacts from large scale natural resource development projects, one has to mitigate the "habitat losses accruing from such projects" (Mulé, 1982, p.1). The study was designed to "experimentally examine the effectiveness of the Terrestrial Habitat Evaluation Criteria (HEC) Handbook-Alaska for evaluating wildlife habitat in Alaska" (Mulé, 1982, p.7). In this respect, it used a far more refined habitat evaluation technique than the overlaying of maps and gross measurement of acres that FWS has used for the habitat evaluations in the 1002 draft report. Its findings, however, are pertinent because the concept and habitat evaluation procedures Mulé used are an out growth of the FWS Mitigation Policy and because his evaluation species included moose and caribou.

The habitat models tested did not perform at acceptable levels of accuracy, and Mulé concluded that Habitat Evaluation Procedure (HEP) models are reasonable only in theory for those species of animals that are habitat specialists and/or have very small home ranges with habitat requirements that are simple enough to model. Interestingly, the models with the most problems and greatest inaccuracies were those for moose,

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caribou and mink, emphasizing that fact that HEP type approaches are "simply not workable" (Mulé, 1982, p. 130) for large mobile herbivores, such as moose and caribou, or for predators and omnivores.

The problem he came across is the same one that invalidates the habitat approach to impact assessment used in the 1002 draft report. Large mobile herbivores "are habitat generalists that range over wide areas, utilize a variety of habitat types (often seasonally), and exhibit complex social and behavioral patterns." (Mulé, 1982, p. 130) Habitat evaluations cannot incorporate the complexities introduced by non-habitat variables that influence habitat generalists such as caribou. The problem is that "in addition to habitat, their populations in Alaska may be limited by non-human and human predation, weather, disease, parasites, or any other number of other density dependent and density independent factors. Attempts to model habitat relationships for these and other such species are frought with difficulties." (Mulé, 1982, p. 130) [Emphasis added.]

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Maurer (1986) shares Mulé's concern that one cannot rely on quantitative habitat models to make impact predictions. One of the major points made by Maurer is that even rigorous models depend on specific sets of data collected under a restricted set of conditions and therefore will be of limited generality and limited use. Although his conclusions were drawn after attempting to predict habitat quality for grassland birds using density/habitat correlations, they are relevant to the concept of using habitat quality in impact predictions and management plans. In his concluding recommendations for management, Maurer emphasizes that all methods of quantifying habitat must be properly verified; and that as the models are more widely applied, they must be updated. Regardless, he cautions that even "an updating strategy may not be entirely effective in

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producing more reliable models, particularly when those models are highly data sensitive" (Maurer, 1986).

The real issue of concern, however, is whether or not habitat "value", or habitat conditions can be relied upon as valid indicators of population status and of potential impacts to wildlife associated with said habitat. In reference to this issue, Maurer concludes:

> "Perhaps of greater concern to the manager is the possibility that populations of species may not be as closely tied to habitat conditions as has been thought previously. Although some species appear to be associated consistently with some habitat variables (Noon et al. 1980), many recent studies have demonstrated a great deal of variation in habitat associations among geographic locations (Collins 1983a,b; Shy 1984). Even among study sites in close proximity, several researchers have documented significant variation in use of habitat for foraging (Maurer and Whitmore 1981, Franzreb 1983, Mannan and Meslow 1984)....The results of the present study should raise serious questions regarding the use of qualitative models, such as HEP, in monitoring and predicting the response of bird species (and perhaps other wildlife species) to changes in their habitats. If rigorous, data-intensive models can perform poorly, it is likely that subjective, poorly documented qualitative models also will present serious problems in their use as predictors of habitat quality (Bart et al. 1984)" (Maurer, 1986). [Emphasis added.]

97 2 2 The policy implimentation and step down process has been uneven and often subjective and impractical in Alaska. An apparent bias towards acreage concerns and compensation has largely ignored and under valued genuine mitigation efforts through improved project design and protective field practices.

98 1 2 The designation of FWS Resource Category 1 for the "core calving area" is inappropriate for several reasons. The habitat in question is not "unique or irreplaceable".

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Biologically based methods have not been used to define a "core" calving area for the Porcupine herd. And, there is no evidence for a unique area of "core calving habitat" with definable special characteristics that might somehow be irreplaceably lost as a result of oilfield development. We refer you to our general comment #6A for a full discussion of this issue.

The primary reason stated for the Resource Category classifications of ANWR lands is that they are recommended by policy. Once again FWS has relied on policy rather than to base their rationale on biological assessments.

The other problem with classifying this area as Resource Category 1 is the mitigation "goal" of NO LOSS of existing habitat value, and the policy guideline specifying that FWS recommendations regarding activities in the area will be that "all losses of existing habitat be prevented". Typically, in Alaska, this has meant no loss of acres and resulted in the recommendation that no development be allowed in a Resource Category 1 area. This is contradictory to Interior's recommendation to lease all of the 1002 area. Either it would have to be recognized and acknowledged by FWS that oil and gas development activities do not produce habitat degradation for caribou; or some special consideration would have to be granted under the policy allowing or endorsing a waiver from this mitigation goal.

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98 2 #4 The assumptions (subparagraph 4) state that the land-use stipulations for exploration drilling on KIC/ASRC lands would continue to be in effect for all oil and gas operations in the 1002 area. This assumption implies that a very broad, comprehensive set of stipulations would apply to all future activities. Frequently, stipulations applicable for seismic and/or exploration activities cannot be economically or

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logically implemented for all production facilities. An example would be the placement of impermeable type liners under exploration facilities during temporary operations. These types of liners may or may not be applicable or feasible for permanent production skids. Additionally, the designs of production skids may or may not include contiguous containment structures, depending on the risk potential of the operation in the skid. Additionally, if the KIC/ASRC land use stipulations are to be applied to all 1002 area leases, they should be printed in full for both public review and for public awareness of existing protective measures that will mitigate many potential impacts.

99 1 6 9 "Minor fuel spills could also occur." These spills would be cleaned up with no effects, or at most brief, and minimal effects.

99 2 2 This paragraph does not present an accurate picture. We suggest that it be rewritten as follows:

Exploratory drilling requires construction equipment to prepare a stable drilling pad, reserve pit, road to the water source(s) and airstrip. When the wellsite is completed, the drilling rig and support equipment is transported in with Hercules C-130 aircraft or trucks using ice roads, depending on distances between well locations.

99 2 4 The 15 million gallons of water needed to drill one exploratory well has been discussed in previous sections. To maintain consistency, this paragraph should be changed to read as follows:

Water requirements for exploration operations are estimated to be as follows:

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(1) 414,000 gals/mile ice road construction
4,200 gals/mile for daily maintenance
(2) 2,500,000 gals/Hercules C-130 airstrip
2,100 gals/airstrip for daily maintenance
(3) 25,000 gals/day drilling operations and domestic use

Although naturally occurring sources of fresh water for exploration and developmental use are scarce in the 1002 area, this is true throughout the North Slope. Methods by which water has been successfully extracted include:

(1) Excavating deep pools in river and stream beds;
(2) Excavating deep pools in lakes;
(3) Insulation of ponds to prevent freezing;
(4) Desalination of sea water;
(5) Erecting snow fences to trap snow which could be used with snow melters;
(6) Converting gravel extraction pits to reservoirs.

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99 2 4 Spring breakup and late summer/fall rains should provide sufficient recharge for any lake or river in the 1002 area. On page 21 of the EIS high water conditions are also discussed. Given the number of sources and techniques for getting water, and naturally occurring recharge of area water resources, it misleads the public to state that water use "could have a major adverse effect".

99 2 5 4 A minimum thickness for the NPRA ice airstrips was quoted at 12 inches. Recent Hercules C-130 operations have found that 6 inch thick tundra ice airstrips are acceptable, so this paragraph should be changed to read as follows:

....Ice airstrips on the NPRA were built with a minimum thickness of 12 inches for safety although recent Hercules C-130 operations have found 6 inch thick airstrips to be acceptable....

p.	c.	¶.	l.	
99	2	7	3	This paragraph should be rewritten to delete the mention of oil to "slicken" up the drill bit as it is not used for this purpose. The paragraph should read: ....the reserve pit will contain well cuttings, mud containing barite, bentonite and may contain some traces of hydrocarbons from cuttings obtained from reservoir rock, chemical residues, principally....
100	1	Item 2		The discussion of filling in the reserve pit with gravel should be rewritten as follows so that it is not misleading: ...Therefore, this method requires construction equipment to blade drilling pad material into the pit or haul in gravel to fill in the reserve pit area which over time would naturally revegetate.
100	1	1-2		The use of the FWS unpublished and unavailable data is not appropriate for this draft LEIS. It is particularly inappropriate in this case because the field work methodology, statistical analysis and draft reports by West and Snyder-Conn have been highly criticized by both industry and regulatory agencies. With regard to this issue, there are a number of published reports that are much more comprehensive and with differing results than West and Snyder-Conn on which impact predictions can be based. At a minimum, the recently published USGS Final Wellsite Cleanup on National Petroleum Reserve - Alaska should be reviewed and referenced. A meeting was held by USFWS on September 18, 1985, to review the West and Synder-Conn 1985 draft report entitled: "Effects of Prudhoe Bay Reserve Pit Fluids on the Water Quality and Macroinvertebrates of Tundra Ponds." This meeting was attended by representatives of Standard Oil Company, ARCO, ADEC, ADF&G, DNR, NSB, and M. Brewer of USGS. At this meeting attendees

questioned the technical basis and validity of conclusions in the draft Snyder-Conn report. Additionally, ARCO submitted written comments to USFWS which questioned the credibility of the Synder-Conn study.

Reviewers have questioned the technical basis and validity of conclusions in the draft West and Snyder-Conn reports for a number of reasons. These reasons include:

1) The conclusions given in the draft reports are based on only 2 or 3 years of field data.

2) The experimental design has serious flaws: for example West and Snyder-Conn do not address other variables (natural or operation induced) which may cause variation in tundra ponds. Their elimination of controls with high salinity demonstrate a biased approach to control selection; and the statistical analysis of results was not meaningful.

3) The question to be addressed by the analysis was the statistical comparison of tundra ponds with reserve pits, in terms of water quality and aquatic life. The use by the author of the same ANOVA for both reserve pits and tundra ponds cannot not provide this answer, thus the conclusions provided are not valid.

4) The draft report identified specific criteria by which selection of reserve pits and ponds would be made for the study. However, the final sites selected to be sampled for the study did not meet those criteria. For example, a number of the ponds were actually impoundment areas that may not have been there prior to construction of the facility.

5) Credibility of this report is further compromised by impact predictions that cannot be technically justified. These areas

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center around the speculated sources of high concentrations of various components of the reserve pit samples. The sampling methods used (grabs at the edges of pits and from under discharge lines instead of from hose discharge onto the tundra) could easily have provided skewed and unrealistic results.

6) Baseline conditions for the ponds and their ability to sustain healthy invertebrates was not substantiated. The use of a variety of species as indicators, instead of a few test species did not provide good study control. The ponds that were sampled freeze solid every winter, thus recolonization must occur every spring. The factors allowing the establishment of healthy invertebrate populations may only occur during certain periods of the open water season, based on the characteristics of the particular pond being studied.

This section should also mention that the State of Alaska has very specific discharge parameters allowing on-tundra discharges only when appropriate.

There are a number of published reports that are much more comprehensive and with results differing from those of West and Snyder-Conn on which impact predictions can be based. At a minimum, the recently published report Final Wellsite Cleanup on National Petroleum Reserve - Alaska volumes 1-3 (USGS, 1986) should be reviewed and referenced.

100 1 3-4 Abandoning reserve pits: Existing regulations which address this activity have been ignored. The State of Alaska Department of Environmental Conservation will promulgate regulations in 1987 which address pit construction and close-out requirements.

100 2 2 (#3) These paragraphs concerning minor oil leaks and spills from
101 1 3 (#6) operations gives the reader an exaggerated view of this

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potential consequence. Minor spills are usually very local in nature, occurring on gravel pads and/or roads where they can easily be cleaned up and where their effects are only short term. Winter operations provide additional protection due to the layer of snow and ice protecting the tundra. Combined with the widespread use of impermeable liners under most facilities and work areas, the tundra in and around most operations remains untouched. The effect on the tundra of winter spills from operating equipment is minimal or none. When accidental spills occur (line 6), the contaminated snow and ice is scraped up and removed for disposal. There are only 3 months during which tundra or waterways are exposed to minor spills. Because of ADEC regulations requiring the reporting and cleanup of all spills, even minor discharges are addressed immediately, cleaned up, and the area restored if necessary.

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CONSEQUENCES RESULTING FROM CONSTRUCTION OF ROADS, PIPELINES, AND MARINE AND PRODUCTION FACILITIES

VEGETATION, WETLANDS, AND TERRAIN TYPES

102 2 1-5
103 1 1-2

To imply that there are "hundreds" of small areas of vegetation effected by oil spills is a great exaggeration. The number of spills for the entire Western Operating Area (WOA) of the Prudhoe Bay Unit (PBU) averages around 100 spills per year or less. Most spills are cleaned up immediately, and in the majority of cases no vegetative impacts occur.

When referring to those cases where tundra spills do cause local damage to the vegetative mat, the report should discuss and cite current work on restoration. Work funded by the oil industry has demonstrated that with the use of proper oil recovery and cleanup techniques, followed by simple restoration techniques, vegetation in tundra areas inundated by oil can recover successfully in a short period of time (as short as one

summer growing season). The speed and success of tundra recovery has been found to be positively correlated with the increase in the moisture level of the areas affected. Most spills occurring on tundra tend to collect in areas of low relief. Conveniently, these areas are wetter. Standing water in areas of low relief provides a buffer zone between the plant roots and the oil; thus only the upper leafy portions of the tundra mat are killed as a result of most spills. Recovery success is also dependent upon the type of product spilled. Crude oil spills have been observed to cause less damage than refined product spills.

Numerous references concerning arctic vegetation recovery are available and should be cited. They include: McKendrick et al. (1978), Walker et al. (1978), Webber et al. (1978), Chapin et al. (1980), Johnson et al. (1980), Johnson (1981), Pope and Hillman (1982), Pope et al. (1982), and Brendel (1985).

Diesel fuel spilled on the tundra may be toxic, especially if a large quantity of diesel is spilled on dry tundra vegetation, allowing penetration to the roots and thereby causing death of the plant. Surface only impacts may not effect the roots, allowing recovery within one season or less. As mentioned above, if the area is moist or allows for recovery on the ponded surfaces, the effects may be temporary with recovery in the same season. Numerous revegetation references from the mid 1980s are available and should be cited.

102 2 4 1 Reserve pit fluids spilled on the tundra may cause some impacts, especially if a large quantity of contaminants covers dry tundra vegetation, however, it was noted in the recently published USGS report for wellsite cleanup on the National Petroleum Reserve-Alaska (USGS 1986),"drilling muds eventually become overgrown by plants; salinity diminishes; and impoundments and thermokarst depressions are colonized by

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water-tolerant vegetation, if water depths are not too deep." Also discussed was that Alaska flora and fauna demonstrate a certain plasticity which provides a capacity for adapting to several commonly occurring disturbances associated with hydrocarbons.

102 2 5 The use of larger quantities of fuel at exploratory drill sites may provide a larger potential risk; however, the design and construction of exploratory pads provide much better spill prevention facilities and equipment. This undoubtedly contributes substantially to the spill statistics which indicate that over 95% of the spills that occur are classified as minor spills, generally less than 1 barrel and frequently less than 10 gallons.

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Similarly, the reference to spills occurring during seismic surveys should be quantified, and if not quantified, deleted. Although there were some fuel leaks during the two winters of seismic exploration in ANWR, they were negligible (totaling less than 5 gallons, L. Brooks, GSI, pers. comm.).

103 1 1 2 There are cases where diesel fuel spilled on the tundra may be toxic, however, the references cited in the 1002 draft report address work done in the late 1970s. Substantial revegetation work has been done since. Current references that should be cited are listed above under p. 103, c. 1, ¶. 1-2.

103 2 2 It is not appropriate for the draft LEIS to quote the Meehan report which is still in draft form and out for review. Additionally it is incorrect to use Meehan's model, developed for assessing potential habitat concerns for birds, and extrapolate its reported results to all wildlife in the area. (Even with regards to birds, Meehan's work showed different responses in different species.) In the report, and thus in the draft LEIS, a number of arbitrary assumptions are made

p. c. ¶. l.

concerning the level of impact that dust and gravel have on tundra wetlands. The assumed 100 foot zone of secondary impact around all facilities, which is stated as 7,000 acres of vegetation that could be modified, has no scientific justification. The actual significance of this secondary impact zone in regards to wildlife use of the 1002 area is also not explained. It has been well observed and documented that birds do use areas of tundra adjacent to facilities where snow melt has occurred earlier than surrounding areas. Additionally, impoundment areas have also been classified as desirable habitats for some species of birds.

103 2 4 12 The largest spill cited in this sentence occurred at Chena River, just outside Fairbanks. The inference that it happened at Prudhoe Bay should be corrected. It is important to clarify that the spill reports by the ADEC, stated as 23,000 in number, encompass a much larger area than Prudhoe Bay. Standard's average number of spills per year is approximately 100 for the PBU. This paragraph provides a very misleading picture of the the spill potential for an oil development area.

104 1 1 9 In addition to stating that most spills that occur in the Prudhoe Bay area are small, (less than 10 gallons) it should be pointed out that these spills rarely occur off gravel pads and roads.

104 2 1 (See comment for p. 100, c. 1, ¶ 1-2, and p. 103, c. 2, ¶ 2) The draft LEIS repeatedly ignores established environmental protection field practices, promulgated by regulation and company policies, for petroleum developments elsewhere on the North Slope. (e.g., snow removal zones, 24 hr. field spill response teams, field security enforced traffic controls, and regulated tundra travel procedures)

p.	c.	¶.	l.	
104	2	1	7	Add the words "design and" in front of the word "construction." Appropriate design and construction does play a major role in preventing spills of all substances.
104	2	3	2	Change the word "moderate" to "minor". Based on the information presented in this section and current references on revegetation and spill impacts the expected modifications would have a minor impact as defined in Table VI-1 on page 96.

COASTAL AND MARINE ENVIRONMENT

105	1	6	2	The word "severely" should be deleted as it implies an impact of extreme consequence could occur from any size of spill during any time in this environment. Based on the history of impacts from spills, research into the environmental effects of spills year-round (Owens et al 1984 and Owens et al 1985), as well as the mitigating measures of spill cleanup and restoration that are part of industry policy and government regulation, this is unrealistic. As stated in the last sentence of this paragraph, the level of impact would relate to the volume of oil spilled, location, effectiveness of cleanup, time of year, and fish and wildlife species present. Even if the catastrophic event were to occur, spill cleanup and natural recovery would take place; the impacts experienced and their magnitude would be totally dependent on the conditions occurring at the time. Past EIS evaluations for potential spill events in the Alaskan arctic have determined this level of potential impact as moderate.
105	2	2	3	Change the word "major" to "moderate". This is based on the historical record of measured impacts from catastrophic spills that have occurred world-wide and the recovery time of the effected environments. As stated on p. 120, c. 1, ¶ 2, l. 1, "Adverse effects on birds from further exploration are likely to be minor." Past EIS evaluations for potential spill events

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in the Alaskan arctic have determined this level of potential impact as moderate.

TERRESTRIAL MAMMALS

CARIBOU

105 2 3 Some data do not appear to be consistent with some of the statements made about use of the area for insect-relief. In contrast to statements referring to caribou going to the coast for insect-relief: 1) caribou have sometimes remained inland in spite of the presence of abundant insects; 2) insects were not always present during several of the late June - early July "insect-relief periods"; and 3) caribou have rapidly left relatively insect-free zones and entered more heavily insect-infested zones. The two most important activities in the 1002 area appear to be calving, and post-calving activities culminating in the formation of large post-calving aggregations and the beginning of post-calving migrations, not "...calving and seeking relief from insects...". It is true that caribou make use of insect-relief habitats in the area when insects are present. During post-calving, caribou seek and make use of insect-relief habitats whenever necessary and wherever they occur locally (whether they be coastal, inland, or somewhere in between). But post-calving aggregations form with or without insect harassment. Insects, when present, act as a local and short-term modifier of these larger-scale happenings. Post-calving use of the 1002 area appears to be based largely on social needs, not just the presence of insects. Generally, discussions of insect harassment and insect-relief habitat appear to ignore this aspect -- if everything implied about insects were true, one might expect the caribou, once forced from the hills by insects, to remain on the coastal fringe until the snow fell, instead of migrating back inland where insects are sometimes present in much greater numbers, or migrating back inland before insects have emerged in any great

p. c. ¶. l.

number, as has often been the case (D.G. Roseneau, 1987, pers. comm.). This section should also clarify that mosquitoes are the relevant insects in the 1002 area, and that the oestrid flies do not emerge until after most of the caribou have left the 1002 area.

105 2 4 Some disturbance-related displacement of CAH animals might occur, but will it matter -- will it be of true biological significance to the population? The CAH is increasing in size and "pioneering" new range (at least new to the animals that are present today). Given the size of CAH vs. its current range, it is doubtful that some displacement from areas east of the Canning River would have more than minor potential for truly adverse impacts to the herd. In fact, it is doubtful that full exclusion from these areas would be of more than negligible impact.

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105 2 5 The discussion here, and throughout the biological impacts section raises the question of habitat (available acres) versus habitat value. Here, the discussion is back to habitat, i.e. the direct and indirect loss of acres with no discussion of relevant values. The inference is clearly that modified habitat has lost value, and for the purpose of impact evaluation the land is totally lost and irretrievable.

With respect to displacement, not only does the impact assessment assume total loss of an area from which caribou are only partially displaced, but it does not consider the possibility that neighboring acreage could increase in value since the PCH is not limited by habitat availability. What is not recognized in the displacement arguments is that the value of any given habitat unit is dependent to a great degree upon the value of the adjacent habitat unit. While some habitat may be disturbed and therefore lowered in value, adjacent habitat may increase significantly in value and compensate for the

p. c. ¶. l.

disturbance simply because it is there, and is available. This is especially true when the species of concern is a habitat generalist. In other words, habitat of low value to the species of concern (such as areas not used as frequently by calving caribou), when considered as parts of a whole, may have great value and be perfectly satisfactory in meeting the animal's needs.

106 1 2 If the Canning Delta is supporting more calving than the Kuparuk area, this is apparently relatively new, and probably a function of increasing herd size (such did not appear to be the case in the early and mid-1970s). The suggestion that calving caribou have been displaced by the Prudhoe bay oilfield is not supportable and should be removed (see below).

106 Table VI-4 The information given in Table VI-4 is dubious at best and is too meager to even permit qualitative comparisons. Footnote No. 1 suggests that about 3,000 animals previously calved in the Prudhoe Bay development area. The 3,000 figure referred to total herd size and not just to parturient females. This information is from Child (1973) and reported by Shideler (1986). The information is very general, and what proportion of these animals actually calved in what was then considered to be the "development area" (generally within a few miles of the coast between Beechey Point and Mikkelsen Bay) or the immediate area of the present day development is unknown. The Table implies 3,000. Indeed, Child (1973), cited by Shideler (1986), refers to the coastal area of Prudhoe Bay as being "...an important summer range for a small population of approximately 3,000 animals...". Child (1973) also states that "Lately the Prudhoe Bay range has become increasingly important as a calving ground for a <u>small</u> segment of the resident herd that over-winters in the area." (i.e., presumably a small part of the 3,000 animals). Child (1973) reports that the incidence of calving "...within the oilfield..." for 1971 and 1972 was

p. c. ¶. l.

contained in other brief reports -- Child (1971 and 1972). [These reports were apparently not accessed by Shideler (1986) -- nor by Cameron and Whitten in various publications.] The incidence of calving never totaled 3,000 animals. For example, on a May 1971 survey Child (1971) found only 68 caribou scattered in coastal habitats between Beechey Point and Mikkelsen Bay -- only 10 cow/calf pairs were identified among them. [Note: presumably, most of the remainder were cows and calving was still likely occurring. Even so, this provides some measure of the magnitude of calving occurring in the coastal lowlands near and at Prudhoe Bay in 1971. For the sake of accuracy, the number of cows and calves in Table VI-4 should be reported as cow/calf pairs. For instance, the number "13" for the year 1972 actually represents 8 cows and 5 calves (see Shideler 1986). The number "42" for the year 1973 actually represents cows, calves and an unknown number (presumably) of yearlings (see Shideler 1986). Are all of the "51" animals listed for 1974 cows and calves? The 1981-1985 "data" reported provide an essentially meaningless comparison with previous years (i.e., three years reported, but data are not available for two of them). In summary, Table VI-4 is useless and should be omitted.]

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106 1 4-5 The impact analysis must be revised recognizing that no area fitting the definition of "core" calving area exists and that there is no basis for the 2-mile displacement zone assumed.

106 2 2 Here it is correctly noted that oestrid flies are not a major feature of the PCH's environment in the 1002 area.

107 Table VI-5 Table VI-5 is confusing because the reader must continually refer to the text to see if the numbers in the table represent acres or percentages. More importantly, the figures given in the table assume total displacement from the assumed 2-mile sphere of influence around all facilities, roads and

p. c. ¶. 1.

structures, and are therefore incredibly misleading. As discussed in our general comments, the 2-mile sphere of influence applied repeatedly in the impact assessment of caribou is based on an incorrect interpretation of the work performed by Dau and Cameron (1985). The table gives less experienced readers the impression that large acreages will be totally and irretrievably lost, which is not the case.

Even though there is some validity to the concept of partial displacement (versus total) there are no data suggesting that displacement of parturient caribou has any effect at all on their calving success or on calf survival. Therefore, it should not be inferred (as it is in this Table) that it constitutes an adverse effect.

Also, the text incorrectly reads: "percent of total US and Canada area potentially influenced by development" when it should be reworded to read: "percent of total calving grounds". As stated, it gives the impression that areas of Canada will be affected by development.

The table also perpetuates the concept that caribou are dependant on a small, fixed "core" calving area (i.e., 311,000 acres -- an area only about 22 miles by 22 miles in size). This is not true (see our general comments). The area should be described for what it is, an area used repeatedly but not exclusively or even predictably on an annual basis by parturient caribou.

Further, the number, 50 caribou/square mile is arbitrary, and no density information is available to support it. Not only are there no data to support the reference to 50 caribou/sq. mi., it is not clear to the reader whether or not the 50 represents cows, cows and calves, or pairs. Most scientists would assume that it meant cows for several reasons including:

p. c. ¶. l.

1) because calves depend little on the habitat for nutrition, and 2) because the numbers could be greatly skewed by including calves depending on what hour/day the survey took place and how many cows had calved at that time. However, we have been informed that the figure 50 actually refers to total animals, mainly cows and calves, (A. Rappaport, FWS, 1987, pers. comm.). Given this information, there could be as few as 25 cows/sq.mi. (one per 26 acres), which is not very concentrated. Even assuming total displacement within a "2-mile sphere of influence", significant numbers of cows would not be displaced (approximately 12,000 cows of approximately 65,000 cows in the population).

This table and references to it should be deleted in their entirety. If not, the table must be thoroughly revised to indicate that caribou will not be totally excluded from the "2-mile sphere of influence" and the definition of caribou concentrations must be clarified.

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107 2 2 This paragraph makes superficial generalizations about the degree and effects of displacement that do not reflect a full analysis of available information on the subject. The numerous studies in the Prudhoe Bay and Kuparuk areas have resulted in a considerable amount of information contained in reports and papers not apparently consulted (e.g. Fancy 1983, Robus and Curatolo 1983, Murphy 1984).

There is no evidence that caribou ever used the area of the Prudhoe Bay oilfield for a calving ground, and therefore, the lack of calving activity there cannot be taken to mean that caribou have been displaced.

As discussed in the General Comments, interpretation of Dau and Cameron's (1985) study is confounded and cannot be used as the basis of a rational impact assessment. Impact analysis should

p. c. ¶. l.

be ecologically based, i.e. emphasis should be placed on the factors governing caribou population dynamics, and impact evaluated in this context.

The entire discussion of caribou response to development is so focused on a few studies evaluating local, insignificant responses to disturbance that the authors have failed to appreciate that caribou elsewhere, even in Alaska, are coexisting with significant human developments.

108 1 2 See discussion under page 105, col. 2, para. 5.

It is doubtful that some measure of displacement into somewhat "less desirable" areas will have an effect on productivity. Davis et al. (1985), reporting on the considerable habitat and sensory disturbances that have occurred in the traditional calving grounds of the Delta herd, stated "Again we observed no adverse effects on productivity, indicating that caribou are more flexible in their selection of calving habitat than previously recognized."

108 1 3 This paragraph is a meaningless description of densities with no connection to the ecology of caribou.

108 1 4 Overcrowding of the CAH is unlikely to occur. The only records of overcrowding refer to populations transplanted to insular situations lacking predators e.g., reindeer on St. Matthew Island, muskoxen on Nunivak Island. However, such an occurrence has never been documented for populations of wild mainland caribou.

The term 'habitat stress' is undefined. What do the authors mean?

p.	c.	¶.	l.	
108	2	4		Dau and Cameron (1985) do not show displacement of 2 miles, but even if they did, how would that displacement be harmful? Only if displacement increased mortality would there be an effect. Displacement by itself is harmless. See the discussion of Dau and Cameron's (1985) work in our general comments.
108	2	5		The "core" calving area concept has to be reconsidered, as does its classification as Resource Category 1. (See comments on earlier sections.)
109	1	2	23	The authors cite Helle and Tarvainen (1984) and Davis and Valkenburg (1979) out of context. This paragraph discusses insect harassment and its observed effects on caribou during the post-calving period on the ANWR coastal plain. At that time and location, caribou are exposed to harassment by mosquitoes. However, the cited references and descriptions of extreme consequences to caribou survival all concern infestation by oestrid flies. Harassment of Porcupine caribou by oestrid flies occurs later in the season and predominately southeast of the 1002 area after the great majority of caribou have vacated the coastal plain. The issue of insect harassment relative to 1002 area development should be kept strictly in its proper context, i.e., relief from mosquitoes, not warble flies and nose bots (oestrid flies).
109	2	3		The last sentence implies that PCH animals may not habituate to oil field developments. Although it may take longer if contact is less frequent, it is logical to assume that PCH animals will habituate to a reasonable degree within a reasonable time to a variety of activities and facilities based on evidence from all other mainland herds. For example the Delta Herd in Alaska has habituated to rather extreme disturbance from military activity (Davis and Valkenberg 1985), and the Snohetta Herd in Norway has adapted to potential barriers including two fences, a major highway used by large trucks, a high board snow fence, and a railroad (Bergerud et al. 1984).

p.	c.	¶.	l.	
110	1	1		The 2-mile interaction area is without proper basis.
110	1	2		It might be noted that the possibility of calves being trampled would be highest when large aggregations are present. This is also the time when disturbance might cause more calves to be separated from cows. Lost calves tend to be very susceptible to predators. Discussion of the possible effects of aircraft disturbance (and other types of disturbance on the calving grounds) on caribou should mention Davis et al. (1985) and Valkenburg and Davis (1985). These investigators found the Delta Caribou Herd to be one of the fastest growing in the state in spite of considerable disturbance by aircraft. They conclude that either the animals have become habituated to it, or have never learned to fear aircraft; habituation seems the likely answer. Discussion of energy stress and major physiological response is vague and speculative. It also reflects an apparent belief that caribou are poorly adapted to their environment and that they are on the brink of disaster. Caribou, in fact, are well adapted.
110	1	2-3		The effects of disturbance will also be partially offset by the fact that not all areas will be developed concurrently. Many of the potentially disturbing activities will be relatively short-term events (e.g., high levels of activities may occur along some roads for a few years, but thereafter occur at much reduced levels). Again, it must be stated that the basic assumption that all development will occur concurrently represents a major flaw in the assessment process.
111	1	4	7-10	A November 1 to May 1 limited drilling window is proposed for ANWR. For a company to maximize its efforts in the refuge while minimizing its costs, it must be able to conduct

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year-round exploration drilling operations. Under reasonable circumstances, industry can drill wells less than 12,000' in one season and would therefore try to restrict their activities to winter. However, wells deeper than 12,000' require more time. If industry is forced to restrict exploration drilling activities to the November 1-May 1 window the costs of deeper wells will be exorbitant - in the range of $50 million each -for operational and logistical reasons. The real disadvantage is that high costs may limit the number of exploratory wells that are drilled to 10 or 12 as has been experienced elsewhere in Alaska, e.g. Gulf of Alaska. The complicated nature of the geology demands that at least 30 wells be drilled if the full potential of the area is to be realized. The best way to find hydrocarbons in ANWR is to lower the cost of drilling and drill more wells - and the only way to lower costs is to allow year-round drilling. This sentence should be reworded as follows:

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...Oil exploration, should be allowed to proceed on a year-round basis provided industry uses techniques which minimize disturbance of the environment.

110 1 4
111 2 7

Given that responses do not automatically translate into negative, biologically significant effects, a flight level of 2,000 ft for caribou is extreme. It is also unrealistic, given the common occurrence of low ceilings and fog. A more reasonable approach might be to settle on 500 ft as the baseline (responses tend to be moderate at this level), and then establish flight corridors wherever possible, including instructing pilots flying at lower levels to avoid passing over large groups of caribou. [Note: during about 4,500 hrs of Arctic Gas sponsored caribou surveys, Calef's observations of "herding" large groups from altitudes of 2,000 ft were never seen, except in cases where the aircraft happened to be flying in the same direction as the caribou were already moving in (D.G. Roseneau, 1987, pers. comm.).]

p.	c.	¶.	l.	
111	2	10		Given the fact that PCH caribou spend little time near the coast, there is no reason why facilities should not be located in this three-mile zone. Locating facilities there would, in fact, significantly reduce the degree of interaction between caribou and petroleum development.
111	2	11		The current practice of placing facilities at least 500 ft from a water course has been adequate. There is no justification for 3/4 mile super-buffer zone.
112	1	2		The expanding trend of the PCH in the absence of evidence of overgrazing clearly demonstrates that the herd is not at the carrying capacity of the land. What is the point of this paragraph? It is too vague to be useful.
112	1	3		A major change in distribution is <u>one</u> possible result of displacement. Minor or moderate changes in distribution are two other possible results. Even if a major change in distribution occurs, it <u>may not necessarily be</u> "...an adverse result...". Indeed, given the history and data on the CAH, it is difficult to imagine that entirely excluding them from the 1002 area (i.e., "... a major change in distribution...") would result in a biologically significant adverse effect on the population. It is also difficult to imagine that displacement of the PCH will translate into more than minor changes in distribution, even under full leasing. As long as conscientious efforts are made to ensure relatively free movement of the herd (e.g., by elevating pipelines; separating pipelines and roads; providing ramps, if appropriate; controlling traffic, if necessary). There is no reason to expect any significant adverse impacts as a result of development.

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This paragraph contains a very superficial impact analysis that is meaningless. The whole issue must be revisited making realistic assumptions and analyzing ecological factors that affect caribou.

112 1 3 The percent loss of habitat and acreage figures discussed here are totally unrealistic and misleading. Not only are they based on worst case development scenarios and the highly simplistic "sphere of influence" concept, but total displacement from areas within the "sphere of influence" which is assumed. It has not been proven that a 2-mile displacement zone around all facilities is realistic. If the "sphere of influence" concept is used to do impact projections it should be properly defined and supporting evidence cited for each species to which it is applied. (See our general comments.)

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112 1 4 There may be "...Lack of relevant experience in estimating impacts on this herd...", but information relevant to estimating impacts to caribou could have been used to a much greater extent. We agree that the estimate of "20-40 percent" is uncertain. Again, because there are no convincing data suggesting that the herd is limited by habitat both the estimate and the possibility of an actual decline in the population are not convincing. Also, in this paragraph and in others, it is implied that changes in distribution automatically cause adverse impacts and lead to population declines. This is not necessarily the case. Indeed, if one considers caribou, one might suspect that it is probably not the case, except under extreme conditions. Caribou are especially adaptable to changes in distribution, and they have demonstrated this capability repeatedly.

There is absolutely no basis for predicting a 20-40 percent decline in population. Not even the exaggerated impact predictions have been logically connected to any mechanism that

p. c. ¶. l.

could lead to a serious population decline. What is a 20-40 percent change in distribution?

112 1 5 We agree that the effects on the CAH will be moderate at most, but suggest they are more likely to be minor or negligible. The primary effect could be a slight change in distribution that is unlikely to translate into a truly biologically significant effect on the population. An actual decline in numbers is not likely to occur, even under, full leasing. Indeed, it is reasonable to predict, based on historical data from the CAH and the biology of caribou, that the CAH will continue to grow in spite of any and all development east of the Canning River.

The analysis of the impact to the CAH must be reconsidered.

MUSKOXEN

112 2 4 McLaren and Green (1985) reported the results of a study of experimental disturbance of 'naive' muskoxen. The distance at which the first animal reacted averaged 345 m. and the distance at which 50% of the herd was alerted averaged 267 m. Two herds that were approached repeatedly showed evidence of habituation. Muskoxen also have easily adapted to captivity. There is good reason to expect that the muskoxen within the 1002 area would habituate to oilfield activities that might take place nearby.

112 2 5 and 113 1 1 M.A. Fraker (pers. comm.) conducted surveys of muskoxen in the Canadian High Arctic in 1974 and 1975 and observed evidence of habituation to aircraft. His studies were based at Rae Point which was the base camp of Panarctic Oils. There was considerable aircraft traffic, including helicopters, Twin-Otters, DC-3s, Electras, 727s, and 737s. There was also a

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small herd of muskoxen off the end of the runway. These animals sometimes looked up at the aircraft as they passed by, and at other times seemed to ignore them completely.

The effects of disturbance will also be partially offset by the fact that not all areas will be developed concurrently. Additionally, many potentially disturbing activities will be relatively short-term events (e.g., high levels of activities may occur along some roads for a few years, but thereafter occur at much reduced levels). Again, it must be stated that the basic assumption that all development will occur concurrently represents a major flaw in the assessment process.

113 1 3 Difficulties have been encountered in measuring and even detecting the effects of habitat loss and disturbance (in particular) on muskoxen (and on other species, including caribou). Using Miller and Gunn's (1979) conclusion provides only one side of the story. Their conclusion is speculative, and to be fair, their statement needs to be paraphrased: the presence of visible responses does not necessarily mean that significant physiological changes or energy drain occur at levels sufficient to have major effects (or even moderate effects) on the population over time.

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113 1 3 The muskox population in ANWR was recently introduced (1969-1970) and is still rapidly expanding. Their population, like that of many other Arctic species is far below threshold levels and will remain so as a result of factors other than habitat. It is extremely unlikely that the muskox population will decline as a result of loss of any habitat.

Displacement from calving areas is somehow assumed to translate automatically into negative effects on productivity. That may not be true at all. The animals have demonstrated an ability to expand into and utilize new areas for calving as the

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population has increased. The exponentially growing population is now calving over relatively large areas. It is quite possible that even relatively large amounts of displacement (or exclusion) from areas currently used by the subpopulation for calving may have little effect on either individual or group production. It is agreed that displacement from calving areas might have some effect on the muskox, but it is doubtful that it would be of more than minor consequence to the population; long or short term.

113 2 1 The report of Reynolds and LaPlant does not support the assumed 2-mile sphere of influence. [Russell (1977) is unavailable to us.] Once again the EIS simplistically assumes that the quantity of real estate translates directly to population well-being.

We suggest that the impact analysis be ecologically based.

114 1 1 The data on this vigorous population, especially in light of the limited amount of surface area that will actually be affected by development, do not support any predictions of major negative effects on muskoxen. Data from this population and other transplanted populations in the state suggest that the present management objective of continued, naturally regulated growth can be met, regardless of some development on 1002 lands. The major management effort should be directed at regulating hunting of the animals. It is understood that some hunting of muskox is already allowed in the refuge. It is also interesting to note that part of the population is already expanding into a region containing development, the Sagavanirktok river drainage.

Just because the Niguanak-Okerokovik-Angun subpopulation is somewhat smaller than the other two primary subpopulations, or that it currently experiences less immigration, does not

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automatically mean that effects might be more pronounced on that subpopulation (assuming development and activities to be similar in each area). Also, given the expanding nature of the subpopulations, it is reasonable to expect that over the next few years, the likelihood of both immigration and emigration will increase.

114 1 2 The prediction of a 25-50 percent population decline is surprising given that there is no scientific justification for it.

It is true that distribution changes may occur under full leasing. However, development will most realistically proceed in stages, and not all changes in distribution are likely to occur at one time. Distributional changes alone may not seriously affect the population. Given the data on this population, it is not inconceivable that even fairly large shifts in distribution may ultimately be of little consequence to the total population. It is implied that up to 50% of the population may suffer some unspecified form and degree of decline. This statement is totally unsupported and very ambiguous. It is almost certain to be interpreted to mean a decline in current total numbers by most readers. Is this a decline to some level, or is it an on-going decline? Is it a decline in productivity, rate of population growth, or total numbers? A decline in productivity in 50 percent of the population may only mean a slower growth rate in the total population. It would not mean a decline in population numbers unless the decline occurring in half of the population is sufficient to offset productivity and recruitment of the other half. Acknowledging available data on muskox population dynamics from these and other transplanted groups, and the demonstrated ability of muskoxen to expand into and exploit new areas, a population decline is unlikely. In fact, given these data, it seems reasonable to predict that both the ANWR

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subpopulation and the total Arctic slope population will continue to increase for some time. It is possible to speculate that in spite of some distributional changes or occasional mortalities, at some point total numbers may plateau at slightly lower levels than if petroleum development had not occurred. Even in that event, however, more animals will probably be present both during and after development than there are today (unless natural events or hunting intercede).

114 2 2 Historically hunting has not been permitted within the North Slope development areas and workers are not allowed to have firearms. For production safety reasons, it is anticipated that this policy would be applied to development areas within the 1002 area. All refuge regulations would be followed by petroleum workers.

WOLVERINES

116 2 5 The logic behind this conclusion of "major effect" is lacking. Displacement, avoidance and reduced food arguments are not based on sound scientific information. Additionally, hunting has not been permitted in the North Slope development area and workers are not allowed to have firearms. It is anticipated that this policy would continue in the 1002 area for safety reasons. All refuge regulations would be followed by petroleum workers. If harvest is the major problem, then it should be controlled by the appropriate regulatory wildlife biologists and not by prohibiting development.

POLAR BEAR

117 2 8 Development in Block C will have only minor adverse effects, if any, on the continued suitability of the eastern 1002 area for polar bear denning. Developments can be sited away from specific denning habitat such as riverbanks, draws, and leeward

p. c. ¶. l.

sides of bluffs, where drifting snow accumulates. Generally it is unlikely that many facilities, roads, etc. will be sited in such locations.

118 1 3 Given adequate pipeline elevation, it is unlikely that, once in place, they will act as barriers to the movement of female polar bears.

118 1 3 True, some reduction in the availability of denning habitat might occur, if production facilities were poorly sited. However, the resulting reduction should not be termed "major". The assessment assumes total exclusion of denning over the long-term which is not likely. Availability of some habitat within coastal denning areas may be reduced in the short-term. However, it is not unreasonable to speculate that bears will reuse some areas after production facilities are in place and construction activities completed. This is just one example in the Section 1002 report where the impact assessment unrealistically assumes "concurrent development" throughout the 1002 area while failing to take into account the duration of some events -- e.g., all roads are apparently always assumed to have high levels of activity on them when in fact some roads will almost certainly have much reduced traffic on them after production systems are brought on line.

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118 1 3 **"...the 12-13 percent of females denning on land..."** Does this represent the percentage of the total females in the "ANWR segment" of the Beaufort Sea population that den on land, or does it represent the percentage of <u>dens</u> found on land during 1983-1985 (see p. 33 -- 87% of dens found offshore)? Given that only some relatively small, localized areas on the ANWR coastal plain provide suitable denning habitat, the number of dens that have been found on land in any one year (1-2, even in recent years when considerably more effort has been made to find them), and allowing for the fact that a few other denning

p. c. ¶. l.

females undoubtedly escaped detection, the estimate of 12-13 percent suggests that the "ANWR segment" of the 2,000 bear Beaufort Sea population is very small. Given the same information, and assuming the "ANWR segment" contains some reasonable number of adult bears (let's say 300 of which 100 might be potential breeding females), the estimate of 12-13 percent seems unreasonably high.

118 1 3 Given what is known about the Alaskan and the Yukon coast, including information provided by local residents and available data on denning, denning habitat and terrain, it is very doubtful that an "...especially significant area..." for denning will ever be found on land (including south of Demarcation Bay). The vast majority of female polar bears will continue to den offshore, just as they probably always have.

If the implications of this paragraph are correct -- i.e., that the mortality of female polar bears is close to the maximum the entire Beaufort Sea population can sustain, and at a level where the annual loss of cubs from one or two dens and a few adult females might cause the entire Beaufort population to begin decreasing along the ANWR coast -- then it follows that subsistence hunting of females must be carefully watched, and perhaps even controlled or stopped.

118 2 2 Caribou should be considered in addition to polar bear when siting/orienting pipelines and roads at right angles to the coast in some coastal areas (e.g., Camden Bay).

118 2 4 It is not reasonable to classify the exclusion of only one or two bears from consistently used denning areas as more than a minor impact. It is difficult to believe, that such minor exclusion will be of real biological significance to the ANWR segment of the Beaufort Sea polar bear population (and certainly not to the Beaufort Sea population as a whole). If

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the ANWR segment is thought important in terms of the Beaufort Sea population, and is so precariously balanced between mortality of females and recruitment as to sustain more than a minor impact from such a potentially small decline in reproduction rate (i.e., the output of one or two adult females annually), then there seems to be little question that any current harvest of females of any age should be stopped. Declines in reproductive rates, as measured in terms of output of a few individuals, do not always translate into declines in populations. Even with relatively small populations (as in this case), survivability of cubs might be a more important factor.

118 2 4 11-16 Again, the arguments here are not convincing that the exclusion of one or two females from denning areas (even assuming total fidelity of individuals to specific areas) could have more than minor impact on the population. If the population is indeed so precariously balanced, then past and current general lack of management of subsistence harvests may be the real cause. That "...similar...intensive developments...along the entire northern coast of Alaska and Canada..." will occur does not seem very likely. Other developments might occur somewhere in the vast area, but not all sections of the coast are of high petroleum potential. Even the development scenario used for impact analyses in this report is acknowledged by the authors to be a worst case scenario and very unlikely. Realistically, if other developments were to occur, the resulting pattern would probably resemble the wide spacing found between current and abandoned DEW Line facilities rather than continuous complexes of active facilities, pipelines and roads.

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BIRDS

119 2 6 6-8 The meaning of this sentence is unclear. The response of fall-staging snow geese to aircraft overflights is not highly

p. c. ¶. l.

variable. Virtually all studies conducted so far have shown that snow geese flush away from approaching aircraft flying at altitudes up to 10,000 feet (Salter and Davis 1974, Davis and Wisely 1974).

120 1 2 6-7 If these estimates are accurate, the area influenced will be about 12.7 thousand acres, or about 1% of the total 1.5 million acres of coastal plain in the 1002 area. This seems like a very low percentage, considering the peripheral influences that no doubt will occur if the birds are affected by increased air traffic in the area.

SWANS, GEESE AND DUCKS

120 1 3 5-7 Other studies that are not documented (e.g., Johnson 1984b, Doughtery 1979) indicate that if proper mitigation programs are initiated, productivity of waterfowl (especially common eiders and probably black brant) actually may increase in areas of industrial development.

120 1 3 8-10 This could be the single most important and profound influence on birds of 1002 development. Snow geese do interrupt fall feeding and do flush at the approach of aircraft flying at altitudes as high as 10,000 feet (see p. 119, c.2, ¶ 6, l. 6-8).

It will be important to maintain strict aircraft corridors (preferably close to the coast, but not right along it) during the 30-45 day fall staging period for lesser snow geese (15 August to 15-30 September).

120 1 5 6-13 Wright and Fancy (1980) suggested that the increased mortality on waterfowl nests at Pt. Thomson may have been caused by foxes following human scent to bird nests in the two study areas, rather than as a result of poor housekeeping at the drilling camp.

p.	c.	¶.	l.	
120	1	6	1	There is a possibility that a major spill could kill waterfowl. Based on the history of incident in PBU, however, this is not likely to be the case unless a large oil spill occurs very early in the season contaminating large areas of first-of-the-season open-water. Based on analysis in spill contingency plans for the area, it is unlikely that even if a catastrophic incident occurred and waterfowl were oiled and subsequently died, that effects to the bird population could be measured. This is stated in the ADEC analysis on the seasonal drilling restrictions made in June 1984 (Final Finding and Decision of the Commissioners Regarding the oil industry's Capability to Clean Up Spilled Oil during Broken Ice Periods in the Alaska Beaufort Sea), as well as many other references.
121	2	4	12-14	We suggest rewording the last sentence in this paragraph, as follows: "The judicious placement of transportation corridors south of coastal tundra swan nesting areas and away from snow goose staging areas would be particularly important."
122	2	1		There is no justification for the statement concluding that "..displacement of these geese from 45 percent of their preferred staging habitat, a reduction in the Banks Island population or change in distribution of an average of 5-10 percent could occur." First, there is no explanation of how the displacement translates directly to changes in distribution or population size. Second, we strongly disagree with the wording that equates a change in distribution to a change in population size, especially a change of "...5-10 percent...". Davis and Wisely (1974) showed that snow geese did accommodate to aircraft traffic on the North Slope of the Yukon Territory; there is no reason to assume that accommodation will not occur in the 1002 area of Alaska.

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p. c. ¶. l.

SEABIRDS AND SHOREBIRDS

123 1 4 6-7 Regarding the mortality of birds due to strikes with towers, antennas, wires, and other structures, the only work done on this subject for the North Slope has been in the Lisburne Field. The Lisburne Field Monitoring report should be referenced as well as the small number of actual bird fatalities. A comparison of the lower 48 mortality rates would also be useful.

RAPTORS

123 2 3 1-3 There is experimental evidence contrary to these statements. Ellis (1981) conducted extensive experiments for the U.S. Fish and Wildlife Service and the U.S. Air Force concerning the effects of supersonic military jet flights (with sonic booms) near nesting peregrine and prairie falcons in Arizona. He found that negative responses by falcons were brief and never limited productivity. He concluded that "the birds were incredibly tolerant of stimulus loads which would likely be unacceptable to humans."

123 2 3 Raptors are not "...acutely sensitive to disturbance...". This grossly overstates the case. Indeed, the entire issue of disturbance to raptors has been blown out of proportion in recent years. Many "potential" effects have been imagined (often with little actual knowledge of the birds' behavior), but few have been realized, and few are supported by data. Over the years, the repetitive process of compiling environmental assessments has resulted in some of the potential effects taking on more than their fair share of reality. The mere fact that birds are "disturbed" and respond in some way, even repeatedly, should not be interpreted to mean that the birds will typically abandon nests or that there will be a biologically significant effect. Indeed, if this were true,

there would not be a large, robust, growing population of peregrine falcons nesting successfully along heavily commercially fished sections of the Yukon River. On the Yukon, many pairs nest successfully within a few hundred feet of fishwheels, set-nets and heavy boat traffic, and often within 1/4 mile of camps and villages, where they are typically disturbed several times a day. Again, if raptors were "...acutely sensitive to disturbance...", how would one explain that on the Seward Peninsula, gyrfalcons and rough-legged hawks commonly nest on cliffs along road corridors, and in in close proximity to active mining operations. It is quite true that repeated harassment can cause abandonment of nests, but these birds clearly exhibit a great deal of tolerance to a variety of situations, especially to those activities not specifically directed at them. Distances at which repeated disturbance may actually begin to take a toll tend to be relatively short. If the birds are nesting in high "superior" positions, or are naturally buffered by terrain features the distance between them and a nearby activity can be surprisingly short. Generally, for a disturbance to have real biological effects on pairs of raptors (and especially on populations), the activity must be at close range (usually within a few hundred yards), or be specifically directed at the birds. It is hardly surprising that gyrfalcons nested within one mile of an active airstrip in NPRA. One might trace perceptions that raptors, such as gyrfalcons and peregrines, are "acutely sensitive" to being disturbed to the fact that people either do not know, or have forgotten, that buffer zones originally recommended to protect nest sites were just that -- buffer zones. When the concept of a buffer zone was first created, peregrine falcon experts took into account the distances at which birds would usually become defensive and stay away from eggs and chicks. Then, to "err on the side of caution", they doubled, or even tripled that distance. For example, the original recommendation to restrict activities within 1/2 mile of active nests included

approximately 1/4 mile of actual "buffer". To be safe, the Alaskan Peregrine Falcon Recovery Team decided to increase that buffer further, and recommended a 1 mile buffer zone. Later, based on the tendency to believe that "more is better", a new 2 mile component was added to the 1 mile buffer zone for certain activities. In recent years, authors of various impact statements and operational stipulations have begun interpreting the current buffer zones as areas within which the nesting birds will automatically respond in some detrimental way to any activities barely crossing into those zones. This has apparently happened because of a lack of familiarity of the definition and logic supporting the original sizes of the buffer zones for raptors. In other words, there is no recognition of the considerable "buffer" distance that had previously been incorporated. If the recommended buffer zones are incorrectly interpreted to mean that the birds are disturbed when these lines are crossed, then it follows that people might incorrectly assume that these birds, raptors, must be very sensitive to "disturbance". In general, this is not true at all.

The Terror Lake rough-leg example is not especially convincing because numbers of nesting rough-legs can and do change abruptly from year-to-year. Given the number of years involved, it is also possible that fewer birds nested in the area because of natural events. Extreme caution must be used when interpreting observations like these. Is there any solid data backing up the supposition that the hiatus in nesting was actually caused by construction activities? If the pairs' nest sites were located very close to the activities then there may very well be a valid relationship. If the nest sites were located farther afield, especially beyond 1/2 mile, then possible relationships become questionable. [Comment provided by D.G. Roseneau, 1987, pers. comm.]

p.	c.	¶.	l.	
123	2	5		It is agreed that adverse effects to raptors would be minor.
123 124	2 1	6 and 1		Given the number of subadult golden eagles vs. the size of the calving element of the PCH (even assuming double or triple the current eagle population estimates), there would have to be a very major decline in PCH before one can realistically imagine more than a minor impact occurring to golden eagles. If changes occurred in the distribution of the PCH, the subadult eagles could (and almost certainly would) easily shift their distribution to match the PCH distribution, just as they almost certainly do when distribution of the PCH varies naturally. [D.G. Roseneau, 1987, pers. comm.]
124	1	Concl.		Changes in the distribution of subadult eagles resulting from changes in the distribution of the PCH are unlikely to be of biological consequence to the eagle population. Changes would have no greater significance than those observed under natural conditions in response to annual variations in PCH distribution (subadult eagles are highly mobile, see above comment). Given the number of subadult golden eagles that are usually present, it is not reasonable to expect any decline in their numbers unless there is a very large decline in the size of the caribou herd. The ratio of these highly mobile nonbreeding predators to the migrating prey base (i.e., caribou) is very large. It is also doubtful that there is a direct linear relationship between the size of the PCH and the number of subadult eagles preying on it. From all reports, and from general observations (mid-1970s to present), the large Western Arctic Herd (WAH) appears to have fewer subadult eagles associated with it even though there are large numbers of adult golden eagles nesting in portions of the Colville-Utukok-Kokolik-Kukpowruk uplands and western Brooks Range. If this difference in numbers of subadults between the two areas is as real as available information suggests, the difference between the number of subadults frequenting the WAH and PCH calving and post-calving

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grounds may well reflect (at least in part) the difference in the locations of the herds' ranges relative to the spring migratory routes of the eagles. Most golden eagles migrating into interior and northern Alaska, and the central and northern Yukon Territory, pass through the Whitehorse area into the upper Tanana and Yukon river drainages. The timing is such that many arriving subadult eagles have good chances of contacting elements of the PCH during its spring migration northward out of central Yukon wintering grounds. In years when the PCH winters almost entirely in the Chandalar district of Alaska, many eagles might still tend to contact this herd before filtering westward throughout the Brooks Range. Subadult eagles are not headed for eyrie sites and may tend to wander, a reflection of their opportunistic tendencies. Subadult eagles arriving north of the St. Elias and Alaska ranges, may be attracted to and "short-stopped" by caribou inhabiting the central and northern Yukon (PCH), and east-central and northeastern Alaska (Fortymile Herd and PCH). Instead of passing over this large accessible potential prey base and continuing towards western Alaska, the subadult eagles may stop and closely follow the movements of the PCH and Fortymile Herd. Currently, fewer golden eagles appear to frequent the range of the Fortymile Herd than frequent the range of the PCH. If the Fortymile Herd were to increase again by several tens of thousands of animals, more eagles would probably attend it. However, if the herd were to continue increasing, doubling, tripling, or quadrupling in size, one might expect concurrent increases in eagles to become ever smaller, and for their numbers to eventually "stabilize", fluctuating in response to other factors, regardless of increasing herd size. [It is interesting to note that the current estimates of the number of subadult eagles frequenting the PCH calving grounds do not appear to be much different from rough estimates made in the mid-1970s, when the PCH was smaller.] [Comment provided by D.G. Roseneau, 1987, pers. comm.]

p. c. ¶. l.

FISH

125 1 3 The tone of the impact assessment is one of overstatement. Key fish issues are (1) winter water withdrawal, (2) adequacy of culverts for fish passage [this was the conclusion of the study of Alyeska Pipeline impacts to aquatic environments (Aquatic Environments Ltd. 1985)], and (3) disturbance of fish overwintering habitats.

125 2 1 Loss of fresh water fish habitat will be minor. Direct mortalities will be few, at most, and will not significantly affect the fish populations. Not considered here is that the creation of gravel pit water sources and other reservoirs may provide increased productive fish habitat.

125 2 2 4 Sticklebacks are one of the more successful freshwater fishes in the Arctic, both in terms of widespread distribution and abundance. We are not aware of any study which has found them to be an "important food source" for other fish. They are very poor swimmers compared to salmonids. It is not reasonable to require that culverts be designed for stickleback passage. Culverts should be designed for passage of key fish species identified because of their economic or subsistence value.

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EFFECTS ON SOCIOECONOMIC ENVIRONMENT

126 2 6 The economic benefits, given the North Slope Borough CIP Program and taxation, should be explained.

SUMMARY OF UNAVOIDABLE IMPACTS, ALTERNATIVE A

131-132 Rather than comment on this summary we refer you to comments already provided in the detailed sections.

p. c. ¶. l.

SUMMARY OF RECOMMENDED MITIGATION FOR THE 1002 AREA

Pages 145-147

Stipulation 1 — We support the concept of consolidating facilities and designing all structures to minimize effects on the environment. We suggest modifying this stipulation to read: "...Locate nonessential facilities outside caribou calving areas where feasible and prudent."

Stipulation 2 — This is a standard engineering practice; however, it should be recognized that other factors will be involved in the final design criteria for each structure. We suggest adding the words "feasible and prudent" to the end of the sentence.

Stipulation 3 — Gravel sources are prevalent throughout the 1002 area. Gravel may provide, in many cases the most feasible option from an operational and economic standpoint. It is not reasonable to limit the use of gravel for exploration wells, especially those deeper than 12,000' that cannot be completed during the November 1-May 15 period. The "thin pad" concept can be utilized to minimize gravel quantities. We suggest the following wording: "The use of gravel for exploration operations should be minimized where feasible and prudent."

Stipulation 4 — Rehabilition plans are included as a section of the Exploration Plan of Operations.

Stipulation 5 — Change the word "prohibit" to "restrict." Maintenance and spill response require access. As in the PBU this access can be restricted to protect the active layer of the tundra during certain times of the year. In PBU all off-tundra travel involves specially designed and approved vehicles to minimize surface impacts; operations are then conducted by permit only.

p. c. ¶. l.

Stipulation 6

Under reasonable circumstances, wells less than 12,000' can be drilled in one season and industry would try to restrict their the operation to winter. Deeper wells will require more time, and there is no logistical or operational reason drilling should not be allowed to continue into summer.

Allowing operations on a year-round basis will considerably reduce costs. Exploration costs will figure prominently into the ultimate success of any exploratory effort in ANWR because it will dictate the number of exploratory wells that are ultimately drilled. The recent KIC well, for example, was 14,000', required two seasons to drill and cost approximately $50 million. If costs remain this high, it is fair to predict that less than a dozen wells will ever be drilled in ANWR unless an early discovery is made. The complicated nature of the geology demands that if the full potential of ANWR is to be realized, industry will have to drill 30 plus wells. Recent examples of exploratory efforts limited by costs and lack of ecouraging results include the Gulf of Alaska, Lower Cook Inlet, Navarin Basin and Offshore Beaufort Sea, where only 6-10 wells were drilled in each area.

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We suggest that this stipulation be revised as follows: "Oil exploration should be allowed year-round except in those areas where summer activity would have a significant adverse impact on wildlife populations."

Stipulation 7

We suggest that gravel removal and water removal be addressed separately recognizing the different regulatory authorities covering each action. The habitat issues are different and should be mitigated on both a seasonal and case by case basis.

Stipulation 8

We fully support this stipulation.

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Stipulation 9

There are several problems with caribou ramps that must be understood. When ramps are used, pipelines are usually at an intermediate height, forcing many caribou to use the ramps rather than cross under the pipe. To allow the passage of large numbers of animals, ramps would have to be very wide, and the situation could still present some difficulty. The other problem is that the convergence of the ramp and pipe creates visual barrier that could cause a local avoidance response. The best option is to design a uniformly elevated pipeline wherever feasible and prudent; and where elevated pipelines are not possible, ramps should include wide "fans".

Stipulation 10

We support this in theory, but for operational and maintenance reasons it may not always be the best or safest option. Spill detection and surface access will play significantly in the design of oil transport structures. This stipulation should be modified to read: Bury pipelines where feasible and prudent.

Stipulation 11

Typos, terrain, caribou. This mitigative point is not consistent with NSB permitting policies concerning the need for pipeline maintenance roads to allow for periodic inspection and maintenance of lines for spills and spill response. In addition, this stipulation is inconsistent with the stipulation 1 and other sections of the report which requires consolidation of facilities by using roads as construction work pads for pipelines. The edge of the road should be no more than 30 ft. from the furthest pipe for side boom stringing.

Stipulation 12

This stipulation is surprising since the farther south oil field facilities are sited, the greater the potential exposure of calving caribou to those facilities, and the greater the contact with migrating herds.

We suggest any stipulation on the location of facilities be deleted. The issue will be evaluated during the EIS process

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following a discovery when the location of the oil is also known. If a decision must be made at this juncture regarding the location of surface facilities, we suggest for biological reasons that they be clustered as close to the Beaufort Sea as feasible. [The concept of minimizing contact with caribou as much as possible by keeping structures as close as possible to the coast was the primary conclusion of a six-year mitigation study undertaken for the Arctic Gas Project. The basis for this conclusions was that nearly all contact with calving animals would be eliminated, and any contact that might occur would be limited to brief encounters.]

There are engineering problems inherent in siting facilities very close to the coast, so we suggest the following wording: "Oilfield support facilities should be clustered as close to the coast as feasible and prudent, consistent with environmental hazard considerations. Long uninterupted distances should be maintained between support clusters."

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Stipulation 13 — Monitoring programs must be kept highly focused if they are to provide useful information.

Stipulation 14 — This stipulation should be modified to require a 500 ft. setback from major rivers and a 100 ft. setback from all other fish bearing streams and lakes in accordance with current State standards that have proved effective.

Stipulation 15 — We recommend separate altitude restrictions for large and small aircraft. For small aircraft, a minimum altitude restriction of 1,000 ft. AGL is adequate. We also recommend establishing corridors for very low altitude flights during fog conditions.

Stipulation 16 — See the comment on raptors (page 123, col.2) provided by D. G. Roseneau. A 1-mile buffer should be adequate.

p. c. ¶. l.

Stipulation 18 — This stipulation should be modified to read: "Survey suitable habitat in the area of operations annually to locate nesting peregrines and other raptors."

Stipulation 19 — This stipulation should be modified to read: "Monitor for female polar bear in the area of operations."

Stipulation 20 — Construction of development facilities will have to be allowed on a year-round basis. Construction of exploration locations will have to be authorized in October, even near the coast, if they are to be drilled during the November 1-May 15 winter drilling window. This stipulation should be deleted.

Stipulation 21 — Historically the possession of firearms has been prohibited in the vicinity of oilfield facilities.

Stipulation 23 — This species is not legally protected and there is no data suggesting that it has ever been threatened by development. (see comment, p. 23, col. 2, ¶ 4.) This stipulation should be deleted.

Stipulation 24 — It may be administratively efficient to establish a performance standard stating that there should be no changes in lagoon water chemistry as a result of development, however, in practice this is not a feasible or prudent standard. Basically, it is easy to characterize the coastal waters in terms of what is expected under certain river discharge flow conditions, and wind velocities, whether it is early season or late season. However, the occurrence of these conditions is extremely variable both temporally and spatially. This makes it difficult to describe specifically what the water quality characteristics will be in a given area at a given time. Therefore, with the inability to determine the "baseline" water quality to an exact salinity and temperature, it would be difficult at best to establish a causal linkage between a

p. c. ¶. l.

development activity and an observed water quality condition--the water quality might vary naturally within the range that is observed post-development.

The coastal waters of the Beaufort Sea are characterized as being estuarine because of the interaction and mixing of the marine ocean waters with the freshwater discharges of rivers and streams. The coastal waters of Simpson Lagoon were studied in the 1970s and the Prudhoe Bay/Gwydyr Bay waters in the mid-Beaufort area have been studied intensively since 1981. This habitat is best described as an "ecotone" between the marine and freshwater ecosystems. At certain times and locations the boundary between the marine and freshwater masses is distinct, fairly narrow (in terms of distance seaward from the shore) and may be evident from froth lines on the surface. At other times and locations, the boundary may be broad, such as in Simpson Lagoon, where mixing has occurred and the water mass is somewhat enclosed. This ecotone is extremely variable in time and space, perhaps more so than other habitats because of its strong three dimensional character. It is a boundary condition that expands and contracts seasonally, even daily or hourly, with snow and rainfall, wind speed and direction, river discharge, etc. The annual variability is similarly large, and has produced the descriptive phrase, "a typical atypical year in the arctic".

Stipulation 25

Eliminate time and area closures/restrictions so exploration and development operations can be conducted on a year-round basis. Certain construction work such as placement and compaction of unfrozen gravel must be carried out during the July-mid-September period. Also, field production operations must continue on a year-round basis.

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Stipulation 26 — Rather than establish another set of flight altitudes and area closures, we suggest creating flight corridors and setting altitude minimums at 1,500' for large aircraft and 1,000' for small aircraft.

Stipulation 27 — This suggests that all camps and pump stations must be fenced. Fencing causes excessive snow drifting which can significantly obstruct surface facilities and access points, obscure spills from detection, cause excess spring ponding and require excess operation time and equipment for maintenance. Delete this stipulation.

Stipulation 30 — Control, use and disposal of fuel and hazardous wastes will be in accordance with state and federal regulations. We suggest the following wording: "Provide plans for control, use, and disposal of fuel and hazardous wastes in accordance with state and federal regulations."

Stipulation 31 — Numerous state and federal laws regulate the handling of hazardous wastes. This stipulation should be changed to read: "Provide treatment storage and disposal of hazardous wastes in accordance with federal and state laws and regulations."

CHAPTER VII OIL AND GAS -- NATIONAL NEED FOR DOMESTIC SOURCES AND THE 1002 AREA'S POTENTIAL CONTRIBUTION

The authors are to be commended for a lucid and concise summation of the 1002 area's potential contribution to the national need for oil and gas. The account is conservative in that it focuses on the impact of the mean conditional resource estimate of 3.2 billion barrels of recoverable oil for the full leasing alternative. It would also have been appropriate to show the impact of the 5% case and the high end economic scenario.

p. c. ¶. 1.

New significant medium and long-term economic trends have been induced in the past 18 months by the oil price collapse. Because of this and the resultant depression in the U.S. domestic oil industry, the trends projected for domestic oil production and imports may be significantly worse than shown in Table VII-2. The figure for domestic oil production of 8.2 million barrels per day in the year 2000 is very optimistic. Oil imports may be as much as 70% of domestic oil needs by the year 2000, not 47% as projected in Table VII-2. Because of declining U.S. production (the U.S. is the world's largest oil consumer and importer) and similar declines in non-OPEC sources (e.g. North Sea) even modest increases in consumption growth rates will eventially put significant upward pressure on oil prices. Higher price scenarios (in real dollars) should not be discounted.

The Department of Energy is revising its petroleum forecasts which will be published in a report in February 1987. We recommend that Chapter VII be revised to incorporate those findings which should reflect the factors discussed above.

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STANDARD OIL COMPANY RECOMMENDATIONS

The draft 1002 draft report will establish a basis for the compilation of a credible final report to Congress supporting full leasing (Alternative A) of the ANWR Coastal Plain with the following recommended revisions:

1. A critical review of the applicability of the USFWS Mitigation policy as applied to the North Slope of Alaska and the major species of concern -- caribou, muskoxen, polar bear, snow geese, and arctic char;

2. Revision of the impact assessment methodology to evaluate the population limiting factors on caribou and other wildlife species of concern;

3. Re-evaluation (and additional literature research) of the baseline data and impact analyses relating to caribou, including the "core calving area" concept, the "sphere of influence" hypothesis, the interaction of wildlife with oil field facilities, and the importance of insect relief areas to caribou during their annual migration cycle;

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4. Review of the existing regulatory framework and standard industry practices in Arctic Alaska that accomplish environmental mitigation, and revision of the impact conclusions and mitigation recommendations to reflect the same;

5. Revision of the development scenarios reflecting a more sequential and staggered series of field developments rather than the assumed concurrent development of 3 major fields, and revision of the impact conclusions to reflect the same; and

6. Update of Chapter VII to reflect the impacts of 1986 price collapse on future U.S. energy situation and the contribution of ANWR's potential petroleum resources.

LITERATURE CITED

ADEC (Alaska Department of Environmental Conservation) and ADNR (Alaska Department of Natural Resources). 1984. Final Finding and Decision of the Commissioners Regarding the Oil Industry's Capability to Clean Up Spilled Oil During Broken Ice Periods in the Alaska Beaufort Sea. Juneau. 41 pp.

ASCE (Arctic Slope Consulting Engineers). 1986. The Arctic National Wildlife Refuge. Its people, wildlife resources, and oil and gas potential. Anchorage. 38 pp.

Banfield, A.W.F. 1954. Preliminary investigation of the barren-ground caribou. Part 1: Former and present distribution, migration and status. Can. Wildl. Serv. Manage. Bull., Ser. 1, No. 10A.

Bartels, R.F. 1973. Bird survey techniques on Alaska's north coast. Unpub. M.Sc. thesis. Iowa State Univ. Ames, Iowa 47 pp.

Bartels, R.F. and W.J. Zellhoefer. 1983. Migratory bird use of the coastal lagoon system of the Beaufort Sea coastline within the Arctic National Wildlife Refuge, Alaska, 1981 and 1982. Pp. 61-75 in: G.W. Garner and P.E. Reynolds (eds.). 1982 Update report, baseline study of fish and wildlife and their habitats. U.S. Fish and Wildlife Service, Anchorage. 379 pp.

Bartels, R.F. and T. Doyle. 1984. Migratory bird use of the coastal lagoon system of the Arctic National Wildlife Refuge, Alaska, 1983. Pp. 169-199 in: G.W. Garner and P.E. Reynolds (eds.). 1983 Update report, baseline study of fish and wildlife and their habitats. U.S. Fish and Wildlife Service, Anchorage. 614 pp.

Beak Consultants Ltd. 1976. A study of the influence of seismic exploration on muskoxen and caribou on Banks Island, N.W.T. Unpubl. rep. for Panarctic Oils Ltd. Calgary. 267 pp.

Bellrose, F.C. 1976. Ducks, geese, and swans of North America. Stackpole Books, Harrisburg, PA. 543 pp.

Bente, P.J. 1985. Observations and banding of peregrine falcons (Falco peregrinus) and other raptors on the middle and lower Yukon River, Alaska, 1985. Unpbl. rep. by BLM for USFWS Office of Endangered Species, Anchorage. 26 pp.

Bente, P.J., D.G. Roseneau, and A.M. Springer. 1982. Numbers, status and diets of peregrine falcons (Falco peregrinus), and observations of other raptors and ravens on the middle and lower Yukon River, Alaska, 1982. Unpl. rep by Falco Enterprises, Fairbanks, for USFWS Office of Endangered Species, Anchorage. 22 pp.

Bente, P.J., D.G. Roseneau, and A.M. Springer. 1983. Numbers, status and diets of peregrine falcons (Falco peregrinus), and observations of other raptors and ravens on the Middle and lower Yukon River, Alaska, 1982. Unpl. rep. by Falco Enterprises, Fairbanks, for USFWS Office of Endangered Species, Anchorage. 19 pp.

Bergerud, A.T. 1971. The population dynamics of Newfoundland caribou. Wildl. Monogr. No. 25. 55 pp.

Bergerud, A.T. 1974. Decline of caribou in North America following settlement. J. Wildl. Manage. 38(4):757-770.

Bergerud, A.T. 1978. Caribou. Pp. 83-101 in J.L. Schmidt and D.L. Gilbert (eds.). Big game of North America. Stackpole Books, Harrisburg, PA. 494 pp.

Bergerud, A.T. 1980. A review of the population dynamics of caribou and wild reindeer in North America. Pp. 556-581 in E. Reimers, E. Gaare, and S. Skjenneberg (eds.). Proc. 2nd Int. Reindeer/Caribou Symp., Roros, Norway, 1979. Direktoratet for vilt og ferskvannsfisk, Trondheim.

Bergerud, A.T. 1986. Caribou, wolves, and man. In press.

Bergerud, A.T., R.D. Jakimchuk, and D.R. Carruthers. 1984. The buffalo of the North: caribou (Rangifer tarandus) and human developments. Arctic 37(1):7-22.

Bergman, R.D., and D.V. Derksen. 1977. Observations on arctic and red-throated loons at Storkersen Point, Alaska. Arctic 30:41-51.

Blokpoel, H. and W.J. Richardson. 1980. On the predictability of spring migration of snow geese across southern Manitoba, Canada. Working Paper 9. In: Proc. 14 Annu. Meeting Bird Strike Comm. Europe. The Hague, Oct. 1979.

Brakney, A.W., M.A. Masteller, and J.M. Morton. 1985. Ecology of lesser snow geese staging on the coastal plain of the Arctic National Wildlife Refuge, Alaska, fall 1984. Pp. 245-262 in: G.W. Garner and P.E. Reynolds (eds.). 1984 Update report, baseline study of fish and wildlife and their habitats. U.S. Fish and Wildlife Service, Anchorage. 777 pp.

Brendel, J. 1985. Revegetation of arctic tundra after an oil spill: a case history. Proc. 1985 Oil Spill Conference, Los Angeles. Pp. 315-318.

Cameron, R.D., and K.R. Whitten. 1979. Distribution and movements of caribou in relation to the Kuparuk Development Area. First interim report. Rep. by Alaska Dept. of Fish and Game to ARCO Alaska, EXXON, and Sohio Alaska Petroleum Company. Fairbanks. 32 pp.

Cameron, R.D., and K.R. Whitten. 1980. Distribution and movements of caribou in relation to the Kuparuk Development Area. Second interim report. Rep. by Alaska Dept. of Fish and Game to ARCO Alaska, EXXON, and Sohio Alaska Petroleum Company. Fairbanks. 35 pp.

Cameron, R.D., K.R. Whitten, W.T. Smith, and D.D. Roby. 1979. Caribou distribution and group composition associated with construction of the Trans-Alaska Pipeline. Canadian Field-Naturalist 93(2):155-162.

Cameron, R.D., K.R. Whitten, W.T. Smith and D.J. Reed. 1985. Sampling errors associated with line-transect surveys of caribou. 2nd North Amer. Caribou Workshop, Montreal. 8 pp.

Campbell, W.B. 1981. Primary production and nutrients. Pp. 199-258 in: Beaufort Sea barrier island-lagoon ecological processes studies: final report, Simpson Lagoon. Envir. Assess. Alaskan Cont. Shelf. Vol. 8. BLM/NOAA, OCSEAP. Boulder, CO 359 pp.

Chapin, F.S., and M.C. Chapin. 1980. Revegetation of an arctic disturbed site by native tundra species. J. Appl. Ecol.:449-456.

Chesemore, D.L. 1967. Ecology of the arctic fox in northern and western Alaska. M.S. thesis, Univ. of Alaska. College. 148 pp.

Chesemore, D.L. 1969. Den ecology of the arctic fox in northern Alaska. Can. J. Zool. 47:121-129.

Child, K.N. 1971. Alaska Cooperative Wildlife Research Unit, Univ. of Alaska, Fairbanks. Quarterly Report 22(4):3-4.

Child, K.N. 1973. The reactions of barren-ground caribou (Rangifer tarandus granti) to simulated pipeline and pipeline crossing structures at Prudhoe Bay, Alaska. Completion rep. to Alyeska Pipeline Service Co. by Alaska Cooperative Wildlife Research Unit, Univ. of Alaska, Fairbanks. 50 pp.

Craig, P.C. 1987. Anadromous fishes in the arctic environment -- a precarious or relatively stable existence? Biol. Pap. Univ. Alaska. In press.

Craig, P. and L. Haldorson. 1986. Pacific salmon in the North American Arctic. Arctic 39(1):2-7.

Curatolo, J.A. 1975. Factors influencing local movements and behavior of barren-ground caribou (Rangifer tarandus granti). M.S. dissertation, Univ. of Alaska, Fairbanks.

Curatolo, J.A., and D.G. Roseneau. 1977. Distribution and movements of the Porcupine caribou herd in northeastern Alaska and the Yukon Territory, 1976. Unpbl. rep. by Renewable Resources Consul. Serv., Ltd., Fairbanks, for Northern Engineering Serv., Ltd., Calgary. 54 pp.

Curatolo, J.A., S.M. Murphy, and M.A. Robus. 1982. Caribou responses to the pipeline/road complex in the Kuparuk Oil Field, Alaska, 1981. Rep. by Alaska Biological Research to ARCO Alaska, Inc. Fairbanks. 65 pp.

Dau, J.R., and R.D. Cameron. 1985. Effects of a road system on caribou distribution during calving. Fourth Internat. Reindeer/Caribou Symp., Whitehorse, 22-25 Aug. 1985. 18 pp.

Davis, J.L., and P. Valkenburg. 1979. Caribou distribution, population characteristics, mortality, and responses to disturbance in Northwest Alaska. Vol. 1, pp. 13-52 in: P. Lent (ed.). Studies of selected wildlife and fish and their use of habitats on and adjacent to the National Petroleum Reserve in Alaska, 1977-1978. U.S. Dept. of the Interior, Anchorage. 226 pp.

Davis, J.L., R.T. Shideler, and R.E. LeResche. 1977. Fortymile caribou herd studies. Final rep., Fed. Aid in Wild. Rest. projects W-17-6 and W-17-7. Alaska Dept. of Fish and Game. Juneau.

Davis, J.L., P. Valkenburg, and R.D. Boertje. 1985. Disturbance and the Delta Caribou Herd. Pp. 2-6 in: A.M. Martell and D.E. Russell (eds.) Caribou and human activity. Proc. 1st North Amer. Caribou Workshop, Whitehorse, Yukon, 28-29 Sept. 1983. Can. Wildl. Serv. Spec. Publ. Ottawa.

Davis, R.A. 1972. A comparative study of the use of habitat by arctic loons and red-throated loons. Ph.D. dissertation, Univ. of Western Ontario. London, Ont. 290 pp.

Davis, R.A., and A.N. Wisely. 1974. Normal behavior of snow geese on the Yukon-Alaska North Slope and the effects of aircraft-induced disturbance on this behavior. Arctic Gas Biol. Rep. Ser. 27:1-85.

Derksen, D.V., T.C. Rothe, and W.D. Eldridge. 1981. Use of wetland habitats by birds in the National Petroleum Reserve - Alaska. USDI Fish and Wildlife Service, Resource Pub. 141. Washington, D.C. 27 pp.

Divoky, G.J. 1978. Identification, documentation and delineation of coastal migratory bird habitat in Alaska. I. Breeding bird use of barrier islands in the northern Chukchi and Beaufort seas. Pp. 482-548 in: Environ. Assess. Alaskan Cont. Shelf, Annu. Rep. Princ. Invest., Oct. 1978, Vol. I. BLM/NOAA, OCSEAP. Boulder, CO.

Doll, D., W.P. McCrory, and J.D. Feist. 1974. Distribution and movements of the Porcupine caribou herd in the Yukon, 1973. Chap. 1 (56 pp.) in: K.H. McCourt and L.P. Horstman (eds.). Studies of large mammal populations in northeastern Alaska, Yukon and Northwest Territories, 1973. Arctic Gas Biol. Rep. Serv., Vol. 22.

Duffy, D.C. 1979. Human disturbance and breeding birds. Auk 96:815-816.

Doughty, R.W. 1979. Eider husbandry in the North Atlantic: trends and prospects. Polar Record 19:447-459.

Edwards, R.Y. 1954. Fire and the decline of a mountain caribou herd. J. Wildl. Manage. 18:521-526.

Elison, G.W., A.G. Rappaport, and G.M. Reid. 1986. Report of the caribou impact analysis workshop, Arctic National Wildlife Refuge, 19-20 November 1985. U.S. Fish and Wildlife Service, Fairbanks. 39 pp.

Ellis, D.H. 1981. Responses of raptorial birds to low level military jets and sonic booms. Unpub. rep. by Inst. for Raptor Studies, Oracle, AZ, for U.S. Fish and Wildlife Service and U.S. Air Force. 59 pp.

Fancy, S.G. 1982. Movements and activities of caribou at Drill sites 16 and 17, Prudhoe Bay, Alaska -- the second year. Final rep. by LGL Ecological Research Associates, Fairbanks, for the Prudhoe Bay Unit owners. 48 pp.

Fancy, S.G. 1983. Movements and activity budgets of caribou near oil drilling sites in the Sagavanirktok River floodplain, Alaska. Arctic 36(2):193-197.

Fancy, S.G., R.J. Douglass, and J.M. Wright. 1981. Movements and activities of caribou at Drill Sites 16 and 17, Prudhoe Bay, Alaska. Fin. rep. by LGL Alaska Ecological Research Associates for the Prudhoe Bay Unit owners. Fairbanks. 48 pp.

FWS (U.S. Fish and Wildlife Service). 1981. U.S. Fish and Wildlife Service mitigation policy -- Notice of final policy. Fed. Reg. 46(15):7644-7663.

FWS (U.S. Fish and Wildlife Service). 1982. Arctic National Wildlife Refuge coastal plain resource assessment. Initial report, baseline study of the fish, wildlife, and their habitats. Section 1002C, Alaska National Interest Lands Conservation Act. Anchorage. 507 pp.

FWS (U.S. Fish and Wildlife Service). 1983. Arctic National Wildlife Refuge coastal plain resource assessment. 1982 update report, baseline study of the fish, wildlife, and their habitats. Section 1002C, Alaska National Interest Lands Conservation Act. Anchorage. 379 pp.

FWS (U.S. Fish and Wildlife Service). 1984. Arctic National Wildlife Refuge coastal plain resource assessment. 1983 update report, baseline study of the fish, wildlife, and their habitats. Section 1002C, Alaska National Interest Lands Conservation Act. Anchorage. 614 pp.

FWS (U.S. Fish and Wildlife Service). 1985. Arctic National Wildlife Refuge coastal plain resource assessment. 1984 update report, baseline study of the fish, wildlife, and their habitats. Section 1002C, Alaska National Interest Lands Conservation Act. Anchorage. Vol. I, pp. 1-361; Vol. II, pp. 362-777.

FWS (U.S. Fish and Wildlife Service). 1986. Arctic National Wildlife Refuge coastal plain resource assessment. Final report, baseline study of the fish, wildlife, and their habitats. Vol. I. 392 pp.

Gunn, A. 1984. Aspects of the management of muskoxen in the Northwest Territories. In: D.R. Klein, R.G. White, and S. Keller (eds.). Proc. First Internat. Muskox Symp. Biol. Pap. Univ. Alaska, Spec. Rep. No. 4:33-40.

Gunn, A., R. Decker, and T.W, Barry. 1984. Possible causes and consequences of an expanding muskox population, Queen Maud Gulf area, Northwest Territories. In: D.R. Klein, R.G. White, and S. Keller (eds.). Proc. First Internat. Muskox Symp. Biol. Pap. Univ. Alaska, Spec. Rep. No. 4:41-46.

Heard, D.C., and G.W. Calef. 1986. Population dynamics of the Kaminuriak caribou herd, 1986-1985. Rangifer (Special Issue No. 1): 159-179.

Helle, T., and L. Tarvainen. 1984. Effects of insect harassment on weight gain and survival in reindeer calves. Rabgifer 4:24-27.

Henshaw, J. 1968. The activities of the wintering caribou in northwestern Alaska in relation to weather and snow conditions. Int. J. Biometeor. 12:21-27.

Holmes, R.T. 1970. Differences in population density, territoriality, and food supply of dunlin on arctic and subarctic tundra. In: A. Watson (ed.). Animal populations in relation to their food resources. Brit. Ecol. Soc. Symp. 10:303-317.

Holmes, R.T., and F.A. Pitelka. 1968. Food overlap among coexisting sandpipers on northern Alaskan tundra. Systematic Zool. 17:305-318.

Jakimchuk, R.D. 1980. Disturbance to barren-ground caribou: a review of the effects and implications of human developments and activities. Rep. by R.D. Jakimchuk Management Associates Ltd. to Polar Gas Project. 140 pp.

Jakimchuk, R.D., E.A. DeBack, H.J. Russell, and G.P. Semenchuk. 1974. A study of the Porcupine Caribou Herd, 1971. Chap. 1 (111 pp.) in: R.D. Jakimchuk (ed.). The Porcupine Caribou Herd - Canada. Arctic Gas Biol. Rep. Serv., Vol. 4.

Jingfors, K., and P. Lassen. 1984. Muskox responses to a seismic test operation: preliminary observations. In: D.R. Klein, R.G. White, and S. Keller (eds.). Proc. First Internat. Muskox Symp. Biol. Pap. Univ. Alaska, Spec. Rep. No. 4:127.

Johnson, L.A. 1981. Revegetation and selected terrain disturbances along the Trans-Alaska Pipeline. U.S. Cold Regions Research and Engineering Laboratory, Sprinfield, VA. National Technical Information Services Rep. 81-12. 115pp.

Johnson, L.A., E.B. Sparrow, T.F. Jenkins, C.M. Collins, C.V. Davenport, and T.T. McFadden. 1980. The fate and effects of crude oil spilled on subarctic permafrost terrain in Interior Alaska. U.S. Cold Regions Research and Engineering Laboratory, Springfield Va. National Technical Information Services Rep. 80-28. 68 pp.

Johnson, S.R. 1984a. Birds and marine mammals. Pp. 265-324 in: Environmental characterization and biological use of lagoons in the eastern Beaufort Sea. U.S. Dept. Comm., NOAA, OCSEAP Final Rep. 24:129-579.

Johnson, S.R. 1984b. Habitat use and behavior of nesting common eiders and molting oldsquaws at Thetis Island, Alaska, during a period of industrial activity. Unpub. rep. by LGL Alaska Research Assoc., Inc, Anchorage, for Sohio Alaska Petroleum Co. Anchorage. 65 pp.

Johnson, S.R., W.J. Adams, and M.R. Morrell. 1975. The birds of the Beaufort Sea. Rep. by LGL Ltd., Toronto, to Canada Dept. Envir., Victoria, B.C. 310 pp.

Johnson, S.R., and W.J. Richardson. 1981. Birds. Pp. 109-383 in: Barrier island-lagoon ecological process studies: Final Rep., Simpson Lagoon. Envir. Assess. Alaskan Cont. Shelf. Vol. 7. BLM/NOAA, OCSEAP. Boulder, CO. 678 pp.

Johnson, S.R., and W.J. Richardson. 1982. Waterbird migration near the Yukon and Alaskan coast of the Beaufort Sea: II. Moult migration of seaducks in summer. Arctic 35(2):291-301.

Kelsall, J.P., and D.R. Klein. 1979. The state of knowledge of the Porcupine Caribou Herd. Trans. 44th N. Am. Wildl. Nat. Resour. Conf.:508-521.

King, J.G. 1970. The swans and geese of Alaska's arctic slope. Wildfowl 21:11-17.

Klein, D.R. 1967. Interactions of Rangifer tarandus (reindeer and caribou) with its habitat in Alaska. Finnish Game Res. 30:289-293.

Klein, D.R. 1968. The introduction, increase, and crash of reindeer on St. Matthew Island. J. Wildl. Manage. 32(2):350-367.

Klein, D.R. 1971. The reaction of reindeer to obstructions and disturbance. Science 173:393-398.

Klein, D.R. 1980. Reaction of caribou and reindeer to obstructions -- a reassessment. Pp. 519-527 in E. Reimers, E. Gaare, and S. Skjenneberg (eds.). Proc. 2nd Int. Reindeer/Caribou Symp., Roros, Norway, 1979. Direktoratet for vilt og ferskvannsfisk, Trondheim.

Koski, W.R. 1977a. A study of the distribution and movements of snow geese, other geese and whistling swans on the Mackenzie Delta, Yukon North Slope, and Alaskan North Slope in August and September, 1975. Arctic Gas Biol. Rep. Ser. 35(2):1-54.

Koski, W.R. 1977b. A study of the distribution and movements of snow geese, other geese and whistling swans on the Mackenzie Delta, Yukon North Slope, and eastern Alaskan North Slope in August and September, 1976. Unpub. rep. by LGL Ltd., Edmonton, for Can. Arctic Gas Study Ltd., Calgary. 69 pp.

Leader-Williams, N. 1980. Population dynamics and mortality of reindeer introduced into South Georgia. J. Wildl. Manage. 44(3):640-657.

Lensink, C.J. 1973. Population structure and productivity of whistling swans on the Yukon Delta, Alaska. Wildfowl 24:21-25.

Lent, P.C. 1966. The caribou of northwestern Alaska. Pp. 481-517 in N.J. Wilimovsky and J.N. Wolfe (eds.). Environment of the Cape Thompson region, Alaska. U.S. Atomic Energy Comm., Div. Tech. Info. 1250 pp.

Lent, P.C. 1980. Synoptic snowmelt patterns in arctic Alaska in relation to caribou habitat use. Pp. 71-77 in E. Reimers, E. Gaare, and S. Skjenneberg (eds.). Proc. 2nd Int. Reindeer/Caribou Symp., Roros, Norway, 1979. Direktoratet for vilt og ferskvannsfisk, Trondheim.

Mahoney, S.P. 1982. The Grey River caribou study. Final report, year 3. May 1, 1981 - May 1, 1982. Newfoundland Div. of Wildlife. 319 pp.

Martell, A.M., and D.E. Russell (eds.). 1985. Caribou and human activity. Proc. 1st N. Am. Caribou Workshop, Whitehorse, Yukon. Can. Wildl. Serv. Spec. Pub. Ottawa. 68 pp.

Martin, P.D., and C.S. Moitoret. 1981. Bird populations and habitat use, Canning River delta, Alaska. Unpub. rep. for U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge. Fairbanks.

Mauer, F.J., G.W. Garner, L.D. Martin, and G.J. Weiler. 1983. Evaluation of techniques for assessing neonatal caribou calf mortality in the Porcupine Caribou Herd. Pp. 201-379 in: 1982 Update report baseline study of the fish, wildlife, and their habitats. ANWR Prog. Rep. No. FY83-6. U.S. Dept. Interior, Fish and Wildl. Serv. Anchorage. 379 pp.

McCourt, K.H., J.J. Russell, D. Doll, J.D. Feist, and W. McCrory. 1974. Distribution and movements of the Porcupine Caribou Herd in the Yukon, 1972. Chap. 2 (89 pp.) in: R.D. Jakimchuk (ed.). The Porcupine Caribou Herd - Canada. Arctic Gas Biol. Rep. Ser., Vol. 4.

McKendrick, J.D., and W.M. Mitchell, 1978. Fertilizing and seeding oil damaged arctic tundra to effect vegetation recovery, Prudhoe Bay, Alaska. Arctic 31 (3):296-304.

McKnight, D.E., and B.L. Hilliker. 1970. The impact of oil development on waterfowl populations in Alaska. Proc. Ann. Conf. Western Assoc. State Game and Fish Comm. 50:286-297.

McLaren, M.A., and J.E. Green. 1985. The reactions of muskoxen to snowmobile harassment. Arctic 38(3):188-193.

Miller, D.R. 1971. Seasonal changes in the feeding behavior of barren-ground caribou on the taiga winter range. Pp. 744-755 in Proc. 1st Int. Symp. on Behavior of Ungulates in Relation to Management. Calgary.

Miller, F.L., and A. Gunn. 1986. Effects of adverse weather on neonatal caribou survival -- a review. Rangifer (Special Issue No. 1):211-217.

Murphy, S.M. 1984. Caribou use of ramps for crossing pipe/road complexes, Kuparuk Oilfield, Alaska. Unpubl. rep. by Alaska Biological Research, Fairbanks, for ARCO Alaska, Inc., Anchorage. 61pp.

Murray, D.F. 1980. Threatened and endangered plants of Alaska. U.S. Dept. of Agriculture, Forest Service, and U.S. Dept. of Interior, Bureau of Land Management. Anchorage. 59 pp.

Mulé, R.S. 1982. An assessment of a wildlife habitat evaluation methodology for Alaska. M.S. thesis. Univ. of Alaska, Fairbanks. 215 pp.

Northcott, P.L. 1984. Impact of the Upper Salmon Hydroelectric Development on the distribution and movement of the Grey River caribou herd in 1982. Env. Assess. Div., Dept. of Environment. Govt. of Newfoundland and Labrador. 83 pp.

Oates, R.M., M. McWhorter, and D. Douglas. 1987. Species accounts of migratory birds at eight study areas on the coastal plain of the Arctic National Wildlife Refuge, Alaska. 1985 Update report, baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildlife Service. Anchorage.

Ogilvie, M.A. 1978. Wild geese. Buteo Books, Vermillion, SD. 350 pp.

Pope, P.R., and S.O. Hillman. 1982. Arctic Coastal Plain tundra restoration: a new application. Pp. 93-108, Proc. Fifth AMOP Tech. Seminar -- 1982. Edmonton.

Pope, P.R., S.O. Hillman, and L. Safford. 1982. Arctic Coastal Plain tundra restoration: first year report on a new application technique. Proc. 33rd Alaska Science Conference. Fairbanks, Alaska.

Raveling, D.G. 1984. Geese and hunters of Alaska's Yukon Delta: management problems and political dilemmas. Trans. North Am. Wildl. and Nat. Res. Conf. 49:555-575.

Reynolds, P.E., and D.J. LaPlant. 1985. Effects of winter seismic exploration activities on muskoxen in the Arctic National Wildlife Refuge, January-May 1984. In: G.W. Garner and P.E. Reynolds (eds.). 1984 Update report, baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildlife Service, Anchorage.

Richardson, W.J., and S.R. Johnson. 1981. Waterbird migration near the Yukon and Alaskan coast of the Beaufort Sea: I. Timing, routes and numbers in spring. Arctic 34(2):108-121.

Robus, M.A. 1983. Caribou movements in the CPF 2 - Oliktok region, Kuparuk Oil Field, Alaska, 1982. Rep. by Alaska Biological Research for ARCO Alaska, Inc. Fairbanks. 74 pp.

Robus, M.A., and J.A. Curatolo. 1983. Movements of caribou along the Oliktok Road and in the Kalubik Creek region, Kuparuk Oilfield, Alaska, 1983. Unpubl. rep. by Alaska Biological Research, Fairbanks, for ARCO Alaska, Inc., Anchorage. 61pp.

Roby, D.D. 1980. Winter activity of caribou on two arctic ranges. Pp. 537-544 in E. Reimers, E. Gaare, and S. Skjenneberg (eds.). Proc. 2nd Int. Reindeer/Caribou Symp., Roros, Norway, 1979. Direktoratet for vilt og ferskvannsfisk, Trondheim.

Roseneau, D.G. 1979. Caribou in the western DeLong Mountains, Alaska: a preliminary impact assessment. Pp. 1-53 in R.J. Douglass, P.J. Bente, and D.G. Roseneau. Interim report on biological research conducted in the western DeLong Mountains during 1978. Rep. by LGL Alaska Ecological Research Associates for WGM Inc. Fairbanks.

Roseneau, D.G., and P.M. Stern. 1974. Distribution and movements of the Porcupine Caribou Herd in northeastern Alaska, 1972. Arctic Gas Biol. Rep. Ser., Vol. 7. 208 pp.

Roseneau, D.G., P.M. Stern, and C. Warbelow. 1974. Distribution and movements of the Porcupine Caribou Herd in northeastern Alaska. Chap. 4 (197 pp.) in: K.H. McCourt and L.P. Horstman (eds.). Studies of large mammal populations in northern Alaska, Yukon and Northeast Territories, 1973. Arctic Gas Biol. Rep. Ser., Vol. 22.

Roseneau, D.G., J.A. Curatolo, and G. Moore. 1975. Distribution and movements of the Porcupine Caribou Herd in northeastern Alaska and the Yukon Territory, 1974. Chap. 3 (104 pp.) in: R.D. Jakimchuk (ed.). Studies of mammals along the proposed Mackenzie Valley gas pipeline route from Alaska to British Columbia. Arctic Gas Biol. Rep. Ser., Vol. 32.

Roseneau, D.G., and J.A. Curatolo. 1976. Distribution and movements of the Porcupine Caribou Herd in northeastern Alaska and the Yukon Territory, 1975. Chap. 1 (82 pp.) in: R.D. Jakimchuk (ed.). Studies of mammals along the proposed Mackenzie Valley gas pipeline route, 1975. Arctic Gas Biol. Ser., Vol. 36.

Roseneau, D.G., P.J. Bente, and A.M. Springer. 1980. Numbers and status of peregrine falcons (Falco peregrinus) on the middle Yukon River, lower Yukon River, and in the Arctic National Wildlife Range. Unpbl rep. by Falco Enterprises, Fairbanks, for the USFWS Office of Endangered Species, Anchorage. 53 pp.

Roseneau, D.G., C.E. Tull, and R.W. Nelson. 1981. Protection strategies for peregrine falcons and other raptors along the proposed Northwest Alaskan Gas Pipeline Route. Unpbl. Final Rep. by LGL Alaska Res. Assoc. Inc., Fairbanks, for Northwest Alaskan Pipeline Company, Salt Lake City. Vol. 1, 218 pp.; Vol. 2, 114 pp.

RRCS (Renewable Resources Consulting Services, Ltd.) 1985. Calving and post-calving distributions of Central Arctic Caribou, 1981-1985. Unpubl. map folio prep. for Alyeska Pipeline Service Co., Inc., Anchorage.

Russell, D.E., and A.M. Martell. 1985. Influence of the Dempster Highway on the activity of the Porcupine Caribou Herd. Pp. 22-26 in A.M. Martell and D.E. Russell (eds.). Caribou and human activity. Proc. 1st N. Am. Caribou Workshop, Whitehorse, Yukon. Can. Wildl. Serv. Spec. Pub. Ottawa.

Russell, J. 1977. Some overt responses of muskoxen and caribou to seismic activities, northeastern Banks Island. Northwest Terr. Wildl. Serv., Yellowknife. 85 pp.

Salter, R.E., and R.A. Davis. 1974. Snow geese disturbance by aircraft on the North Slope, September 1972. Arctic Gas Biol. Rep. Ser. 14:258-279.

Shank, C.C. 1979. Human-related behavioral disturbances to northern large mammals: a bibliography and review. Rep. to Foothills Pipe Lines (South Yukon) Ltd. Calgary. 246 pp.

Scheffer, V.B. 1951. The rise and fall of a reindeer herd. Sci. Monogr. 73(6):356-362.

Schell, D.M. 1984. Primary production and nutrient dynamics in Simpson Lagoon and adjacent waters. U.S. Dept. of Comm., NOAA, OCSEAP Final Rep. 24:69-112.

Schell, D.M., D.M. Parrish, and P.J. Ziemann. 1984. Primary production, nutrient dynamics and trophic energetics. Pp. 433-467 in: Environmental characterization and biological use of lagoons in the eastern Beaufort Sea. U.S. Dept. of Comm., NOAA, OCSEAP Final Rep. 24:129-579.

Scotter, G.W. 1967. Effects of fire on barren-ground caribou and their forest habitat in northern Canada. Trans. North Am. Wildl. and Nat. Resour. Conf. 32:246-259.

Shideler, R.T. 1986. Impacts of human developments and land use on caribou -- a literature review. Vol. II: Impacts of oil and gas development on the Central Arctic Herd. Alaska Dept. of Fish and Game Tech. Rep. 86-3. Juneau. 126 pp.

Shideler, R.T. 1986. Impacts of human developments and land use on caribou: a literature review. Vol. II. Impacts of oil and gas development on the Central Arctic herd. Tech. Rep. No. 86-3. Habitat Div., Alaska Dept. of Fish and Game. Juneau. 128 pp.

Skoog, R.O. 1968. Ecology of the caribou (Rangifer tarandus granti) in Alaska. Ph.D. dissertation, Univ. California, Berkeley. 699 pp.

Smith, M., and R. Glesne. 1982. Aquatic studies on the North Slope of the Arctic National Wildlife Refuge, 1981 and 1982. Fisheries Resources Progress Report FY 83-1. U. S. Fish and Wildlife Service, Fairbanks. 71pp.

Smith, T.E. 1984. Population status and management of muskoxen on Nunivak Island, Alaska. In: D.R. Klein, R.G. White, and S. Keller (eds.). Proc. First Internat. Muskox Symp. Biol. Pap. Univ. Alaska, Spec. Rep. No. 4:52-56.

Smith, W.T., and R.D. Cameron. 1985. Reactions of large groups of caribou to a pipeline corridor on the Arctic Coastal Plain of Alaska. Arctic 38:53-57.

Solman, V.E.F. (ed.). 1971. Studies of bird hazards to aircraft. Canad. Wildl. Serv. Rep. No. 14. 105 pp.

Spindler, M.A. 1978a. Fall staging of lesser snow geese on the Arctic National Wildlife Range. Unpub. rep. by U.S. Fish and Wildlife Service, Fairbanks. 11 pp.

Spindler, M.A. 1978b. Bird populations utilizing the coastal tundra, coastal lagoons, and nearshore waters of the Arctic National Wildlife Range. Unpub. rep. by U.S. Fish and Wildlife Service, Fairbanks. 23 pp.

Spindler, M.A. 1984. Distribution, abundance and productivity of fall staging lesser snow geese on coastal habitats of northeast Alaska and northwest Canada, 1983. Pp. 74-101 in: G.W. Garner and P.E. Reynolds (eds.). 1983 Update report, baseline study of the fish, wildlife and their habitats. Unpub. rep. by U.S. Fish and Wildlife Service, Anchorage. 614 pp.

Springer, A.M., D.G. Roseneau, P.J. Bente, W. Walker II, and R.G. Clarke. 1979. Numbers and status of peregrine falcons on the Colville River, middle Yukon River, and lower Yukon River, Alaska, 1979. Unpubl. rep. by LGL Alaska Ecol. Res. Assoc., Fairbanks, for the USFWS Office of Endangered Species, Anchorage. 69 pp.

Underwood, L., and J.A. Mosher. 1982. Arctic fox. Chap. 23 (pp.491-503) in: J.A.Chapman and G.A. Feldhamer (eds.). Wild mammals of North America. Johns Hopkins Univ. Press, Baltimore. 1148 pp.

Urquhart, D.R. 1973. Oil exploration and Banks Island wildlife -- a guide for the preservation of caribou, muskox, and arctic fox populations on Banks Island, N.W.T. Unpubl. rep., Northwest Terr. Game Mgt. Div., Yellowknife. 105 pp.

Valkenburg, P., and J.L. Davis. 1985. The reaction of caribou to aircraft: a comparison of two herds. Pp. 7-9 in: A.M. Martell and D.E. Russell (eds.). Caribou and human activity. Proc. 1st North Amer. Caribou Workshop, Whitehorse, Yukon, 28-29 Sept. 1983. Can. Wildl. Serv. Spec. Publ., Ottawa.

Valkenburg, P., and J.L. Davis. 1986. Calving distribution of Alaska's Steese-Fortymile caribou herd: A case of infidelity? Rangifer (Special Issue No. 1):315-323.

Walker, D.A., P.J. Webber, K.R. Everett, and J. Brown. 1978. Effects of crude and diesel oil spills on pLant communities at Prudhoe Bay, Alaska, and the derivation of oil spill sensitivity maps. Arctic 31(3):242-259.

Walters, C.J., R. Hilborn, and R.M. Peterman. 1975. Computer simulation of barren-ground caribou dynamics. Ecol. Model. 1:303-315.

Walters, C.J., R. Hilborn, R.M. Peterman, M. Jones, and B. Everitt. 1978. Porcupine caribou workshop, draft report on submodels and scenarios. Unpubl. rep., Inst. of Animal Resource Ecology, Univ. of British Columbia. Vancouver. 42 pp.

Webber, P.J., and J.D. Ives. 1978. Damage and recovery of tundra vegetation. Environ. Conserv. 5(3):171-182.

White, R.G., B.B. Thomson, T. Skogland, S.J. Person, D.E. Russell, D.F. Holleman, and J.R. Luick. 1975. Ecology of caribou at Prudhoe Bay, Alaska. Pp. 150-201 in: J. Brown (ed.). Ecological investigations of the Tundra Biome in the Prudhoe Bay region, Alaska. Spec. Rep. No. 2, Biol. Pap. Univ. Alaska, Fairbanks.

Whitten, K.R., and R.D. Cameron. 1982. Calving distribution and initial productivity in the Porcupine Caribou Herd, 1982. Pp. 591-599 in: 1983 Update report, baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage. 614 pp.

Whitten, K.R., and R.D. Cameron. 1983. Population dynamics of the Central Arctic Herd, 1971-1981. Acta Zoologica Fennica 175:159-161.

Whitten, K.R., G.W. Garner, and F.J. Mauer. 1984. Calving distribution, initial productivity, and neonatal mortality of the Porcupine Caribou Herd, 1983. Pp. 359-420 in: 1984 Update report, baseline study of the fish, wildlife, and their habitats. ANWR Prog. Rep. No. FY84-12. U.S. Fish and Wildl. Serv., Anchorage. 614 pp.

Whitten, K.R., F.J. Mauer, and G.W. Garner. 1985. Calving distribution, initial productivity, and neonatal mortality of the Porcupine Caribou Herd, 1984. Pp. 527-621 in: 1984 Update report, baseline study of the fish, wildlife, and their habitats. Vol. II, ANWR Prog. Rep. No. FY85-18. U.S. Fish and Wildl. Serv., Anchorage. 614 pp.

Williams, T.M., and D.C. Heard. 1986. World status on wild Rangifer tarandus populations. Rangifer (Special Issue No. 1):19-28.

Wilmore, S.B. 1974. Swans of the world. Taplinger Publishing Co., New York. 229 pp.

Wright, J.M., and S.G. Fancy. 1980. The response of birds and caribou to the 1980 drilling operation at the Point Thomson #4 Well. Final report. Unpub. rep. by LGL Alaska Research Assoc., Inc., Fairbanks, for EXXON USA, Anchorage. 62 pp.

APPENDIX

SAPC Testimony, January 5, 1987
SPC Testimony, January 9, 1987

TESTIMONY OF

STANDARD ALASKA PRODUCTION COMPANY

ON THE

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

FOR THE

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

January 5, 1987

PRESENTED BY:

ROGER C. HERRERA

MANAGER EXPLORATION AND LANDS

Mr. Chairman:

My name is Roger Herrera and I am representing the Standard Alaska Production Company with whom I am employed as Manager of Exploration and Lands.

The 1002(h) report has two great attributes which are not often seen in environmental impact statements - it is short and readable. The authors are to be complimented because these praiseworthy characteristics have probably resulted in the report having been read in its entirety by a large number of people. The nature of the decision to be made regarding the Coastal Plain of Arctic National Wildlife Refuge obviously demands a careful and dispassionate assessment of the knowledge gained from the six years of concentrated study in the area. It is our opinion that the 1002(h) report sets out that information in a meaningful and relatively balanced way. It is an adequate document to make judgments on the issue.

You have previously heard testimony from the Alaska Oil and Gas Association. Standard Alaska Production Company was involved in the preparation of that statement and endorses it in its entirety. We believe that the Coastal Plain of ANWR must be opened in full to responsible leasing, exploration, development, and oil production (Alternative A). Only in that way will our future state and national interests be adequately considered. We must plan to boost our domestic reserves and production, and at the same time indulge in responsible conservation if we are to preserve our lifestyle.

The Coastal Plain of ANWR figures prominently both as a possible source of major oil supplies and as a means to assuage man's yearnings for the aesthetics of solitude, scenery, and wildlife.

Without Coastal Plain oil it is perhaps pertinent to mention that the aesthetic experience of wilderness that is perceived to be the alternate goal to development will be available only to an elite few. It is also reasonable to mention that the tens of thousands of Americans and other visitors who have enjoyed a once-in-a-lifetime trip to the North Slope in the past decade have done so because of the development of Prudhoe Bay. Prudhoe Bay has not destroyed their arctic experience, it has made it possible, unique, and memorable. A small point, but one worth remembering.

One aspect of the report requires comment at this stage, namely the bias recognizable in the chapters dealing with caribou. This bias has lead to an emphasis on a proposed mitigation measure, the utilization of the Fish and Wildlife Service mitigation policy.

In discussing the inappropriateness of this policy in Alaska, reference must be made to the recently initialed U.S./Canadian Porcupine Caribou Agreement of December 3, 1986.

The Fish and Wildlife Service mitigation policy was deliberately excluded by the U.S. Government from that Agreement. If the use of the mitigation policy is unacceptable to the Government in its efforts to achieve conservation of the Porcupine Caribou herd in conjunction with the Government of Canada, what justification is there to impose it on industry in order to achieve exactly the same results on the Coastal Plain?

The Fish and Wildlife Service mitigation policy and some of the biological conclusions in the report result from an assumption that fish and wildlife populations using the ANWR Coastal Plain are indiscriminately limited by habitat availability. There is no evidence to support this assumption and, in fact, the report does not cite or discuss any evidence to justify that position.

Nesting birds on the North Slope are in general much more influenced by weather than they are by habitat, and there are no examples of mammal population size or productivity which has been limited by North Slope habitat availability. Caribou abundance is believed to approximate prehistoric levels in the North American Arctic, and it is generally accepted that caribou productivity is limited principally by wolf predation on the fall, winter, and spring ranges, augmented by human harvest. It is therefore not logical to suggest that animal species distribution or abundance would change in any biological, meaningful way as a result of the limited, low-density oilfield construction approach used in Arctic Alaska. Recent bird studies (Troy et al 1986) and fish studies (Craig 1986) support this conclusion, and the steadily increasing caribou populations during the period of oilfield development also indicate that habitat is not a confining factor.

The only biologically effective approach to assessing and mitigating any effects of development on wildlife is to determine how industry activities will alter population-limiting factors for each species of concern, and then to apply mitigative measures that avoid those limiting factors. That is quite different from and more practical than the Fish and Wildlife Service policy of preserving "habitat value". Such a policy usually translates into protecting land from change, or ensuring that all change is "natural". This ignores Arctic biology and makes policy dominant over biology. It imposes a particular point of view on the real world without determining whether the real world conforms with the imposed viewpoint.

In this case the policy is flawed and should be scrapped in Alaska. Likewise some of the proposed mitigating measures which result from the policy are unnecessary and often counter-productive. Many of the mitigating measures that have been proposed have been proven to be effective on the North Slope and are fully supported by Standard Alaska Production Company. Our aim with regard to environmental protection is the same as the Department of Interior's, but we feel strongly that the end result of oil production with minimum and acceptable environmental impact cannot be achieved using the Fish and Wildlife mitigation policy in the Arctic.

Two other points about the caribou sections of the report: First, the report would be greatly strengthened and balanced if reasonable use had been made of the information and analysis of the expert caribou Canadian biologists, Bergerud, Jakimchuk, and Bamfield. Their work has been largely ignored in the draft LEIS and the dismissal of the dissident views of Bergerud on Page 110 as "widely disputed" is a distortion unworthy of the authors. Second, the so-called core calving areas of the Porcupine herd and the "space constraints" which the caribou are supposedly subjected to at that time of the year, ignore the fact that many tens of thousands and in some years, hundreds of thousands of Porcupine Caribou calve in Canada. The maps in the report are misleading and less than scientific in not depicting the full calving range.

It is our intention, Mr. Chairman, to comment in detail on this and other issues in a separate written submission which we hope will be carefully considered.

TESTIMONY OF

THE STANDARD OIL COMPANY

ON THE

DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

FOR THE

ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

COASTAL PLAIN RESOURCE ASSESSMENT

January 9, 1987

Washington, D.C.

PRESENTED BY:

ROGER C. HERRERA

MANAGER EXPLORATION AND LANDS

STANDARD ALASKA PRODUCTION COMPANY

Mr. Chairman:

My name is Roger Herrera and I am Manager of Exploration and Lands for the Standard Alaska Production Company. Today I am presenting testimony for The Standard Oil Company.

Standard is the largest producer of oil from the State of Alaska and has been present as an explorer and producer in Alaska since the late 1950's. The 1002(h) report has drawn on many scientific and technological studies carried out by or for Standard Oil as is recognized in the bibliography. Based on our long experience of operating in the Arctic, we believe the report is thorough, balanced, and fair in its description of the coastal plain ecosystem and assessment of scenarios of development. It needs some modification in the caribou section to make it more realistic, and it does not justify some of the proposed mitigation measures, especially the use of the Fish and Wildlife Service mitigation policy. That policy, which concentrates on preserving habitats rather than populations of animals, cannot benefit wildlife in Alaska. Alaska, in particular the North Slope and coastal plain, is unique in having more habitat than animal species can ever occupy. Consequently, administrative efforts to protect habitat above all does little or nothing to benefit populations such as caribou, polar bear, musk oxen, etc. The concept and practice of mitigation is akin to motherhood and totally accepted by my company, but I know from 25 years experience in the Arctic that the Fish and Wildlife Service mitigation policy is a poor protective mechanism and it should be changed.

The success of our mitigation efforts in the past is perhaps measured by the results of a recent public opinion poll in Alaska (Dittman November 1986). Eighty-six percent of the respondents thought that the oil industry has operated in an environmentally safe manner at Prudhoe Bay. Only five percent gave negative replies. That accolade was earned not because of protective environmental regulations and stipulations, although they obviously played a part, but principally because the operating oil companies pursued a philosophy of care for the environment and the animals. This was done for two reasons. First and foremost, because we are human beings too and have the same appreciation of wilderness and the aesthetics of scenery or seas of caribou as anyone else. Secondly, there is a clear logic and self-interest in not doing this wrong in the Arctic. A simple example is an oil spill on a gravel pad or the tundra. The spill itself cost the value of the oil - perhaps a few dollars, but the cost of clean up is usually measured in thousands, tens of thousands, or millions of dollars. The incentive not to spill oil quickly becomes very clear, as does the incentive to design better equipment to prevent oil spills.

It is perhaps worth mentioning, in passing, that the statistics on oil spills contained in the report are no doubt correct and represent the facts of life working outside at 40 or 50°F below zero in a harsh environment. What is not mentioned is the fact that the vast majority of those spills occur on gravel pads or roads and that all of them are totally cleaned up.

A recognition of this effort is seen in the figure of 83% of Alaskan respondents (November 1986 Dittman poll) who believe that the oil industry can operate safely in wildlife refuges in Alaska.

The success of future development of the coastal plain of ANWR will be achieved in two ways. One, by continuous and friendly consultation and coordination between industry, native residents and refuge managers and other Fish and Wildlife Service personnel, and secondly, by repeating and enhancing the philosophy and practice which has worked so well at Prudhoe, Kuparuk, Milne Point, and Endicott. Surely those two requirements are not beyond our capability?

Before closing let me mention some aspects of the report that require attention. The maps depicting caribou calving areas are less than truthful and if they have been used to arrive at the conclusions on caribou concentrations, etc., those conclusions must be wrong. Caribou calving areas have been mapped annually deep into Canadian territory, and not to depict the total calving area on the maps is unscientific and akin to joining the flat earth society. This should be rectified.

The three mile buffer zone precluding development facilities at the coast to protect caribou insect relief areas is unnecessary. Caribou use of that zone is sporadic and ephemeral and southern areas of the coastal plain are much more important to the herd than the northern fringe.

Standard Oil supports Alternative A. We appreciate the opportunity to testify and will submit detailed written comments in due course.

STATEMENT ON THE DRAFT REPORT

"ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT"
AND LEIS

BEFORE THE SECRETARY OF INTERIOR

SUBMITTED BY
TENNECO OIL COMPANY EXPLORATION & PRODUCTION
ON
JANUARY 9, 1987

MR. SECRETARY, I AM DR. MICHAEL ZAGATA, DIRECTOR OF THE ENVIRONMENTAL AND SAFETY DEPARTMENT FOR TENNECO OIL COMPANY. MY PURPOSE IN BEING HERE IS TO ADDRESS ONE OF THE ISSUES RAISED IN YOUR DRAFT REPORT, IE. THE POTENTIAL IMPACT OF OIL AND GAS EXPLORATION AND DEVELOPMENT ON THE PORCUPINE CARIBOU HERD. I WILL FOCUS ON THE CARIBOU ISSUE BECAUSE IT IS SYMBOLIC OF THE HEART OF THE PRESENT DEBATE CONCERNING THE NEED TO EXPLORE FOR AND CONSIDER THE DEVELOPMENT OF THE OIL AND GAS RESERVES BENEATH THE ARCTIC NATIONAL WILDLIFE REFUGE.

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ALTHOUGH THE UNITED STATES, INDEED THE WORLD, CURRENTLY ENJOYS AN ABUNDANT SUPPLY OF PETROLEUM, WE MUST LEARN FROM HISTORY THAT THAT SUPPLY IS CYCLIC. IT IS LIKELY THAT DURING THE NEXT DECADE THE U.S. WILL EXPERIENCE ANOTHER SHORTAGE. WHEN THAT HAPPENS, AMERICANS AS A NATION WILL, FOR A VARIETY OF REASONS, FIND WAYS TO EXPLOIT POTENTIALLY COMMERCIAL DEPOSITS OF PETROLEUM.

MR. SECRETARY, TENNECO CONCURS WITH YOUR FINDINGS THAT THE COASTAL PLAIN IN ANWR POTENTIALLY CONTAINS ENORMOUS DEPOSITS OF PETROLEUM.

THEREFORE TENNECO TAKES THE POSITION THAT THE CONTROVERSY PRESENTLY SURROUNDING ANWR IS NOT SO MUCH A QUESTION OF WHETHER THE MINERAL RESOURCES BENEATH THE REFUGE SHOULD BE EXPLORED FOR AND DEVELOPED, AS IT IS A QUESTION OF WHEN THOSE POTENTIAL PETROLEUM DEPOSITS WILL BE EXPLORED FOR AND DEVELOPED.

THE PRINCIPLE ARGUMENT AGAINST THE OPENING OF ANWR FOR PETROLEUM EXPLORATION AND DEVELOPMENT APPARENTLY IS THE PRELIMINARY FINDING IN YOUR DRAFT REPORT THAT THE PORCUPINE CARIBOU HERD WILL BE ADVERSELY IMPACTED BY DEVELOPMENT ACTIVITIES. INCIDENTAL TO THAT FINDING, CERTAIN HABITAT HAS BEEN PLACED IN RESOURCE CATEGORY I, AND BY SO DOING, THE POTENTIAL FOR MITIGATION IS NEGATED. AS A PROFESSIONAL WILDLIFE BIOLOGIST, I QUESTION THIS HABITAT CLASSIFICATION BECAUSE I AM RELUCTANT TO CONCLUDE, BASED ON AVAILABLE INFORMATION, THAT NO MITIGATION IS POSSIBLE. WITH MORE INFORMATION SPECIFIC TO THE PORCUPINE CARIBOU HERD, I BELIEVE EFFECTIVE MITIGATION MEASURES CAN BE FOUND. MOREOVER, THE LONG-TERM IMPACT OF PETROLEUM DEVELOPMENT ON THOSE CARIBOU WILL DEPEND ON THE "TOOLS" WHICH REFUGE PERSONNEL HAVE AT THEIR DISPOSAL FOR RESOURCE MANAGEMNT, AND/OR THEIR USE OF SUCH TOOLS.

TENNECO HAS A STRONG CORPORATE POLICY TO PROTECT THE ENVIRONMENT AND HAS A HISTORY OF CONDUCTING ITS BUSINESS IN A MANNER THAT MITIGATES ADVERSE IMPACTS ON THE ENVIRONMENT AND WHERE, OPPORTUNITIES EXIST, ENHANCING THE ENVIRONMENT. INDEED, TENNECO'S MANAGEMENT CONSISTS OF MANY PEOPLE, WHO IN THEIR PRIVATE, AS WELL AS PROFESSIONAL LIVES, ARE CONSERVATION MINDED. TENNECO THEREFORE TAKES THE POSITION THAT IT SHOULD BE EXPECTED TO CONTINUE CONDUCTING ITS BUSINESS IN AN ENVIRONMENTALLY RESPONSIBLE MANNER AND CAN BE EXPECTED TO SEEK WAYS TO MINIMIZE ADVERSE ENVIRONMENTAL IMPACTS.

TENNECO DOES NOT FEEL THAT THE ANWR ISSUE SHOULD PIT PRO VS ANTI-DEVELOPMENT INTERESTS AGAINST ONE ANOTHER. AS AMERICANS, IT IS IN ALL OF OUR BEST INTERESTS TO DETERMINE THE AVAILABILITY OF A POTENTIALLY ENORMOUS ENERGY SUPPLY. IT IS ALSO IN OUR BEST INTEREST THAT WE DO IT IN AN ENVIRONMENTALLY RESPONSIBLE MANNER.

WE ARE COMMITTED TO THAT END AND THAT IS WHY WE FEEL THAT NOW IS THE MOST OPPORTUNE TIME TO DETERMINE IF THAT ENERGY RESOURCE REALLY EXISTS. WE HAVE A SHORT TERM OVERSUPPLY OF ENERGY AT PRESENT. THIS GIVES US THE LUXURY OF SOME ADDITIONAL TIME - TIME TO CONDUCT THE RESEARCH NEEDED TO DETERMINE THE POTENTIAL FOR ADVERSE AND/OR POSITIVE IMPACTS ON THE CARIBOU HERD, TIME TO CONSIDER AND TEST MITIGATION MEASURES, AND TIME TO CONSIDER OPPORTUNITIES FOR ENHANCEMENT. THAT TIME WILL BE LOST IF A TWIST OF FATE ERODES THAT SURPLUS AND CREATES A CRISIS SITUATION BEFORE ANY ACTION IS TAKEN. WE HAVE THE TIME NOW TO SIT TOGETHER, NOT AS ENVIRONMENTALISTS, DEVELOPERS OR REGULATORS, BUT AS PEOPLE CONCERNED WITH OUR WILDLIFE HERITAGE AND OUR ENERGY FUTURE. IF AN ENERGY CRISIS DEVELOPS BEFORE WE RESOLVE SUCH QUESTIONS NOT ONLY WILL THE CHANCE BE LOST BUT THE DEVELOPMENT OF THE PETROLEUM RESOURCES MAY PROCEED AT A PACE THAT IS NOT IN THE BEST INTERESTS OF THE WILDLIFE RESOURCE.

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THE ANWR ISSUE PRESENTS A "GOLDEN" OPPORTUNITY TO SHOW THAT OUR APPROACH TO ENVIRONMENTALLY SENSITIVE ISSUES HAS MATURED. TENNECO IS READY AND WILLING TO UNDERTAKE THE CONSTRUCTIVE STEPS NECESSARY TO BUILD THE CONFIDENCE NEEDED BY ALL THE PLAYERS IN THIS ISSUE IF WE'RE GOING TO WORK TOGETHER. INDEED WE INVITE THOSE PLAYERS TO BEGIN A POSITIVE DIALOG ON THIS ISSUE. THE SUBJECT OF SUCH A DIALOG MIGHT WELL INCLUDE THE CREATION OF A WILDLIFE TRUST FUND FOR ANWR PATTERNED AFTER THE EXISTING LAND AND WATER CONSERVATION FUND. A PERCENTAGE

OF THE EXISTING ROYALTY COULD BE DEDICATED FOR ANWR IN THE SAME WAY A PERCENTAGE OF THE OFFSHORE ROYALTY IS DEDICATED FOR THE LAND AND WATER CONSERVATION FUND. THIS WOULD GIVE ALL OF THOSE WHO USE THIS ENERGY A CHANCE TO CONTRIBUTE TO THE SOUND STEWARDSHIP OF THE RENEWABLE RESOURCES ASSOCIATED WITH ANWR.

THANK YOU FOR THIS OPPORTUNITY TO PRESENT OUR VIEWS AND I LOOK FORWARD TO WORKING WITH THE DEPARTMENT AS THE ANWR ISSUE IS FURTHER EXPLORED. I WOULD BE HAPPY TO ANSWER ANY QUESTIONS YOU MAY HAVE REGARDING TENNECO'S POSITION.

cc: D. B. JOHNSON

C. S. KHOO

J. BARNES

D. S. TAYLOR

H. A. BRISCOE

January 19, 1987

DRAFT ARCTIC NATIONAL WILDLIFE REFUGE
COASTAL PLAIN RESOURCE ASSESSMENT
AND LEGISLATIVE ENVIRONMENTAL IMPACT
STATEMENT

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

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Gentlemen:

Texaco appreciates this opportunity to present its views on the captioned report. While we have some suggestions for change, we commend the U.S. Fish and Wildlife Service for its exhaustive efforts in developing a comprehensive, well balanced resource assessment. We strongly recommend Alternative A, the opening of the entire ANWR coastal plain for oil and gas leasing.

The report is timely when placed in the context of a potential national security and economic crisis resulting from the collapse of energy prices. One of the Administration's highest priorities must be to complete its energy national security study requested by the President and to establish policies which will increase domestic production, while at the same time decrease reliance on insecure sources of imported crude oil and petroleum products. As part of an overall national security strategy expeditious Administration and Congressional action should also be taken to open the Artic National Wildlife Refuge (ANWR) for leasing.

Selection of Alternative A will provide a clear signal that this nation is taking steps to provide for its energy security. As with the Strategic Petroleum Reserve, Alternative A is not an instantaneous solution. Once legislative authority has been given, we estimate that leasing in the remote, harsh climate of the ANWR coastal plain would not commence before the early 1990's and significant production would not start before the late 1990's. Nevertheless, its potentially large new reserves can

reduce the nation's energy security risk and expand efforts toward achieving national energy security. Accordingly, this resource assessment is timely and vitally important.

THE NATION'S NATIONAL AND ECONOMIC SECURITY IS AT RISK

Consideration of this matter is timely and critical under present circumstances. It is well known that decisions by foreign producing countries caused a decline of more than 40 percent in crude oil prices during 1986. This precipitous drop in revenue makes an increasing number of producing wells uneconomic. Consequently, U.S. production has fallen. While barely down in the first quarter of 1986 when compared to the first quarter of 1985, production fell 2.9 percent in the second quarter and 3.1 percent in the third quarter. By the end of the year U.S. production had fallen by 700,000 barrels per day. At the same time, U.S. consumption was up 1.2 percent in the first quarter, up 2.4 percent in the second quarter, and up 3.8 percent in the third quarter.

The net effect is that the growing difference between domestic consumption and production has been filled with increased oil imports which are up 23 percent over 1985. Significantly, petroleum imports have risen to 38 percent of U.S. oil consumption, a higher level of dependence than at the time of the 1973-74 embargo. Every knowledgeable forecast shows an increasing dependence upon imports.

The sharp drop in prices not only affects existing wells, but also impacts the drilling of new wells and thereby future production. Production declines normally over a period of time and drilling of new wells and the discovery of new reserves help to offset this decline. Lower prices, however, limit the number of wells drilled and the risk operators are willing to take to find new reserves. As a result, exploratory activities have been severely curtailed. The consequence is that future production from U.S. wells will be less than it would have been at higher crude price levels and, therefore, imports will be increased. As crude prices rise, as they inevitably will, exploration will accelerate. Given the long lead times involved in bringing Arctic production to market, however, it is important that affirmative action be initiated now to open the ANWR coastal plain for oil and gas exploration. Even if oil and gas leasing were authorized now, energy production from the coastal plain would not help offset increasing dependence on oil imports until the late 1990's at the earliest.

Worldwide lower prices, over a period of time, also reduce the productive capacity outside the U.S. due to the normal decline in production from older wells and to the reduction in cash flow to pay for new drilling and exploration. That fact means that, increasingly, world consuming nations, especially those requiring

larger imports, become more vulnerable not only to international cartels, but also to the political and economic decisions of the more radical producing states. Before an actual oil shortage occurs, artificial shortages may be created, as in the 1970's, by one or a few producing nations. The consequence, as before, would be rapidly, upwardly spiraling crude oil prices and major overall economic and political disruptions. Accordingly, the United States increasingly faces the real possibility of a return to serious energy problems. Future problems tend to be complacently deferred. Prudence dictates otherwise.

There is compelling evidence that a continuation of existing trends will result in an excessive and imprudent level of imported crude oil and petroleum products within the next 2-3 years. Our national security interests demand that the U.S. Government promptly adopt policies designed to insure that U.S. crude oil production not decline below a target minimum level. Such policies could include improved financial incentives to the domestic producing industry including consideration of an oil import fee or minimum "floor price." The appropriate remedy can be determined once the objective as to the desired future level of U.S. production is determined. (See Attachment entitled "Effect of Petroleum Imports on U.S. Crude Oil Production" which was a portion of Texaco's comments filed with the Department of Energy in connection with its energy security study for the President.)

THE ANWR REPORT IS IMPORTANT

The Department of the Interior's resource assessment clearly indicates that the coastal plain constitutes a tremendous opportunity for the discovery of new petroleum reserves. Consistently, the coastal plain is considered by many knowledgeable explorationists to be one of the most prospective areas, if not the most prospective, in the United States. Resource estimates reach easily into the billions of barrels. Production from the coastal plain may equal, or perhaps even exceed, the resource potential of Prudhoe Bay, which now accounts for nearly 20 percent of the oil production in the U.S. The true nature and extent of this resource can be determined only through the drilling of wells. Hopefully, this potential production will be available timely and mitigate the increasing dependence upon foreign oil supplies.

Those who oppose ANWR coastal plain development argue that the reserve potential of the coastal plain may be too small to justify leasing, as it may represent only a few months supply of oil for the nation at its current consumption rate. This argument lacks substance because this nation currently has less than a five-year supply of domestic reserves (existing domestic crude oil reserves divided by total domestic petroleum

consumption). Also, a few months supply is certainly significant when compared with the remaining estimated 10-month supply from Prudhoe Bay, the largest oilfield ever discovered in North America. The resource assessment supports the fact that the coastal plain is our best opportunity for finding another field as large as Prudhoe Bay.

Skepticism has also been expressed about the possibility of finding commercial-sized oil fields in the coastal plain. The Department of Interior has estimated that there is a 19 percent chance of success. That level of risk is very good in the oil business. Historically, the chance of an exploratory well encountering a commercial oil discovery is about five percent. Therefore, the opportunity for a commercial oil discovery within the coastal plain is nearly four times better than average.

Others wanting to delay the exploration of the ANWR coastal plain point out that there is presently a surplus of productive capacity in the world and that the domestic industry's current economic condition precludes heavy involvement in new frontier areas. Such statements ignore the long lead-time necessary before there will be production from the coastal plain. Even with favorable legislative action in the near future, actual production from the coastal plain probably will not occur until the late 1990's, under a best case scenario.

Timely exploration of the coastal plain, and the hoped for production from substantial new reserves, would act as a buffer, or mitigating influence, against forecasted crude oil shortages and rapidly escalating crude oil prices.

DEVELOPMENT OF ANWR COASTAL PLAIN PROVIDES SIGNIFICANT BENEFITS

Aside from its national security benefits the economic benefits associated with the exploration and development of the coastal plain are substantial. Oil production from the coastal plain would provide a significant, new source of tax and royalty revenue to federal, state and local governments. Moreover, development of the petroleum resources within the coastal plain would create jobs as a result of the new demand for goods and services not only in Alaska, but also in other states. Additionally, the negative U.S. balance of payments for international trade would be reduced.

Equally important, the opening of the ANWR coastal plain to oil and gas activities, provides necessary acknowledgment that this nation is taking steps to meet this future problem, which certainly has an impact upon the nation's military defense. While weapons are important, the availability of sufficient petroleum products has to be a concern. The nation also needs to know, as soon as possible, if hydrocarbons are not present in the

ANWR coastal plain. That information would allow energy policymakers to restructure their plans for future energy requirements.

ALTERNATE A IS THE PREFERRED OPTION

In view of the national benefits which could be derived from development in the coastal plain, Texaco believes that Alternative A should be adopted by Congress. Alternative B prohibits leasing on part of the area used by the Porcupine caribou herd for calving. However, the need for this exclusion is not well-documented in scientific literature. Alternative C would delay leasing and development indefinitely and calls for off-structure drilling which would provide additional information but would not establish the presence or absence of oil reserves. Alternatives D (no action) and E (wilderness) are unacceptable since each would preclude any development whatsoever. Given the decline in U.S. production, Texaco believes it would be imprudent to leave untested what the report terms, "clearly the most outstanding oil and gas frontier remaining in the United States..."

RECOMMENDATIONS ON THE REPORT

Acknowledge Additional Structures - The resource assessment identifies 26 major structures within the coastal plain based on an Ellesmerian play concept. We believe there may be insufficient information to assess properly other more complex plays which were not mapped. Accordingly, it would be desirable to have the statement, "No prospects were adequately resolved within the detached and highly deformed Mesozoic and Tertiary rocks," reflect that assessment of these areas had not been made. The report also states "...in these and several other plays (referring to all play concepts except the folded Ellesmerian/ Pre-Mississippian) the estimated accumulation sizes, though perhaps substantial, are often of such size as to be of little or no current economic interest if occurring singly, and are often mapped with great difficulty." Texaco believes this statement could be misleading by discounting the viability of these play concepts based on current price assumptions. That assessment should be based upon projected prices at the time of production.

Also in the report is the statement, "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." It implies that the Ellesmerian play trend must exist for development to occur and that one or two wells will prove the presence or absence of this play. Texaco strongly believes that there can be economic plays in the ANWR coastal plain without this particular geologic play being present and that such test wells may raise many new

questions and still not provide conclusive answers. Accordingly, further drilling could be warranted.

We agree with the statement, "Areas without mapped structures may prove to be of greater, lesser or equal potential. Without exploratory drilling as a confirmation and delineation tool, all (reserve) estimates must be considered uncertain." Therefore, it is necessary to have access to the entire coastal plain.

Date Reserve Estimates - In order to avoid misrepresentation of the resource assessment, we suggest that Table III-1 on page 50 be revised to include the dates that reserve figures for each basin were developed. In the event additional wells have been drilled in a particular basin which would impact reserve estimates, such estimates should be revised accordingly.

Exploration and Production of the Coastal Plain Can Proceed With Minimal Adverse Impacts - The resource assessment portion of the report was conducted under a statistically-based, "most-likely" case scenario. In contrast, virtually all of the environmental impact discussions are based on a "worst" case scenario. Also, it seems to have been overlooked that the consolidation of facilities and the imposition of reasonable operating stipulations can frequently fully mitigate an environmental concern.

The report states that "Long-term losses... would be the inevitable consequence" of development. Development "will result in long-term changes in wildlife habitats, wilderness environment, and native community activities" (emphasis added). The language is inconsistent with the facts and other quotes from the same section of the report, such as "The amount of reduction and its long-term significance for herd viability is highly speculative" (emphasis added).

ANIMAL AND PLANT LIFE WILL BE PROTECTED

Texaco agrees that caribou of the Porcupine herd are the most conspicuous biological community on the coastal plain, but we believe that designation of USF&WS Resource Category 1 for a portion of their widespread calving area in the Jago River area is not justified. The terms "traditional," "core calving area," "unique" and "irreplaceable" are inappropriate in this case. Concentrated calving has been observed in the Jago highlands during only five of the past 14 years which indicates that the calving habitat is not fixed at any one location along the calving habitat from Canning River to the Babbage River in Canada. Therefore, all of this area is an acceptable calving habitat and there is nothing traditional about the Jago highlands. It just happens that on the average, the interaction of migration, forage, predators and weather conditions have

combined to place some of the herd in that area when their calves were due to be born in five out of 14 years of observation.

Additionally, the discussions of possible adverse effects on the herd seems to ignore experience gained at Prudhoe Bay, Kuparuk River, Milne Point and Endicott despite the statement in the report 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." Despite weak scientific evidence to support a distinction between the Central Arctic Herd and the Porcupine Caribou Herd, the report states "The lack of observable adverse effects from displacement exhibited by the Central Arctic Herd would be unlikely for the Porcupine Caribou Herd."

Texaco believes that industry has proven the ability to function in the Arctic without adversely affecting the caribou population. With similar protective measures during the coastal plain development, we see no reason why the Porcupine Caribou Herd should not continue to flourish in the same manner as the Central Arctic Herd.

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At several points in the report, the suggestion is offered that oil and gas exploration and development would "eliminate the wilderness character of the area." Texaco acknowledges that any activity within ANWR will affect its character. However, only about one-tenth of one percent of the surface acreage will be involved and the duration of use of the land is limited. Thereafter, the equipment would be removed and a natural regenerative process would begin to return the wilderness quality to the area.

It is useful to observe that the many predictions of adverse biological impacts, prior to construction of the trans-Alaska pipeline, have proven false. Animal and plant life have flourished and the state and nation have shared an era of great economic prosperity due to the pipeline and associated oil development. The extension of oil and gas activities to the ANWR coastal plain, therefore, would involve a known and proven process.

Texaco fully expects that oil and gas operations on the coastal plain would have only minor or negligible impacts on plant and animal life residing there. We fully support the conclusion, drawn by the Department of the Interior, on page 169 which states in part ". . . the production of oil from North America's largest oil field at Prudhoe Bay has taught us much about how to protect environmental values. Even though 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." We expect that same result to occur on the coastal plain.

ENVIRONMENTAL PROTECTION STIPULATIONS

Texaco believes the Department of the Interior can responsibly manage any oil and gas activities which may be authorized by Congress. In this regard, the proposed environmental protection stipulations, with a few exceptions, appear to be reasonable and consistent with current oil industry practice in the Arctic. Our comments on the exceptions follow:

First, there is a prohibition on all exploratory activity from May 1 to November 1. Texaco believes that activities likely to cause little interference with animal behavior should be permitted as part of a research program approved by the Fish and Wildlife Service to determine effects on wildlife. Activities in this category would be those confined to the drill pad and would include drilling and testing of wells. As currently stated, the stipulation could cause single exploratory wells to take two or more years to complete.

Second, there is, in the Arctic Slope Regional Corporation/U.S. agreement, a requirement that ice pads be used for wells being drilled up to 10,000 feet. We suggest that this stipulation be revised to allow the use of pad material in order to ensure a safe and successful completion of the operations plan. Bottomhole depth is often not the most important criteria in determining how long it takes to complete an operation. A stipulation, stating a preferred use of ice pads where a drilling program can be prudently accomplished with its use, would be acceptable.

Third, the restriction on surface occupancy in the 3-mile corridor along the coast to only marine facilities and infrastructure is an unnecessary prohibition of other temporary and essential facilities. Other mitigating measures already ensure caribou passage and minimize disturbance to wildlife. Texaco recommends the stipulation provide, at least, for temporary exploration and essential production facilities on a site-specific basis.

Fourth, we believe the stipulation which indicates a preference for buried pipelines should be reconsidered. Arctic experience has shown that burial of pipelines is unnecessary to accommodate movements of animals where elevation or ramping is used. Further, buried pipelines may not be environmentally preferable due to permafrost. Texaco

recommends that any proposed stipulation adopt the wording of the State of Alaska policy on pipeline design, siting and construction which states that adequate elevation, ramping or burial of pipelines will be required in areas identified as important caribou movement.

Fifth, the stipulation on the construction of docks and causeways is overly restrictive in calling for no change in water chemistry. Minor changes in water conditions should be acceptable as long as there is no measurable impact on marine species.

Sixth, the closure of a 3/4 mile zone along rivers is an excessive restriction to protect a riparian habitat. Maximum effort should be required to protect critical habitats. However, essential production facilities should be allowed on a site-specific basis.

SUMMARY

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The nation is now facing a future energy security crisis which will result in product price increases and/or supply shortages. As in the 1970's, the timing will be determined by foreign political and economic decisions. Similar to military defense, national plans and actions should be prudently undertaken to mitigate or avoid the energy crisis.

The subject report provides a resource assessment and legislative environmental impact statement for the Arctic National Wildlife Refuge Coastal Plain. The report makes clear that this area has the potential to provide very significant volumes of oil. The report also makes clear that oil and gas activities can be accomplished in an environmentally safe manner.

Based upon the foregoing, there can be little doubt that the discovery of new reserves of petroleum would benefit the United States. Accordingly, to mitigate the prospective national energy security crisis, we strongly recommend Alternate A, the opening of the ANWR coastal plain, as the prudent, most viable option.

Sincerely,

J Dan Ames

JDA:caj

ATTACHMENT

EFFECT OF PETROLEUM IMPORTS ON U.S. CRUDE OIL PRODUCTION

Absent a shift in U.S. energy policy, the continuation of current crude oil price levels ($14-$15 a barrel) will substantially increase U.S. oil import dependence by causing a decline in U.S. production and an increase in domestic consumption.

Projections completed by the Congressional Budget Office, American Petroleum Institute, the National Petroleum Council (NPC), Congressional Research Services, Data Resources Inc., and the Department of Energy indicate U.S. crude oil production, which was 8.9 million barrels a day in 1985, could fall by up to 3 MMB/D in 1990. The attached chart entitled "U.S. Net Oil Imports" shows a composite projection from four recently-available studies of U.S. production dropping to 6.3 MMB/D in 1990. And DOE has projected that by 1995, U.S. oil production will range between 5 and 7 MMB/D, assuming oil prices of $20 and $30 per barrel, respectively.

When combined with a 2 percent annual increase in U.S. oil consumption, amounting to as much as 2 MMB/D of incremental demand, the United States would be dependent on crude and product imports for more than 50 percent of its needs by 1990, a level higher than that experienced during the energy disruptions of the 1970's. This point is illustrated on the attached chart entitled "U.S. Oil Import Dependence." And according to the recent NPC survey's lower price scenario, imports would rise to 11.4 MMB/D in 1995 and account for 60 percent of total consumption. Such dependence raises a number of economic, energy and national security concerns which should be promptly considered by the U.S. Government.

1. Exploration cutbacks will reduce future U.S. oil production.

The downturn in U.S. exploration and development is evident by the decline in active rotary rigs from over 4,000 in 1981 to roughly 900 in mid-November 1986. This dramatic drop in rigs will have a marked downward impact on future levels of oil production.

Reductions by 40-50 percent in domestic exploration and production budgets relative to 1985 already are having a severe negative impact on the infrastructure of the U.S. oil industry, drilling contractors, oil field equipment suppliers, etc. The financial resources of many independent producers have been virtually depleted. The seismic crew count is down 80 percent from 1981; (i.e. 80) large and small companies have cut back sharply on R&D budgets; service companies are going bankrupt; equipment is being sold to foreign suppliers or scrapped; and, skilled professional and technical personnel are losing their jobs and transferring to other industries. This gap in infrastructure services will have a severe negative effect in the 1990's.

Announced and projected reductions in oil industry spending and oil field activity are linked closely with projections of declining U.S. production. Accordingly, it is noteworthy that a recent survey by the Independent Petroleum Association of America (IPAA) of its members found that at $13 per barrel their drilling activity would fall by 85 percent between 1985 and 1990. Similarly, a recent American Petroleum Institute survey found that total capital and operating expenditures for exploration and production (in 1985 dollars) would drop from $70 billion in 1985 to $21.1 billion in 1991 if the price of oil were at $15 per barrel during that period, and that total wells drilled would decline from about 75,000 in 1985 to about 31,000 in 1991.

2. Natural Gas Production will be similarly affected.

If crude prices remain in the $15/bbl. range until 1990, protracted cutbacks in exploration and development will also significantly reduce U.S. domestic natural gas production capability. During this period, demand is likely to be in the 17-18 TCF/year range. The combined effect of supply and demand should eliminate the domestic surplus gas deliverability in the U.S. by 1990, if not earlier.

As a result, DOE cannot expect that surplus domestic supplies of natural gas will be available in the 1990's to replace crude oil supplies for those industrial consumers capable of switching fuels. In 1985, industrial primary energy was supplied 43 percent by oil, 42 percent by natural gas and 15 percent by coal. Only one-third (1.2 MMB/D) of the oil is used for manufacturing heat and power, in which the potential for substitution of gas for oil is greatest. If it is assumed that half of the oil could be replaced by gas, this would be 600 MB/D of oil, equivalent to about 1.2 TCF/year. It is doubtful that as much as 1 TCF/year of surplus gas would be available after 1990 to substitute for disrupted oil supplies to industrial consumers with fuel switching capability.

3. Surplus production capacity will be unavailable in the 1990's outside OPEC.

The trend over the next several years toward declining domestic production as imports increase will characterize not only the U.S but many other non-OPEC countries as well. As a result, if today's levels of oil prices generally prevail through 1990, the world oil surplus that averaged 11 MMB/D in 1985 could largely disappear by 1990.

The sudden drop in crude and product prices is and will continue to have an effect on consumption. The demand for light-end products is increasing in the United States and abroad. The worldwide decline in residual fuel demand has been reversed as many utilities and industrial users with dual-fired capacity increase their use of fuel oil rather than natural gas or coal. Free World demand for petroleum is expected to increase by some 1 MMB/D in 1986, compared with a decline in 1985.

Free World oil demand could easily reach 50 MMB/D by the end of the decade, an increase of over 4 MMB/D from the 1985 level. But non-OPEC production will fall substantially as the combination of low prices and drastically reduced exploration will particularly affect production from the U.S., North Sea (U.K.), and Canada.

Although the downturn in exploration and development has been most dramatic in the U.S., drilling activity is also down sharply throughout the world. In Canada for example, 113 rigs were operating in mid-November, compared with 305 a year ago. Other areas, such as the North Sea, have been similarly affected. According to a recent Hughes Tool Survey, rigs operating outside North America were 305 less than in 1985 with lower activity in every section of the world, including the Middle East. A composite non-OPEC picture is available from a recently released study by Chase Econometrics which projects a decline in non-OPEC crude and NGL production by 4 MMB/D to 21 MMB/D in late 1988 within one of its two low-price scenarios.

The net effect of rising world demand and declining non-OPEC production will be a dramatic increase in OPEC's output and control over the market. By 1990,

OPEC's crude oil production could reach 24 MMB/D - up more than 50 percent from 1985. With current available OPEC capacity estimated at only about 27 MMB/D, OPEC's potential to control the market will be greatly enhanced. There is little doubt OPEC could establish an effective oil production sharing arrangement with only this small amount of surplus capacity.

National security expert Henry M. Schuler has written that over 95 and 85 percent, respectively, of the "installed but currently unutilized production capacity" is located in OPEC countries and the Middle East. When the output of currently unutilized production capacity is absorbed, non-communist nations will turn to proved but undeveloped reserves, over 76 percent which are located in OPEC and 69 percent in the Middle East.

API, in a study recently completed ("Two Energy Futures"), concludes that OPEC will obtain effective control over world oil prices when demand for OPEC oil exceeds approximately 80 percent of OPEC's current productive capacity. The forecast increase in world oil consumption of 4 MMB/D by 1990 combined with a 4 MMB/D decline in non-OPEC production would result in a demand for OPEC production in 1990 well above 80 percent of its current productive capacity of approximately 27 MMB/D.

4. The Strategic Petroleum Reserve (SPR) provides inadequate insurance.

The SPR was authorized by law in 1975 with the intent to store up to 1 billion barrels of oil. This level was subsequently lowered to a 750 million barrel SPR to be developed by 1991, deferring any decision on the remaining 250 million barrels. The current SPR of 505 million barrels provides a level of protection to the United States during a time of disruption. But it is unlikely that the SPR will be doubled between 1986 and 1990 to provide the same margin of protection against the growing U.S. oil import dependence which exists today.

The current SPR could replace net oil imports for about 82 days, if oil imports remain at August (1986) levels, but would fall to 50 days of protection if imports were to increase to 10 MMB/D by 1990. (10 MMB/D is a composite figure compiled from several forecasts.) To provide a 100 day supply would require a SPR of 970 million barrels (assuming imports of 9.7 MMB/D). To reach this level would require a fill rate of approximately 315,000 barrels per day for the next four years! This would cost $7 billion (for the oil alone at $15) and would severely impact government expenditures. The physical facilities for injecting and storing additional SPR oil would also have to be expanded at a substantial cost. In addition, a similar doubling of security stocks would be required in other IEA countries if the current margin of protection is to be maintained.

5. Alternative supplies of energy will not be available to the U.S. in 1990.

At present price levels, the synthetic/renewable energy contribution to meeting U.S. energy needs is and will continue to be minimal. Optimistic projections for shale oil, coal liquefaction, coal gasification, solar energy, methanol, et al have, for the most part, proved unattainable even at crude oil price levels prevailing before the current decline. The U.S. established the Synthetic Fuels Corporation in 1979 with a firm commitment to replacing oil with new sources of indigenous production. The goals set by the Administration for the Synfuels Program were 500,000 MB/D by 1987 and 2 MMB/D by 1992. With the suspension of further Synfuel Corporation funding, it appears the

Administration and Congress have little faith today in the potential synfuel contribution.

The recent nuclear accident at Chernobyl is expected to sharply limit the growth of the nuclear industry, particularly in the U.S. Almost no new orders for a nuclear powered utility in the U.S. have been made in the last decade. While coal and natural gas continue as alternatives to petroleum, there will be no significant alternative for transportation fuels and home heating oil in the medium term. If a crude oil import supply disruption should occur in the early 1990's, some coal or natural gas would probably be available to substitute for residual fuel for boilers. However, dual-fired capacity is limited. Also, there is a growing industry consensus that natural gas supply shortfalls are inevitable because reserve additions aren't keeping pace with consumption.

6. Conclusion

The U.S. oil industry is presently undergoing a massive restructuring. Budgets for oil and gas exploration and production, R&D, equipment purchases, etc. have been reduced by 40-50 percent. By 1990 U.S. reliance on imports will be at even higher levels than in 1973 and 1979. But when the U.S. reaches such dependence, industry will be unable to respond quickly to meet national economic and energy security concerns.

7. Policy Determination

There is compelling evidence that a continuation of existing trends will result in an excessive and imprudent level of imported crude oil and petroleum products within the next 2-3 years. Our national security interests demand that the U.S. Government promptly adopt policies designed to insure that U.S. crude oil production not decline below a target minimum level. Such policies could include improved financial incentives to the domestic producing industry including consideration of an oil import fee or minimum "floor price." The appropriate remedy can be determined once the objective as to the desired future level of U.S. production is determined.

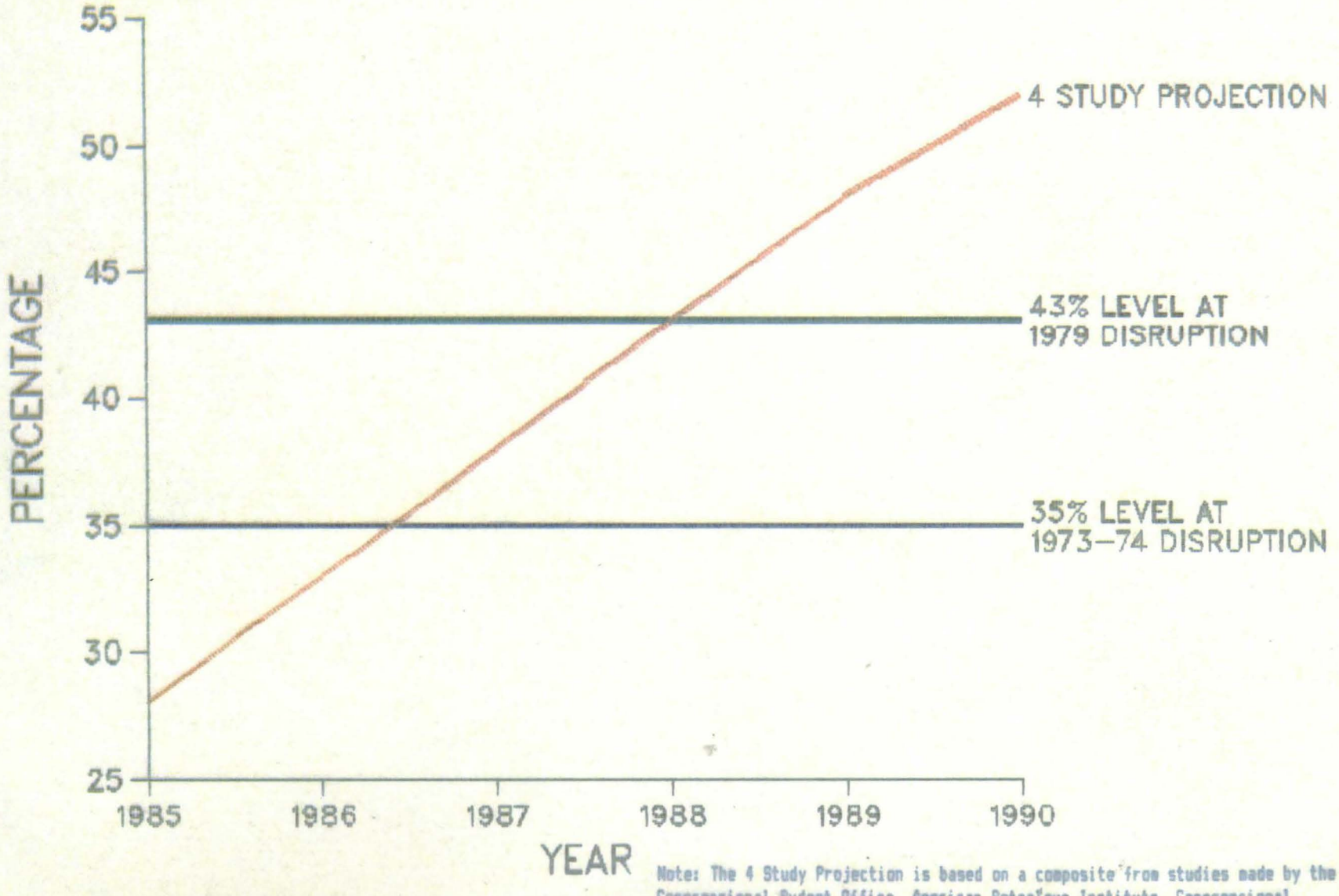
FREE-WORLD REFINING CAPACITY AND OIL DEMAND
(MMB/CD)

	1979		1981		1985	
	CAPACITY	DEMAND*	CAPACITY	DEMAND*	CAPACITY	DEMAND*
Western Europe	20.3	14.4	20.2	12.3	16.0	11.3
United States	17.2	18.5	18.5	16.1	15.4	15.7
Other Western Hemisphere	10.7	6.1	10.9	6.2	9.6	5.9
Asia/Pacific	10.3	9.3	10.6	8.7	10.4	8.4
Africa/Middle East	5.2	2.9	5.4	3.3	6.5	3.7
TOTAL	63.7	51.2	65.6	46.6	57.9	45.0

*Demands cannot be compared directly to refinery capacities because there are other components to supply such as natural gas liquids supply, processing gain, inventory change, yield differences, crude oil quality, etc.

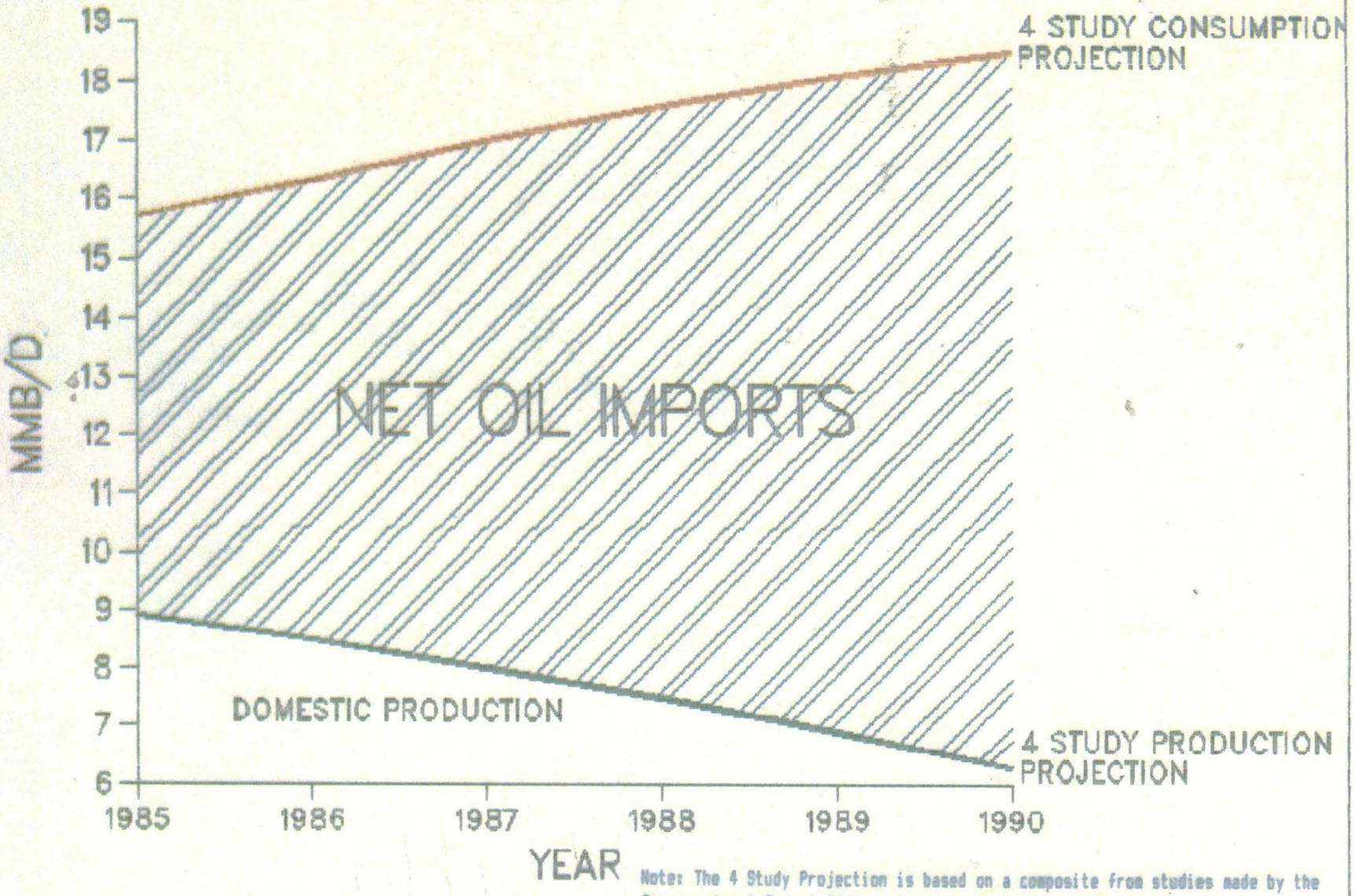
SOURCE: Capacity: International Petroleum Encyclopedia. Demand: Western Europe - OECD; United States - DOE; Other - British Petroleum Statistical Review.

U.S. OIL IMPORT DEPENDENCE



Note: The 4 Study Projection is based on a composite from studies made by the Congressional Budget Office, American Petroleum Institute, Congressional Research Service and Data Resources Inc.

U. S. NET OIL IMPORTS



Note: The 4 Study Projection is based on a composite from studies made by the Congressional Budget Office, American Petroleum Institute, Congressional Research Service and Data Resources Inc.

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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 DONALD C. HARTIGAN

Mailing Address TEXACO INC. 550 W. 7TH AVE, SUITE 1320

ANCHORAGE AK 99501

Check appropriate box below:

☐ I am here to offer my own views.

--or--

☐ I am speaking for TEXACO INC.
(please enter name of organization you represent)

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TESTIMONY-DRAFT ARCTIC NATIONAL WILDLIFE REFUGE
COASTAL PLAIN (ANWR) RESOURCE ASSESSMENT AND
LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

My name is DONALD C. HARTMAN. I am ADVANCED EXPLORATION GEOLOGIST (title) for Texaco in ANCHORAGE, ALASKA (location).

ALTERNATIVES

Texaco strongly recommends that Alternative A (full leasing of the 1002 study area) be adopted by Congress as the alternative most compatible with national needs.

Specifically, domestic U.S. oil production, by some estimates, is expected to decline from approximately 8.6 million barrels per day at present to an estimated 4 to 5 million barrels per day by the year 2000. Assuming a modest increase in national demand, imports of oil, largely from politically volatile regions of the world, could climb to more than 12 million barrels per day by the year 2000. Specifics aside, a strong consensus has emerged on the falling U.S. production and dramatically-rising import dependence from projections recently completed by the Congressional Budget Office, the Congressional Research Service, the Department of Energy, the National Petroleum Council, the American Petroleum Institute, and Data Resources Inc.

Such great dependence upon imported oil raises a number of important economic, energy, and national security concerns. API President Charles DiBona warned of a severe energy crisis in the mid-1990's in releasing the API's report, entitled "Domestic Petroleum Production and National Security," on December 30, 1986. Similarly, the Interim Report of the NPC on the U.S. Oil and Gas Outlook noted in October 1986 that the "imminence and gravity of the national energy vulnerability" mandate that the NPC request the Secretary of Energy to convey the urgency of the situation to the Administration, the U.S. Congress, and the American people. And, President Reagan, himself, recognized the seriousness of growing import dependence in forming a fast-track, interagency study of U.S. energy security under DOE Deputy Secretary William Martin. Their report is expected in February or March, 1987.

Unquestionably, national security would be enhanced by the opening of ANWR and the anticipated discovery of substantial new reserves. Without doubt production of those reserves would decrease U.S. dependence on foreign oil and lower the future trade deficit. But, the timing of ANWR's opening is also critically important.

Although there is currently a worldwide surplus of oil, it is important to note that, due to the logistics of Arctic exploration and development, any oil discovered in ANWR in the

near-term would not be produced until about the year 2000. Accordingly, Texaco believes that Alternative A should be adopted and timely access to ANWR be granted so that this source of supply may be available when needed. This approach would also assure orderly, efficient development of resources in a non-crisis atmosphere.

The economic benefits associated with the exploration and development of ANWR are also substantial. Oil production from ANWR would provide a significant new source of tax and royalty revenue to federal, state and local governments. Moreover, development of the petroleum resources underlying ANWR would promote economic opportunity not only in Alaska but also in the Lower 48 states. Demand for goods and services in connection with such development would create jobs and positive impacts nationwide.

In view of the national benefits which could be derived from ANWR's development, Texaco believes the remaining alternatives are unacceptable. Alternative B prohibits leasing on part of the area used by the Porcupine caribou herd for calving, however, the need for this exclusion is not scientifically documented. Alternative C would delay leasing and development indefinitely and calls for off-structure drilling which would provide additional information but would cause unnecessary delays without establishing the presence or absence of oil reserves. Alternatives D (no action) and E (wilderness designation) are unacceptable since each would preclude any development whatsoever. Texaco believes it would be folly to leave untested what the report terms, "clearly the most outstanding oil and gas frontier remaining in the United States...". This is especially true given the declining state of our national oil reserves and the lead times necessary to establish production.

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ENVIRONMENTAL IMPACTS

The resource assessment portion of the report was conducted under a statistically based, most likely case scenario. In contrast, virtually all of the environmental impact discussions are based on a worst case scenario. Texaco is concerned that such an unbalanced approach could be misleading. The major biological concern appears to focus on the Porcupine caribou herd and insufficient credit seems to have been given to consolidation of facilities and the imposition of reasonable operating stipulations which can frequently fully mitigate an environmental concern. Furthermore, the discussion of possible effects on the herd seems to ignore experience gained at Prudhoe Bay, Kuparuk River, Milne Point and Endicott. That, despite the statement in the report 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 with similar minimal effects."

Texaco would also like to take this opportunity to point out that all of the predictions of biological disaster before construction of the trans-Alaska pipeline have proven false. Animal and plant life have flourished and the state and nation have shared an era of great economic prosperity due to the pipeline and associated oil development. The extension of such development to the ANWR coastal plain is therefore a known and proven process.

At several points in the report, the suggestion is offered that oil and gas exploration and development would "eliminate the wilderness character of the area." Texaco acknowledges that any activity within the Refuge will affect its wilderness character; however, what seems to be ignored is the fact that oil and gas development is of limited duration. Industry's use of the area in the event of a commercial discovery is expected to span 20-50 years. Thereafter, the equipment would be removed and a natural regenerative process would begin to return the wilderness quality to the area.

Texaco agrees that caribou of the Porcupine herd are the most conspicuous biological community on the 1002 coastal plain, but we believe that designation of USF&WS Resource Category 1 for a portion of their widespread calving area in the Jago River area is not justified. The terms "traditional", "core calving area", "unique" and "irreplaceable" are inappropriate in this case. Concentrated calving has been observed in the Jago highlands during only 5 of the past 14 years which indicates that the calving habitat is not fixed at any one location along the calving habitat from Canning River to the Babbage River in Canada. Therefore, all of this area is an acceptable calving habitat and there is nothing traditional about the Jago highlands. It just happens that on the average, the interaction of migration, forage, predators and weather conditions have combined to place some of the herd in that area when their calves were due to be born in 5 out of 14 years of observation.

Texaco supports the USF&WS conclusion that minor to negligible impacts may be expected to other mammalian species, to fish, to fowl and to threatened and endangered species.

STIPULATIONS

Texaco believes the Department of Interior can responsibly manage any oil and gas activities which may be authorized by Congress.

In this regard, with the exception of a few provisions, the proposed environmental protection stipulations appear to be reasonable and in accordance with current oil industry practice in the Arctic. Texaco will more fully address this issue in our written submission later this month.

CONCLUSION

Texaco fully supports the proposed leasing recommendation by the Secretary of the Interior on page 169 which states in part "... the production of oil from North America's largest oil field at Prudhoe Bay has taught us much about how to protect environmental values. Even though 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." It is clear that the nation's best interests are served through the opening of ANWR to energy exploration and development. We trust that Congress will recognize that need and act to authorize leasing within ANWR as presented under Alternative A.

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Thank you.

LRN:12/31/86
sjm:J6/C2

REC3/DW.402
DW.2