T-1628-78

IN THE FEDERAL COURT OF CANADA

(TRIAL DIVISION)

BETWEEN;

THE HAMLET OF BAKER LAKE, et al

Plaintiffs

-and-

THE MINISTER OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT, et al

Defendants

* * *

Held before The Honourable Mr. Justice P. M. Mahoney, at 330 University Avenue, 8th Floor, Toronto, Ontario, May 28th - 31st and June 1st, 1979, inclusive.

* * *

APPEARANCES:

A.E. Golden, Esq., D. Estrin, Esq.,	for the Plaintiffs.
L.P. Chambers, Esq., D.T. Sgayias, Esq.,	for the Minister of Indian Affairs and Northern Development.
W.C. Graham, Q.C. Esq., K.W. Cosman, Esq., (As agent for C.T. Thomson)	for Essex Minerals Company Limited.
W.C. Graham, Q.C., Esq., R.W. Cosman, Esq.,	for Pan Ocean Oil Limited, Cominco Ltd., and Western Mines Ltd.
T.G. Heintzman, Esq., Ms. Marvyn K. Koenigsberg	for Urangesellschaft Canada Ltd. and Noranda Exploration Co. Ltd.

VOLUME X

Thursday, May 31, 1979

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--- upon resuming at 9:30 a.m., May 31, 1979

MR. HEINTZMAN: My Lord, before Mr. Golden continues with the re-examination, I wonder if we can do some housekeeping that arises out of my examination yesterday. I have had Samuel Hearne's diary and, in particular, the two chapters relating to his second trip, which we were concerned with yesterday, photocopied and perhaps that can be an exhibit.

THE COURT: That's fine. That will be I-7. It occurred to me in the middle of the night that maybe that map you were using yesterday did not get marked either.

MR. HEINTZMAN: I would like this map to be marked as I-8, the one that Doctor Harp and I were discussing. It has the archaelogical sites and the journey of Samuel Hearne on it. I ask that that be marked as I-8.

THE COURT: Fine.

EXHIBIT NO. I-7: A Journey from Prince of Wales' Fort in Hudson's Bay to the Northern Ocean: 1769-1770-1771-1772: Chapters II and III by Samuel Hearne.

EXHIBIT NO. I-8: Map: Northwest Territories: Yukon Territory.

--- DOCTOR ELMER HARP, recalled

RE-EXAMINATION

BY MR. GOLDEN:

Q. I was told it had the treeline marked on it. I gather it is not so?

A. There is a very faint dash line. It's almost impossible to see it in places. It's this line down in through here. From here it comes down through here and here it goes. Where does it go from here? I know it follows right out to the coast.

Q. Doctor Harp has been kind enough to help me. It is true, it is very difficult to see. There is a line commencing on the Hudson Bay coast, at the point of the woods on this Exhibit I-8, extending northwestward, and it's actually a series of dashes that are very close together running northward up to North Henik Lake and then meandering into the south again almost near the border of Manitoba and then up to the north just intersecting Ennadai Lake, which is of archaeological significance, and then proceeding again northwesterly and meandering -- it is the only way to describe it-- across to a point just past the western limit of the Thelon but considerably south of it and proceeding north around the shore of Great Slave Lake and then a northwesterly direction, almost to Coppermine, without describing all its meandering in detail. It takes one very close to Coppermine before meandering south to Great Bear Lake.

Doctor Harp, that description of the treeline, may I assume then it is a definitive treeline, that is one that is capable of at least trying to mark on a map?

A. Yes, in various ways, but I think you usually end up making a very subjective

judgment as to where the last tree is.

Q. If one were to look for wood, would one have to go as far as that line, or would there be wood to the north and east of that line as well but perhaps lower and shrubbier?

A. That usually marks the limits of spruce trees. I think general convention in the north spruce trees are trees, but the willow trees are not. I think you are likely to find shrubby willow tree as well as birch and other vegetation north out beyond the final treeline.

Q. My friend Mr. Heintzman, in his cross-examination, referred you to a paper by Doctor Irving, which is found in a book called Science, History and Hudson's Bay, Volume 1. You were asked to look at a portion of that. I should ask you if you would not mind looking at it again with me, but another portion.

Again dealing with trees, Doctor Irving, in his work at page 35 condenses some of his findings into a table, which is actually a diagram, and indicates on that a period of history starting somewhere to the other side of 7000 B.C. and extending to 1960 A.D. in which he shows either with specific evidence, which is a solid line, or dotted lines, which is a tentative kind of finding, that shows the movement of the treeline. That is something I do not think we considered up to now.

First of all, is it a fact that archaeologically that the treeline does not

remain stationary?

A. Yes, it certainly is.

Q. Has it been shown archaeologically?

A. In a few instances I think this has been supported quite adequately by archaeological evidence, but we cannot use that as the final determinate, however.

Q. Now, he has the central Arctic, the Thule marked off somewhere between 1000 A.D. and 1700 A.D. These are very rough lines.

A. Yes.

Q. He shows in the central Arctic one period. That's the entire area you told us. The central Arctic, I gather, includes the Keewatin?

A. Well, when he is speaking of central Arctic he means, I believe, that general portion of Canada, as opposed to the western Arctic-Alaska, eastern Arctic, so forth.

Q. He also shows the southern Keewatin somewhat separately, but the southern Keewatin is where he has done his work, I understand?

A. Yes.

Q. So, it's of special significance to this paper?

A. Yes.

Q. Then he shows-- this is not an important factor for now -- but shows Thule on the

coast only in the southern Keewatin which is his area, but Thule in the central Arctic right up. Then opposite that on the graph showing the movement of the treeline, what does he indicate?

A. Around the period of 1000 A.D., beginning perhaps about 700 A.D. and continuing on to perhaps 1200 A.D. he indicates a retreat southwards of the treeline. Since it's marked with a solid line I assume that's supposed to be pretty well documented. Then at about 1200 A.D. there is a period of stability in which the treeline does not appear to change for several hundred years, whereupon it once more begins a slow advance northward. This again has been documented. So, it returns to the median line about-- what shall we say-- 1900 or thereabouts, and from that point forward no change is indicated.

Q. Thank you. So, dealing with the understanding of phenomenon of the treeline movement and dealing with the sites that have been described-- I'll not go through them all-- the Grant Lake site, Dubawnt area, west end of Aberdeen, is it possible to indicate whether or not the forest was closer at one point than it is now? In other words, has there been movement one way or another in those areas?

A. Yes. Sometimes this can be documented through preservation of wood for some centuries, sometimes in frozen soil. It can be partially documented sometimes through the science of paleethnology or paleethnalysis from soil deposits.

One can always throw in archaeological data, information if this is sufficient-- sought to be sufficiently accurate. The treeline obviously is a very critical factor to prehistorians in this area, because we still tend to use it as a crude separator between the woodland Indian cultures and tundra Inuit cultures. We still think of it in this fashion, even though it is a loose open boundary, as we have seen it.

I might add also, although we always see the thing plotted on a map in terms of a conventional line, that's an almost impossible thing to do. Just for example, I think I mentioned yesterday discovering little relic forests up in the south end of Beverly Lake, inland from the south shore a couple of miles, back up in a hidden sheltered valley, there was a small stem of spruce trees-- the largest went up twenty-five, thirty feet, well beyond the height of this ceiling-- absolutely surrounded by hundreds of miles of open tundra, and yet in there this little micro environment-- sheltered from windshield, and all of that sort of thing-- is a clutter of forest way up beyond where it should have been. I don't know if it's a relic from earlier post-Pleistocene times or whether it's brought about by the floating of driftwood and seeds and cones down the Thelon River which were then tossed up by those beaches and sprouted.

Q. I think you already told us that Beverly Lake has got driftwood on its shores?

A. Yes, much.

Q. Did you mention Aberdeen? I am not sure whether you did.

A. Very little escapes beyond into Aberdeen.

Q. In fact, Doctor Gordon-- I do not want to test your memory on this at this point-- but in his paper deals extensively with the effects of this climatic change, because apparently it had a great impact on his work at Ennadai Lake, which happens to be an area through which the treeline fluctuated periodically?

A. Yes.

Q. Now, you were asked about--

MR. HEINTZMAN: My Lord, I would ask that the page from Doctor Irving's book, which is the chart to which my friend referred, be marked as an exhibit.

THE COURT: That may be the easiest way to make the record explicable.

MR. HEINTZMAN: I will have a photocopy of it made.

THE COURT: Yes.

MR. GOLDEN: I was going to do that. I was just debating-- I don't think it justifies to xerox the entire article. It deals with an area to the south to the area where I am immediately concerned.

MR. HEINTZMAN: With respect, my Lord, I do not want my friend to be giving evidence. The area dealt with is the exact area we

are talking about in this case.

MR. GOLDEN: Doctor Irving's paper is not dealing with the Baker Lake region.

MR. HEINTZMAN: With respect, it is.

THE COURT: If Doctor Irving's article is what we are dealing with it's going to be an issue, we better get the whole argument in. As I understand it, this chart, the reason for referring to it was to demonstrate the movement of the treeline over a period of some eight, nine thousand years.

MR. HEINTZMAN: I think we should put the whole article in, my Lord.

MR. GOLDEN: Yes. My friend has already referred to this article. Perhaps that might be the best way of doing it.

THE COURT: Yes.

MR. GOLDEN: It has matters of value to both of us. I think it has value to us and he thinks it has value to him. I think it should be all in.

THE COURT: Yes.

MR. GOLDEN: If Mr. Heintzman will do that, that's fine.

EXHIBIT NO. I-9: Article: The Barren Grounds by W.N. Irving.

BY MR. GOLDEN:

Q. You were asked about Doctor Clark's paper. Just before we leave the question of the forest, I understand also-- have you

ever seen a paper by Doctor Irving, together with Rissen and Larson, which deals with the topic of radio, carbon and soil evidence of former forests in southern Canadian country?

A. Yes, I have. I don't remember it well, but I have seen it.

Q. We will not deal with it. I do not want to take the time to read it.

You were asked about the paper by Brenda Clark. Certain portions were read to you. May I refer you to the portion-- I will just read one paragraph-- it's at the top of page 125-- just a page before page 126 that was read to you-- I will read the paragraph and ask you if it is a paragraph with which you agree.

A. Yes.

Q.

"On the barren grounds the Thelon River-Baker Lake area seems to have been occupied some time during the modified Thule phase (A.D. 1200 to 1610). It has been suggested that this occupation occurred on a seasonal basis. The people represented the coastal population would have entered the region by way of Chesterfield Inlet and Baker Lake for the fall caribou hunt

and in order to collect wood."

That seems to be adopted. The authority cited for that proposition is one gentleman named Harp, 1961.

A. I accept that totally.

MR. HEINTZMAN: My Lord, I am wondering again, in view of his reference to this article, if the article can be marked as an exhibit. I quoted from several pages and my friend has quoted from another page. I would ask that the document be marked as an exhibit.

MR. GOLDEN: I am having some difficulty-- we are limited in our expert evidence, and these are all the papers of other experts in the field. While Miss Clark's work certainly appeals to me, I think there has to be some limit to using the expert opinions of others. My friend cross-examined-- I am not afraid of it, but I do not want to clutter the record with a lot of other insignificant--

THE COURT: We are into a slightly different situation. Tables are very hard to translate into transcripts. In this case the article, to the extent that it's been referred to, has been read into the record, and the witness has been asked whether he agrees or disagrees with the particular proposition put forward. I do not see any need to have the whole article put in.

BY MR. GOLDEN:

Q. You were asked about the writings of a Bryan Gordon, who did some survey work.

You were referred to an article which is in an orange book such as this, the Mercury Series book.

A. Yes, sir.

Q. May I refer you to another paper written by Doctor Gordon and dealing this time not with a Grant Lake site but dealing with his work on your sites and in areas around your sites.

A. Yes.

Q. I suppose you would be aware of this, that he did visit your sites in 1974?

A. Yes.

Q. In addition, he explored some sites of his own in this area?

A. That's correct.

MR. HEINTZMAN: My Lord, before my friend does this, I am not sure what article my friend is referring to.

MR. GOLDEN: It's entitled 1974 Thule Culture Investigations in Baker Lake, Northwest Territories. It was published in the Annual Report of the Archaeological Institute of nineteen-- it's not written down here-- some time shortly thereafter, '75 or '76. I would be glad to furnish my friend with a copy. We would have had to have a truck to bring out all the papers if we had copies made of all of them.

My friend indicates he has it so perhaps I can go on and read the portion.

For the purpose of the record, again, because I just do not want to file the document

itself, I will read from page 223 of the book, which is about the seventh, eighth page of his paper. He talks about the cultural affiliations to the Baker Lake area. The cultural affiliations must lie upon site distribution and associated tool types. Using Harp's 1961 data it appears that much of the material on the ridge adjoining the settlement, the materials on the southeast end of the Blueberry Hill and the two bluff sites overlooking the Thelon River, which are marked LB, LA, 13 and 14 their affiliation with Thule-Inuit occupation possibly 1200 to 1600 A.D. The use of quartzite percussion as a caribou attractant by Thule people is unfortunately unverified at this time. The 1974 survey revealed the distribution of caribou hunting sites parallel to the western shore of the lake, but absent along the north shore, with entrances open to the northeast and concealing wall to the south, most hunting blinds were oriented towards caribou herds moving north across the Thelon River, at its narrowest constriction where it enters Baker Lake. Undoubtedly the Caribou-Inuit in the early 20th century of Baker Lake-Inuit were aware of the herd movements in this area. Both of these historic groups erected series of blinds, tent rings and caches in conjunction with a conservatively maintained herd migration.

A. I agree.

Q. Now, you were asked about some observations that were made by persons shipping up the coast, the west coast of Hudson's Bay, and they

appeared in Doctor Burch's paper.

A. Yes, I recall.

Q. Miss Clark delivered a paper to the Canadian Archaeological Association in Ottawa in May of 1977. The copies of that paper I understand have been distributed in the ordinary way. Are you familiar with that paper? It has to do with the Thule occupation in western Hudson's Bay.

A. Yes.

Q. May I read to you from page 10 of that paper.

MR. HEINTZMAN: My Lord, I would like to see what this paper is.

THE COURT: Sure.

MR. HEINTZMAN: I have not seen that before.

MR. GOLDEN: I can provide my friends with a copy of this.

It says that although exploration was going on in the west Hudson's Bay area since 1613, there are no references which intimate the first hand account of Thule-Inuit occupation until 1717 (Kenny 1932). This hiatus in the historical record has let anthropologists to propose that there was not a continuous occupation in west Hudson's Bay in Thule's time and, in fact, there were no Inuit in this area from the 15th century to the late 17th century. Then she cites Burch '77, which I think we should read-- I would argue there is a continuous occupation of the west coast Hudson's

Bay area and the lack of documented sources from early historic times to the early 1700's may not be surprising. The early 17th century explorers were very much concerned with finding the northwest passage rather than finding the native inhabitants of the west Hudson's Bay. Coupled with the single-minded intention was the attitude and non-attitude of Europeans at this time to aboriginal people. Renewed interest in non-European people perhaps can best be exemplified by Rousseau's concepts of the noble savage that was more characteristic of the latter part of the 18th century than of the early 17th century and early 18th century. I wonder if this intellectual background would only tend to promote apathy or inattentiveness to the signs of any presence of the native peoples, especially people that they have no reason to have intercourse with in the first place. The early 17th century explorers were searching for a route to the Pacific and did not come to west Hudson's Bay with any intentions of carrying on in native trade. Furthermore, people were camped, for example, back on the Meliadine River, some twenty-three miles from the actual coastline, or at Meliadine Lake that may have been easily missed by the explorers traversing the coastal waters. Even in the latter part of the 17th century, when trading ports were being established around Fort York and Fort Churchill, the Cree and Chipewyan, not the Inuit, were the focus of European attention.

Do you have any comment with

respect to that?

A. No. I think that is a very good statement.

Q. Without going into a lot of detail about it, did Miss Clark do work to establish sites on the Meliadene River and Meliadene Lake?

A. I am a little hazy on the geography around Rankin Inlet, but I believe they are all associated with the Rankin Inlet area.

Q. Yes?

A. If so, yes, because she has done quite extensive work around Rankin.

Q. I don't think I have to hear criticism about the evidence on those sites, somewhat inland. Maybe it's not that far inland, but --

A. They are not on the beach.

MR. HEINTZMAN: My Lord, my friend is giving evidence as to where the sites are located.

THE COURT: No doubt one of the maps will indicate where these are. We are trying to shorten the process.

BY MR. GOLDEN:

Q. The Meliadene River appears just to the north of Rankin Inlet on a bay which is sheltered by an island and runs back northwestward leaking through a series of small channels to a lake, which is a long lake, Meliadene Lake. The river runs three inches-- about twenty-

four miles back, and the lake starts about ten miles back and runs about twenty miles back. I think we can take notice of that.

MR. HEINTZMAN: Well, we cannot take notice of where she did the work and if she was working in the Meliadene River, unless we mark her study as an exhibit.

THE COURT: Doctor Harp told us he knows she worked in the Rankin Inlet area and if she worked in the Rankin Inlet area those places are very near it and probably she must have worked there.

MR. GOLDEN: I don't think the real question was that she worked in the Meliadene Lake or River. I just wanted to establish that. We can look at the map and find it out ourselves. It doesn't matter which end of it, as far as I am concerned.

THE COURT: I don't know if it's particularly important what site she picked as an example to illustrate her theory as to why people say down on the coast had not noticed the natives.

BY MR. GOLDEN:

Q. I don't have a curriculum vitae of Doctor Burch. You must be familiar enough with his work to be able to tell us whether or not he has done any field work in the Baker Lake area, and by that, I mean, the larger Baker Lake area extending down the Kazan River up to Thelon, Aberdeen areas, you worked in, or to the southwest or the sites that

you identified in your evidence in chief?

A. I'm sorry, I can't cite exact details about his research in the last few years. I have followed his career mostly and I know the kind of training he has had and so forth-- but most recently he hasn't-- he's been operating as an independent research man without any direct academic affiliation. He was last associated with the University of Winnipeg, I think. He has been carrying on these researches on his own. I believe he has been into the field in this general area, but he has not completed his field program. I am not aware of his having been back into the country or made any basic penetration.

Now, I might also add that Burch is not an archaeologist. He has had some archaeological training and field experience, enough to acquaint him with the problems of archaeology and the techniques, so on, so forth, but he is more a student of living people, ethnographer-- an ethnologist, and laterally became interested in the historical prophecies of cultural change in these general areas that led him back into this documentary research. So, I cannot say more than that.

Q. Thank you. In dealing with the paper that was presented to you yesterday, it would appear-- I do not want to take you all through it-- portions were read to you of the historical references and portions were read to you dealing with references to the south of Eskimo Point

on the west coast of Hudson's Bay, and some evidence concerning Hearne's journeys, so on, which we now know to be south of our area, and came up towards Dubawnt Lake and then the next trip where he came up the other way. I should like to refer you, however, to a portion of his thesis which deals with the Rankin Inlet area. I do not want to take too much time with this. If I may paraphrase, starting at page 17, after he deals with the southern interior, he then deals with the archaeological evidence in the Hudson's Bay coast. He says that the search for Caribou-Eskimo origins obviously must focus on the Hudson's Bay coast rather than on the interior. That's after he has drawn a number of conclusions about the fact that Hearne did not see anyone in the interior, so on. Because of the geographical limitations of archaeological research in the area, it must be restricted for the present to the region between Cape Fullerton and Rankin Inlet. In terms of cultural sequence, our concern is with the transition from Thule to Caribou-Eskimo. He then reads McCartney of 1971. He says that he summarized his opinion on the Thule historic Eskimo transition as follows. I am just going to read a portion quoted from McCartney by Burch.

A. Yes.

Q. The transition from classic Thule to historic central Eskimo is a consistent one in terms of basic technology and life ways with only minor stylistic alterations occurring

over the four, five hundred year interval. That's A.D. 1200 to sixteen, seventeen hundred. This is due to the fact that no population exodus or replacement took place with the demise of classic Thule culture in much of the central area. Rather, there is population continuity and Thule peoples are the direct ancestors of historic central groups. That is a statement with which I assume you agree?

A. I do agree, yes.

Q. It sounds very much like your evidence yesterday.

Presumably McCartney-- this is back now to Doctor Burch-- presumably McCartney means that the historic Copper-- then he cites authorities-- Eskimo populations specifically all developed out of an earlier Thule base. The most recent workers in the Caribou-Eskimo area are Linnamae and Clark. We now know they worked on the Rankin Inlet area?

A. Yes.

Q. Also they subscribe to this view which, of course, is fully consistent with the Harp hypothesis of Caribou-Eskimo origins. He then deals with the theory in some detail making-- confirming everything found and making a statement, and I am now referring to the last few sentences on page 18. He says that the dates thus appear to offer irrefutable confirmation of the Harp hypothesis of Caribou-Eskimo origins and disproof of the competing Taylor hypothesis. The matter is not quite that simple,

however. Of the sixteen days in the series, twelve, including both the earliest and the latest were acquired in the Rankin Inlet district. That's Linnamae and Clark?

A. Yes.

Q. All of those twelve were obtained in semi sub-terrain houses of the Thule type (Linnamae 1977) and among other things, one would have to conclude from this that the residents of Rankin Inlet were living in such houses as late as circa 1684. However, then a problem arises from the fact that the inhabitants of that area were living in surface houses made from stone, plastered with snow, moss and mud only half a century later. Also of interest is the fact that the remains of such houses, which are found in the Rankin Inlet area, are almost identical to houses found in the Copper Eskimo area. He then continues to read. The analysis is what I was coming to. This is the postulated question. How does one account for the sudden shift to surface stone house structures after nearly half a millennium of semi sub-terrain sod house use?

There are only three possible answers. The first is, that the new type was invented locally and that it rapidly replaced the previous type.

The second possibility is, knowledge of the new type diffused to the Hudson Bay area from somewhere else.

The third is, that knowledge of the new type was brought physically to the area by immigrants from somewhere else.

The first alternative is unlikely since the shift seems to have occurred quite rapidly in otherwise a conservative population. This leaves us with the second and third possibility, but neither the archaeological nor the historical data provide a direct basis for selecting between them. Somewhere else seems to be the Copper Eskimo area in either case, but unfortunately no dates from that shed any light on the matter.

Can you help us by shedding some light in the matter?

A. It raises an interesting problem and I don't think it is one we can resolve here because it's obviously going-- it demands some field work on this problem. If it shifts from semi sub-terrain house to this rock house on the surface is as sudden and drastic as he suggests-- I am not prepared-- I will not accept this out of hand with a lot of further supporting evidence than he gives-- then one would have to look to the outside I think for the diffusion of an idea for the source of this idea. I am not prepared to accept his correlation of these houses in Hudson's Bay with several reported examples of "similar remains in Coronation Gulf". There again, it's an association that has to be supported with careful documentation and field research. I am familiar with houses of this general

nature in the eastern Arctic and I wonder if tentatively one could explain them in such fashion as this. By this time, of course, the Thule people, and their more recent descendants, may have been in touch and more continual touch with Europeans, the explorers, so forth-- men with their ships sail down to Labrador and up into David Strait and then contacted the Baffin Islanders, so forth, peoples in Hudson's Strait. There are many other bands of Inuit before they had ever gotten down into Hudson's Bay. We do know, of course, as the explorers returned again and again and as their explorations were heightened they built shore bases, storage depots, and various kinds of stations all along the coast, including Hudson's Bay. This became focal points at which various native groups began to gather because they were places of employment where new fantastic materials like iron and steel could be obtained, so forth, so on. It is through a heightened meeting of peoples and cultures in a situation as this that we get an increased diffusion of ideas. It's quite an exchange when we get a process of that culturation occurring much more rapidly.

Q. Yes?

A. If I were going to investigate this problem, which I don't think I am, I might follow along that line, at least for a while, and see what can be done with it.

Q. With that hypothesis--

A. In other words, I find it an interesting suggestion but so underdeveloped at the present moment that it's virtually useless in support of his theory.

Q. Is there something in your sites which would indicate surface houses, in the sites you found in the Baker Lake area?

A. Yes, they were all surface houses. I did not find any semi sub-terrain houses. It turned out there were such houses but-- for example, in the Aberdeen site-- these were completely invisible on the surface-- no indication whatsoever. But, when Doctor Wright began his systematic excavation of that site he then found them. They are very shallow, of course and could easily become obscured over centuries of time.

Q. They are not full basements?

A. No.

Q. Dug in a little bit?

A. Yes. Maybe a foot down, a foot and a half below the surface surrounded by a very low ridge. These minor irregularities become obliterated quite soon in the geological process.

Q. Dealing with your sites again in the Baker Lake area, your Thule findings-- I am sure that I am going to ask you to do something that you may resent and I do not want you to be so specific about which houses or which findings were specifically Thule period in relation to the houses

or not-- was there any evidence of surface housing in the Thule period in your findings?

A. Yes. I mentioned specifically the site on Blueberry Hill which is directly behind the present day settlement at Baker Lake. This is the one that Bryan Gordon checked over again and mentioned in that little report that you read from a little while ago. That's the nearest one to the current settlement. There are also Thule remains that were picked up on the southwest end of the lake-- it's just across from the lake, really-- particularly by Nash on the Polar Gas survey. As I recall, a couple of those sites were Thule sites.

Q. So, surface sites don't deny Thule occupation?

A. No. No, they are one of the indications we have to support it. You see, if you are thinking-- you are comparing I believe surface sites with buried sites?

Q. Well--

A. Our sub-terrain--

Q. The same kinds of comparison Doctor Burch used in the Rankin Inlet area where he said he attached significance to the finding of surface sites.

A. Yes.

Q. Then he took the position they had to be as a result of-- eventually took the position that they would result of a mass migration, I believe, later in his paper?

A. Yes.

Q. If you can find Thule sites elsewhere with surface then--

A. No. I think--

MR. HEINTZMAN: My Lord, I want to register another objection as to the way the witness is being examined in reply. Mr. Golden is stating propositions of evidence and it's just not proper when a witness is your own witness, and particularly in re-examination.

MR. GOLDEN: I was caught up in the discussion, my Lord. I don't have to deal with it. I apologize if I did go too far.

THE COURT: I think you went a little further there.

BY MR. GOLDEN:

Q. The last matter I should like to refer to you was a passage read to you from the paper which has been filed with us of Doctor McGhee. I would like to paraphrase the key parts in his findings. He deals with a number of topics in the paper, as you are aware.

A. Yes.

Q. The third last paragraph, which is the one we have all referred to, says:

> "Rather surprisingly, the most simple and primitive of the central Eskimo group, the Caribou-Eskimo to the interior of barren grounds west of

Hudson's Bay..."

-- this is what we are talking about.

A. Yes.

Q.

"... may have been a product of the most recent cultural transformation. Archaeological surveys of the Caribou-Eskimo area have failed to produce evidence of any pre-historic Eskimo occupation (Harp 1961 - Irving 1968)."

Asking you first about yourself, were you able to produce evidence of pre-historic Eskimo occupation in the Baker Lake and other areas?

MR. GRAHAM: I believe that question was answered on examination in chief and very carefully, my Lord. I do not believe by going into it again at this time is proper at all.

THE COURT: I must say I do not remember the answer.

MR. GRAHAM: And I will turn to my notes. My Lord, my recollection is that the witness said there was no such evidence.

MR. GOLDEN: He did no such thing. My friend Mr. Heintzman cross-examined and put this statement to him. The witness--

THE COURT: Rather than discuss it further, the proper thing to do is to put

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the question and get the answer. If there is a conflict-- I don't remember the question and answer, frankly.

BY MR. GOLDEN:

Q. Doctor McGhee says, in effect, by quoting you that after that proposition you did not produce any evidence of pre-historic Eskimo occupation. Is that so?

A. I objected ferriferously to that and said the statement was so bad that it must have been caused by a typographical error. My Lord, in fact, that is what was responsible for that. There is a word or words left out of that statement.

THE COURT: Doctor Harp's original evidence, of course, was that he discovered Thule sites.

MR. GRAHAM: I apologize.

THE COURT: I understand that it's pre-historic.

MR. GRAHAM: I apologize, my Lord. I had not heard the term pre-historic. I apologize to my friend. I thought he was re-directing himself in respect of Doctor Harp's recent fine, which I believe his evidence was clear on.

MR. GOLDEN: I want to get clear on the record. I think Doctor Harp was so astound by the proposition that he did not really answer it in a complete way. I just wanted to make sure the record is clear on it.

THE WITNESS: It is one of

those unfortunate things that happens in publications and hope the right people don't read it or pick it up.

BY MR. GOLDEN:

Q. Did you, in fact, find evidence of pre-historic Eskimo occupation?

A. Yes.

Q. I say this for a reason. This paper may or may not become evidence in this case and I want to make sure we have a clear statement on this.

The next citation is Irving 1968. I think Doctor Irving's work was-- we have a geographic problem because he referred us to the north end of the barrens and south end of the barrens. That's two separate areas.

A. Yes.

Q. Whether Doctor Irving found pre-historic occupation or not, was that in relation to the area that's under discussion here?

A. We have discussed it with relation to Hearne's voyages, discussed the occupation of sequence on the Barren Grounds, noting that Indians appear to have been in there first and that they were followed in quite recent times by Eskimo peoples coming in. But, I did at one point try to differentiate that area from the Thelon drainage country lying to the north of it and the rest of our discussions.

Q. To make it clear, then, the area under discussion, being the Thelon drainage

area, as you put it--

A. I tried-- I hope I established the fact that we did somewhere along the line-- there were different patterns of occupation or different historical sequences of occupation as between that Thelon Lake country and the Barren Grounds that lie farther to the south.

Q. The discussion we are having now I think is obvious to all of us-- I am deliberately simplifying the proposition so we have it clear-- that is, Doctor Irving's work was in an area that was not directly of concern in relation to this?

MR. HEINTZMAN: My Lord, I object to that question.

BY MR. GOLDEN:

Q. Okay. Where was Doctor Irving's work?

A. What I would call the southern portion of the Great Barren Grounds or the southeastern portion, if you wish.

THE COURT: That's what you would call it. What would we call it if we are looking at a map?

THE WITNESS: Most simply I suppose the area between the treeline and verging northward toward the Thelon River. You could establish an artificial boundary around the coast, that sort of thing. It's relatively meaningless. It's this triangular southern portion of the Barren

Grounds lying right here on this map.

THE COURT: All around Churchill, Manitoba?

THE WITNESS: Going that far, yes.

BY MR. GOLDEN:

Q. The witness indicated an area which is bounded to the north by the Yathkyed Lake.

MR. HEINTZMAN: I am sorry, the witness indicated right up to Baker Lake.

BY MR. GOLDEN:

Q. Doctor Harp, would you mind taking your finger, please, and slowly drawing a line as I trace where it goes verbally?

A. Yes.

Q. If a line can be drawn?

A. Yes.

Q. I realize it's difficult. Just try to give us an area where you expected Doctor Irving's work would be of significance in terms of its historic impact, as opposed to the area that you have been working in.

A. I think in general terms we might say that-- let's begin at the treeline in the south, which would put it down here on that line which begins-- which enters Hudson's Bay, approximately at the latitude of Fort Churchill-- the treeline. Then, with the various meanderings, extends northwestward towards the mouth of the

Mackenzie. That, in effect, creates a triangular area in northeastern corner of Canada-- the Hudson's Bay, northeast. Irving's work came into that country. I think some of these places he worked at are actually not shown on this map. They lie a little bit farther south.

Q. This map is Exhibit P-10?

A. May I see this other map?

Q. The witness is referring to I-8.

A. Possibly if we held this up you could see it a little more clearly. Think of this approximate area as the Barren Grounds triangle. Just about in the middle of the eastern coast line roughly we have Chesterfield Inlet, the Thelon River, the chain of lakes back there running quite east and west for several hundred miles. These lines, of course, show Hearne's second early false journey where he wandered up into this country north of Lake Dubawnt--

THE COURT: I think all we want to know is the extent of this man's work in the area.

THE WITNESS: All right. I would say down in through here. We have some of his sites marked on these lakes. There Mr. Heintzman marked them.

BY MR. GOLDEN:

Q. Doctor Irving?

A. Doctor Irving's

investigations, over in through here. These to the east that I pointed at a moment ago are by Doctor Gordon. But right down in here--

Q. Ennadai Lake?

A. It's down close to the sixtieth parallel, close to the southern treeline boundary of the Barren Grounds where we have Irving's sites mentioned. They stand at a considerable distance.

THE COURT: Can you give us a geographical name that would indicate how far north he went?

BY MR. GOLDEN:

Q. The witness indicated Ennadai Lake which is shown on Exhibit I-8.

A. Yes.

Q. I cannot give a--

THE COURT: That's the idea.

BY MR. GOLDEN:

Q. That's really what he wanted. We have to give the sphere of influence of his work.

A. I am not aware of any natural boundaries in there that influences this kind of choice.

MR. GRAHAM: My Lord, I thought your Lordship asked the witness the furthermost northern point of his work. I do not believe he gave the answer, I believe Mr. Golden gave the answer.

THE COURT: Mr. Golden said

it's Ennadai Lake-- is it?

MR. GOLDEN: Yes.

THE COURT: That's about as far north as he went.

THE WITNESS: May I check, please?

THE COURT: Sure. Look at it by all means. We have to have something here so we can understand after you go back to New Hampshire.

THE WITNESS: I don't think from this map that Ennadai is the most northern point by several miles. He seems to have-- operated and discovered a couple of other sites some dozens of miles-- maybe fifty, one hundred miles-- I'm not exactly sure-- farther north on an unnamed lake in a patch of unnamed country.

BY MR. GOLDEN:

Q. Anyway, this paper of '68 deals with I believe Ennadai?

A. Yes.

Q. Among other things?

A. Yes, among other things.

Q. The next piece of evidence that Doctor McGhee gives for his statement is that he says that together with the 18th century Chipewyan occupation of this region documented by the travels of Samuel Hearne of 1958-- I guess that was my travel-- that was a publication date-- he suggests that the Caribou Eskimo culture resulted from a movement of the interior from the Hudson's Bay coast

at some time after the Chipewyan were decimated by smallpox around 1780 A.D. Now, that statement, on the travels of Samuel Hearne, you've already shown us, I think, the most northern point of the Samuel Hearne travel. On Exhibit I-8 that's along there, and you confirm that, that it's running up to the north of an unnamed lake and around west to Dubawnt Lake--

A. As closely as possible after short investigation, yes.

Q. Now, I will not ask you to scale that because it's too difficult to do. What significance would you attach to the findings of Samuel Hearne, that he saw no Eskimo until he got to Coppermine, and that he saw Chipewyan in the region he travelled in, as related to the work you have done?

A. Well, I can only say simply that as of 1771 or two, whenever this particular journey took place, during the summer months he ran into Indian hunters on the Barren Grounds and this doesn't surprise me in the least because this is country that they had been exploiting in similar fashion for centuries of time-- they and their ancestors. I am not surprised. Since we know very little about the prehistoric occupation of that country we know very little about the use of it by Eskimo peoples. So, it's impossible to say anything useful about why or why he did not see Eskimos in the country. We are dealing with a lot of tara incognito in these places, and particularly, as we go back in time.

Q. This statement in the article is a rather generalized statement saying the interior Barren Grounds west of Hudson's Bay, which gives us a geographical problem.

In the area of your concern and, indeed, the area of our concern in this action, are you aware of any writings or findings that put Chipewyan occupation in that area at any time between 1000 A.D. and the present date?

MR. HEINTZMAN: My Lord, I would like to understand what my friend is asking. If he is talking about writers by explorers then I can deal with it. If he is talking about writers such as Gordon, Wright and what not, then that's another matter.

THE COURT: That's one thing. The other thing the word occupation seems to be developing-- and it means different things to different people-- apparently the evidence is that Chipewyans certainly travelled over this land, as did the Inuit.

By occupation, are you speaking in terms of permanent settlement, Mr. Golden? What do you mean by occupation?

MR. GOLDEN: Really what I think I mean is the habitual utilization of the land. We will have some cultural evidence with respect to that. That's basically what I am concerned with. We know they are nomadic people and come and go. The question is, do they come consistently. I don't think

I can agree with my friend when he says there is evidence to that. We have this terrible geographic word the barren. We now know there are all kinds of barrens. We have tried to get delineation as best we can of them and the utilization. What I would like to do with Doctor Harp is ask him-- may I put it this way-- is there any evidence of archaeological significance which indicates habitual use of the barrens area centered on Baker Lake? To use your terminology, the area that is-- perhaps I will leave it. We have the evidence. I do not want to lead the witness and I will get into difficulties that way. Better not. Thank you.

THE COURT: That's fine, Doctor Harp. Thank you very much.

THE WITNESS: My Lord, may I have your permission to say just a word or two-- to add a word or two to my testimony that might enhance the perspective of these problems we have been talking about? Is this out of place?

MR. GOLDEN: I have no objection.

THE COURT: If I knew what you were going to say I might be able to give you some view on it. If there is some matter in your testimony that you feel requires clarification, you feel you might change a mistake, add or have not made yourself as clear as you should have and Mr. Golden, in his re-examination, hasn't brought that out to your satisfaction then I suppose we should hear what

you have to say.

THE WITNESS: Let me feel my way into it and I assume you will stop me if I go too far.

I was thinking about some of my remarks yesterday and the concern that possibly I had left a wrong impression in the minds of some people concerning the limitations of archaeology in the evidence that we have to deal with.

Now, certainly we have to be aware of this all the time. On the other hand, I would like to stress that we are noble people. We do try to do things as best we can and to utilize all the latest approaches to obtain scientific knowledge. Therefore, we do have a potential for a lot of good and substantial contributions to human knowledge. I wanted to make that point.

As you have noticed here, we have run into constant difficulty in distinguishing people and occupations and movements, particularly, with respect to discrete boundary lines. It always comes down to a problem point when somebody asks the question, when did this occur? When did these people stop being here? When did these people come in? It is the matter of boundary line defining the human and social categories that make our problems so severe sometimes. We run into this constantly. They are unavoidable. We have this problem and sometimes we cannot tell, from our limited knowledge, whether these people were ancestral Inuit or whether

they were ancestral Indians. That gets to be a crucial problem often at times.

If I may, I would like to, very briefly, just tell you one little recent experience of mine that I think casts some interesting light on that particular problem. This has to do with a little village of Santa Kilawak, which is the one and only village-- native village out in the Belcher Island. I spent two summers in the island-- '74 and '75-- and got to know some of the local people very well indeed. I saw a good deal of them. I came to learn the country well.

However, the thing that impressed me about this very pleasant little hamlet-- when we first came into it there was in the order of about two hundred and fifty people, mostly native Inuit, including half a dozen white-- but here was a totally westernized community, if I may use that word, and a mere fifty or sixty years ago these people were living virtually untouched traditional way of life. When Robert Flarrity came there back in the early 19's, a prospector for iron ore, he found them in that fashion-- in the Hudson's Bay coast. The current village has been there for the last ten, fifteen years.

Now, you look at these people. It crossed my mind what will an archaeologist find in this around two thousand years from now? I hope I will not be around two thousand years from now. What will be found there? Just the same kinds of

material-- the cultural remains we have been finding in the barren ground sites? We have got a lot of plastic bottles lying around, fragments of T.V. sets, telephones, kitchen knives, spoons, that sort of thing. We would find a total representation of western European-Canadian 20th century material culture, because these people dress like us, use the same tools, weapons, following the same behaviour pattern. They have adopted so much of this kind of culture.

What in the world would we find there to suggest these were Eskimo people? I would contend, just in passing, that we would find virtually nothing to suggest these people were Inuit. This could just as well have been a totally white outpost settlement in the Arctic. We wouldn't know anything about Inuit culture until we happened, by accident, to run across their burial ground, which is on the hill top perhaps a mile to the south, and maybe we would never find the burial ground. But, then, you would have a different kind of evidence possibly that would help to identify these people. There we might be able to read some of the physical characteristics of the Arctic Mongoloids in their skeletal remains.

Now, I hope that's not a totally irrelevant little story. It is simply a modern example of these very severe difficulties that we face in trying to analyse and interpret this meagre information from the past. I hope it's useful in adding to the perspective.

THE COURT: Thank you. I suppose it is fair to say there have been a number of public relations aspects of this case, from a number of points of views, and certainly it's a pitch for the archaeological profession. In the exercise of discipline, it's not out of the order here.

Fine, Doctor Harp. Thank you.

MR. GOLDEN: Mr. Estrin will be examining our next witness.

THE COURT: Rather than start another witness we should take a ten minute recess and not interrupt you afterwards.

--- short recess

---Upon resuming after recess

THE COURT: Mr. Estrin?

MR. ESTRIN: Dr. Geist?

DR. VALERIUS GEIST, CALGARY, ALBERTA: SWORN

EXAMINATION IN CHIEF

THE COURT REGISTRAR: State your full name, address and occupation.

THE WITNESS: My name is Valerius Geist. I am a Professor in the Faculty of Environmental Design at the University of Calgary. I live at 6140 Dalmarnock, Calgary.

THE COURT: You may sit down if you are more comfortable at any time.

THE WITNESS: Thank you.

BY MR. ESTRIN:

Q. Dr. Geist, we have your Affidavit before the Court. Annexed to it is your curriculum vitae. I wonder if we can just refer to your curriculum vitae for a moment because I would like to ask you about certain aspects of your background.

First of all, aside from your occupation as being Professor of Environmental Sciences, I understand you are Associate Dean of the Faculty?

A. Yes, I am.

Q. What is your educational background, particularly, your B.Sc. and Ph.D?

A. I am a student of animal behavior. The scientific discipline is named ethology. It is a science that has come forth in the last thirty years or so. It deals with the study in the field, primarily, of living creatures, of what they do, how they act towards each other, what signalling system, what language they speak, so to say. It entails usually considerably time out in the field in order to make these kinds of observations. These observations are carried out through all seasons of the year, of course, and in the present time it has become even possible to do night time observations. It is a very detailed study of what animals do.

Q. Have you made your study in this area of a particular kind or classification of animals?

A. Yes, I have.

My interest has been the northern ruminant. These are the large mammals that we characterize by the peculiar stomach they have. These include such animals as the ones in contention here, the caribou, also the moose, the elk, white-tail, mule deer, mountain sheep, mountain goats, so on.

Q. You have published

I see rather extensively, and indeed a lot of your curriculum vitae deals with publications. I would just like to ask you about a few of these.

First of all, on the second page, the book by yourself, Mountain Sheep: A Study in Behaviourand Evolution. I see that it has gone to a Japanese edition?

A. Yes, it has been translated into Japanese.

Q. I think you told me some other attention had been paid to this?

A. Yes. I have received two awards for that. I have received one by the Wildlife Society and the International Society of Professional Biologists and also received the Alberta Achievement Award for it as well.

Q. I note further down on that page that you made a report to the Berger Commission entitled Harassment of Large Mammals and Birds. Can you tell us how that came about and what it is?

A. Yes. This report was commissioned by Judge Berger. I was asked at that time to report on the state of the art pretaining to harassment, as well

as to do a critique of the then available publications on harassment brought forward at that time by ArcticGas.

Q. Did your work in this study involve a critiquing of studies involving -- predictions about harassment of caribou?

A. Yes, they did.

Q. I note on the next page you have made a number of films. I would like to ask you about one in 1975 The Heart-rate Acceleration due to the Approach and Capture of Sheep. Can you tell us briefly about that?

A. Well, what we tried to show on that film and did show was the correlation, or lack thereof, between the external behaviour of a domestic sheep, in this case, and the heart-rate, as we were able to record it by means of a radio transmitter that was attached to the animal.

Q. Now, turning over to page six of your curriculum vitae, I would like to draw your attention to one recent publication entitled Behaviour (Chapter 19), a book called Big Game of North America (WildLife Management

Institute). Can you tell us how you came to do that particular chapter?

A. Yes. I was asked -- I was invited by the editors of that book which were trying to produce a book for universities that had programs of wildlife management, as a text book on wildlife management. I was asked also to write a chapter dealing with behaviour of large mammals, in this case, and that's what I had done.

Q. At what audience are the books published by the Wildlife Management Institute directed to?

A. The Wildlife Management Institute books are primarily directed at the professional audience. That is, they are directed at wildlife managers in the field, directed at professors that are teaching at universities, directed at graduate students that are doing research, as well as undergraduates taking wildlife management and interested laymen, of course.

Q. I see that you have two others in press for the Wildlife Management Institute?

A. Yes, I do.

Q. That's further down

that page. One is Adaptive Strategies in the Behaviour of Elk and Behaviour Patterns of Mule Deer. Again, how did you come to write these?

A. Quite simply. I have been working in the last ten years quite a bit with different kinds of deer. I have given talks -- written talks in these matters in various universities across the United States, in particular. I was preparing myself at that time to write a book, which I'm proceeding with, on the behaviour of deer. They asked me to contribute major chapters to these publications. I have complied to that. There are two. They are now present.

Q. What relationship is there, if any, between the caribou and deer?

A. Well, first of all, the caribou is a deer. It is a new world deer. The deer that I've been studying in North America would, of necessity, be a new world deer, particularly the mule deer and whitetailed deer. So, the last ten years I have concerned myself with that very group of animals that the caribou does belong to.

Q. On the last page, page ten of your curriculum vitae, under the heading of Public Service, I see you have listed Member of Panel 10 (Boreal Arctic), Biological Programme. Is that sometimes abbreviated IBP?

A. Yes.

Q. What is the IBP program, or what was it?

A. The International Biological Programme was something Canada committed itself to about 1965. My concern was only with one subcommittee, the subcommittee that was in charge of conservation of Terrestrial Ecosystems. Ten panels were formed at that time, and I became the Co-Chairman of one of these panels, a panel of scientists, that was to look into the possibility of finding areas suitable for ecological reserves and then getting on with the process of getting the ecological reserves established. I remained the Chairman for that panel for some eight years.

Q. What was the goal of the IBP program?

A. The goal of the IBP program was actually two-fold: first, to somehow establish areas that could be used for

scientific research and where scientific research could be done in an ongoing fashion -- for this reason they required representative sites; another and very important goal was to identify those areas that required some form of protection because of the wildlife values, or the plant ecological values or the basic biological values entailed therein. So, we have identified areas that were of some significance in that regard.

Q. I see you have listed Consulting and Professional Activities. Can you tell us briefly about some of your consulting work?

A. Yes. I have consulted for crown corporations, such as BC Hydro. I have consulted for oil companies. I have consulted for mining companies. I have consulted for the City of Calgary.

Q. And the last item you list on your curriculum vitae is Editorial Boards of Scientific Journal. I see you are a member of three. A question that arises out of that: is there a difference between a paper that is published in such a journal with an editorial board and

other kinds of so-called scientific papers?

A. Yes. You may notice that two of these are journals in the proper sense; the other happens to be a film depository which is of no great concern.

In answer to your second question, there is a distinct difference between articles which have been published in journals, that are properly constituted with scientific journals with editorial boards and the refereeing system behind it. The reason for that -- Lord knows we are not perfect as scientists -- we are trying to ensure that by publishing in journals with a refereeing system that we examine, challenge the work that comes forward. So, what goes into the public domain and which is properly and formally identified as the scientific literature is based on the judgment of more than the author involved, but is based on the judgment of the referees, as well as the editors in question. That, by the way, is also true if you publish in books, for instance, in the Academic Press. In fact, they are very, very severely challenged.

Q. As a scientist, do you in a formal sense, use unreviewed papers?

A. Yes and no.

You use unreviewed papers, but if you do that and try to enter in into the form of scientific literature, you do that with the assurance that you've examined very carefully the paper itself, and to the best of your opinion the paper holds. In other words, when you sign something in support, it is done on that basis.

No, because quite a few of the unreferred works are simply internal -- for internal consumption, internal information, and we simply respect the fact often enough that was their purpose and we do not make -- I do not make -- the great use of them, at least in the form of scientific literature -- in my former work, pardon me.

MR. ESTRIN: My Lord, I would ask that Dr. Geist's Affidavit be taken as read.

THE COURT: I have some problem here, Mr. Estrin. We have an Affidavit here sworn in the City of Calgary before a commissioner of the solicitor of the Supreme Court of Ontario. Now, that gives rise to a rather obvious question in my mind as to whether the person

who took the Affidavit had the right to do so from the jurisdiction in which he took it. I am sure there will be no objection to the evidence on that technical ground, but I think we have some repair work to do here.

MR. GRAHAM: I might be able to help Your Lordship. I did have occasion once to research the question as to whether or not commissioners for taking oaths, which I understand the solicitors at the bar in Ontario do so in France, and by researching the Evidence Act and the relevant portions of the Act which authorizes commissioners in Ontario, I was able to ascertain I could do so in France.

THE COURT: For use in the courts in Ontario?

MR. GRAHAM: Yes sir. I don't know whether it would also apply to the federal court.

THE COURT: I think we would in Ontario. I can tell you the law of Alberta is such there is a provision there for commissioners for taking oaths outside of Alberta and that for those within. They are not the same officers or offices.

MR. GRAHAM: He would be entitled to do so?

THE COURT: I hope what we have here is a statement of the evidence which Dr. Geist proposes to give and which was duly served in accordance with Rule 482 and that there will be no technical problems with both, the undated and perhaps questionable in the form of the Affidavit. I am quite prepared, subject to any objections, to take the Affidavit as read. Okay. It will be taken as read.

AFFIDAVIT

I, DOCTOR VALERIUS GEIST, Professor, of Environmental Sciences at the City of Calgary, in the Judicial District of Calgary, in the Province of Alberta, make oath and say as follows:

I am presently employed as a Professor of Environmental Sciences of the Faculty of Environmental Design at the University of Calgary, and have done extensive research and teaching regarding the harassment of large mammals including caribou, and as such I have knowledge of the matters hereinafter deposed to.

Now shown to me and annexed to this my affidavit is a true copy of my

curriculum vitae.

Now shown to me and annexed to this my Affidavit is a true copy of a study by George W. Calef, Elmer A. DeBock and Grant M. Lortie entitled "The Reaction of Barren-Ground Caribou to Aircraft". I have reviewed this study.

I have also reviewed a study by Mr. William Darby entitled Beverly and Kaminuriak Caribou Monitoring and Land Use Controls, 1978.

I believe that the methods used to identify which activities result in harassment to caribou in these and other similar studies are inadequate as being too insensitive. I further believe that any proposed control measures designed to protect the caribou in the Baker Lake area from future harassment by mineral exploration activity and associated aircraft activity are inadequate due to the fact that they are based entirely on faulty methodology.

In designing a proper methodology to detect harassment of caribou and other large mammals it is important to keep in mind that behavioural responses are not always an accurate indicator that harrassment is occurring.

A harassing stimulus is one which is not always readily detectable externally. A harassed animal may respond internally but exhibit no external change. Such internal responses may include raising the tonus of skeletal muscles, increasing metabolism with the concomitant increase in ventilation and heart rate, as well as alteration of the hormonal homeostatic mechanisms that increase the conversion of glycogen, fat and protein into blood sugar and the resorption of electrolytes from the kidneys, plus alteration of other organ functions.

Intense harassment or frequent harassment which imposes a burden on the energy and nutrient supply of the animal can become the so-called "alarm reaction", the first phase of stress. If prolonged it leads to organ damage, reduced viability and early death of the animal.

The barren-ground caribou in the Baker Lake area probably exist on a tenuous energy balance, which if upset could seriously reduce the viability of reproduction in individuals or that of the population as a whole.

Existing information indicates that harassment has many direct and indirect detrimental effects upon both individuals and populations. Specific effects include:

(i) Harassment, by greatly elevating the metabolism of the body, elevates the cost of living to the animal at the expense of its body growth, development and reproduction.

(ii) Harassment can lead to death, illness, or reduced reproduction due to secondary effects of physical exertion and temporary confusion.

(iii) Harassment can lead to avoidance or abandonment of areas in which animals experience harassment, leading to a reduction in the population's range, and ultimately a reduction of the population, due to loss of access to resources, increased predation or

increased cost of existence.

Harassment may be caused by stimuli and situations too inconspicuous or subtle for the uninitiated or anthropomorphic observer to grasp.

Caribou are highly social ungulates with limited reproduction and a biology that tends to conserve youngsters. This factor limits their natural population expansion much more severely than for example, in the case of moose. For this reason populations of caribou will not likely soon recover from the ill effects of a particular type of harassment -- even after that agent of harassment ceases to exist -- the way that a population of another ungulate, such as moose would.

I make this Affidavit for the purpose of Rule 482 under the Federal Court Act and for no other or improper purpose.

CURRICULUM VITAE

Born: 2 February 1938 in Nikolajew, USSR

Citizenship: Canadian - naturalized 1960. Resident in Canada since 1 October 1953. Previous citizenship German -- resident Germany 1943-53.

Education: Senior Matriculation: Central

Collegiate, Regina Saskatchewan, 1957.
B.Sc. Honours Zoology: University of British Columbia, Vancouver, BC, 1960.
Ph.D. Zoology: University of British Columbia, Vancouver, B.C., 1966-67.
Postdoctoral: Max-Planck-Institut für Verhaltens-physiologie, Abteilung Professor Konrad Lorenz, Seewiesen über Starnberg/obb, West Germany, 1967-68.

Employment: University of Calgary, Department of Biology, Visiting Lecturer, January - June 1968.
Assistant Professor, Environmental Sciences Centre (Kananaskis), 1968-71.
Programme Director, Environmental Science, 1971-75 and,
Associate Professor of Environmental Science, 1971-76 and,
Professor of Environmental Science from 1976.
Associate Dean, Faculty of Environmental Design from 1977 -

PUBLICATIONS

Books: 1971. Geist, V., Mountain Sheep: A Study in Behaviour and Evolution, Chicago: University of Chicago

Press, 432 pp, illus.

Japanese edition, Orion Press, Tokyo, 1975.

1974. Geist, V. and Walther, F. (eds), The Behaviour of Ungulates and Its Relation to Management, Morges, Switzerland: International Union for Conservation of Nature and Natural Resources, vols 1 and 2, 940 pp.

1975. Geist, V., Mountain Sheep and Man in the Northern Wilds, New York: Cornell University Press, 270 pp, illus.

1978. Geist, V., Life Strategies, Human Adaptations, Environmental Design, Springer-Verlag, New York, 495 pp, illus.

Thesis: 1966. "On the Behaviour and Evolution of American Mountain Sheep", Ph.D. thesis, University of British Columbia, Vancouver, 251 pp.

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Teaching:

1977-78 EVDS 604, Conceptual Bases of Environmental Design, participant.

EVDS 693.10, Human Biology in Environmental Design.

EVDS 693.19, Canada's Wildlife Ecology and Management in Canada's National Parks, course for park wardens, with S. Herrero.

ZOOL 577, Advanced Mammalogy.

1976-77 EVDS 604, participant and EVDS 693.10.

1975-75 EVDS 601, Human Adaptations.

EVDS 602, Environmental Design Practice, Participant.

1974-75 EVDS 601 (1971 - 1976).

EVDS 693.03, Mammalogy in relation to Environmental Impact Assessment, with S. Herrero (1973-75).

EVDS 711, Environmental Science studio, participant.

EVDS 602 and 693.14, participant.

EVDS 643, Human Behaviour in the Built Environment, participant.

1968-71 Biology courses in Introductory Ecology and Ethology.

Graduate Course in Advanced Mammalogy.

Honours:

1972 Book of the Year Award, The Wildlife Society, in recognition of Mountain Sheep.

1972 Alberta Achievement Award, in recognition of Mountain Sheep.

1979 Achievement Award, Foundation for North American Wild Sheep, February 24, Minneapolis.

Listings:

Contemporary Authors

International Scholars' Directory (1st edition)

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Public Services:

Deer Survival Committee, International Union for Conservation of Nature and Natural Resources.

Commission on Ecology, International Union for Conservation of Nature and Natural Resources; working group on ecological reserves till 1978.

Member of Panel 10 (Boreal Arctic), Canadian Committee for the International Biological Programme - Conservation of Terrestrial Ecosystems.

Identification Consultant to Environment Canada for the Convention on International Trade in Endangered Species, from 1975.

Arctic Land Use Committee, Department of Indian and Northern Affairs.

Consulting and Professional Activities:

Director of Wildlife Heritage Ltd., 6140 Dalmarnock Crescent, Calgary: studies of large mammals in relation to environmental impact of hydroelectric development, mining, roads and gas pipelines. Environmental impact assessment.

Editorial Boards of Scientific Journals, etc.:

Member of the editorial advisory board of the journal Applied Animal Ethology, 1974 on.

Member of the editorial board of the journal Behaviour Ecology and Sociobiology, 1975 on.

Member of the Encyclopedia Cinematographica

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BY MR. ESTRIN:

Q. Dr. Geist, we know that some persons have written on the topic of observable responses of animals to man made stimuli. Is there a unique aspect to the work you have done regarding animal behaviour?

A. I don't know the word unique is appropriate in this case. However, I have been interested, when it comes to the question of harassment, what are the internal responses of the animal to these various stimuli. In other words, what is the effect of harassment, not simply the visual aspects of it. That has been something of interest to me. But, I must state this is nothing unique, because this kind of work has been carried out by physiologists ever since the date of publof and that happens to be only since 1897, unless I am dreadfully mistaken.

One of the great students, not terribly well known today, but nevertheless, quite influential in his days, Dr. Howard Little, of the Animal Behaviour Laboratory, did quite an extensive study on the gist of this

matter. Much of this work today is unfortunately not well known, for various reasons, but here he was one of those people that investigated to great detail what were the responses of the body versus these visible responses of the animal under duress.

Q. Why have you been concerned to do research on other than externally detectible stimuli?

A. For the very simple reason that I, as an animal behaviourist, who has to know, after all, the body of knowledge that extends itself into a large -- broad spectrum of biology itself, and because I was aware that the manifestations that the animal shows externally do not always match with the internal manifestations. When I became aware of the whole problem of animal harassment of wildlife, of wildlife harassment, it was my concern that we would understand what were the affects of this harassment on the animals, what was the affect on the growth, on the development on the animal on its bio-energetics, and ultimately, I would hope, on its demographic -- demography, and that means the number of animals

available in a life at anytime.

Q. You have done research in this area. Have you received support for this research?

A. Yes, I have received support. My support has come, first, from the National Research Council of Canada and lately, it has come from the National Science and Engineering Research Council of Canada, because N.R.C. of course, has ceased to exist. I have received a grant and been continuing -- in fact, I have a group working on that very problem.

Q. Now, in regard to the area you are concerned about, may I ask you if you can tell us whether there are subtle changes, let us say for example, a caribou's movement on the ground -- a subtle movement, perhaps, just a change of part of a foot which -- or even no change at all which accordingly might not be observed but which may, nevertheless, not indicate nothing has happened? It is a rather awkward way of putting it.

A. Yes. Let me put it this way: when you're observing an animal and living with a beast year round and you are in daily contact with it, you are

able to see subtle manifestations that normally escape the untrained eye, and that you are able then to form some judgment to the effect that the animal is quite badly disturbed, let us say, or less disturbed. Yes, you can do that.

Nevertheless, even that -- and we know that now from work we have carried out with wild creatures -- that this is not sufficient. The actual energy expenditures, as indicated for instance by heart rate, can be quite, quite high and, yet, there is no external manifestations.

In short, the animal -- to give you just a few examples out of that -- for instance, one minute of running will cause some fifty minutes of recovery. That means that the animal after one minute of running may be standing, may even be resting, but its metabolism remains high for some fifty minutes thereafter. If we go and handle the animal, if we go and do -- in other words, go and do a greater insult to the animal than simply a bit of chasing then the recovery period may last much longer than that.

We have one recovery

period, for instance, on an animal that lasted something like six hours. We do know also from other work carried out on animals that have been captured, tagged and marked and followed thereafter to see what's happened with them, we know from that work that -- this goes right under the name capture-myopathy, incidentally -- a good number of animals continue to die as a consequence of that activity some five, six, seven, eight days later.

Q. Could you spell myopathy?

A. It is spelled -- I am a terribly bad speller, pardon me, My Lord, in English. I am a German. It is said those who have a native tongue count in it and spell in it, and that's true for me. Capture-myopathy has been defined -- could I follow your request a little bit later?

THE COURT: Perhaps you can fix this up over the lunch hour.

BY MR. ESTRIN:

Q. Yes. Now, what you have told us about these recovery periods, are these things that have been suggested or are these things that you have had the opportunity to document in your

actual research?

A. These are things that I have documented in the field. I, unfortunately, was not able to append to my Affidavit work that was pertinent, because at that time we had a manuscript in front of an editorial board and, in fact, it has subsequently been accepted. I have a copy of it here. I am perfectly willing to let the court have that copy, if that's its wish.

Q. Now, the work that you have done, is it applicable or inapplicable to the barren-ground caribou?

A. It is, in my opinion, perfectly applicable to the barren-ground caribou. Yes, sir.

Q. Why?

A. It is applicable because we are dealing here with a large mammal. Those of us who have worked as physiologists, as behaviourists, with large mammals and have had reason to delve into those matters do know that many of the physiological parameters or learning parameters are quite generalizable. In short, when we are doing some work that we call, for instance, "stress on a rat",

it's simply not applicable to rats. It goes much beyond that.

In short, this is a body of knowledge, a body of fact and a body of theory done over many years of work today that is quite applicable to this. It is from this body of knowledge that we can make the generalization that if harassing stimuli do impinge on caribou that, very likely, they will have much the same affects as we've observed in other animals.

If you go, for instance -- this is actually work done in Alberta -- if you go and chase these animals, trap and rough handle them and you go and examine them then you expect to find evidence of capture-myopathy, which means a certain degeneration that have taken place, which could previously have, in fact, been first identified and examined on African antelope -- in fact, the blue bull, if I'm not mistaken, in South Africa.

Q. Yes.

A. In short, we expect that, and we do find it.

Q. In the field work that you've done, I take it has been done on the category of large mammals?

A. Oh yes, it has been done on a category of large mammals. The work that I've been referring to has been done with mountain sheep. We have instrumented these animals and we have obtained data from them, that I've previously eluded to.

Q. Now, I would like to refer you to paragraph 12 of your Affidavit. I would like to ask you to explain or give us a bit more information about the statements made in paragraph 12.

First of all, about caribou being highly social ungulates, and stopping there for a moment.

A. Yes, sir. The highly social ungulates, its an informal name that's applied to large herbivorous animals -- the caribou belong to that group. It's an informal name.

Now, when we speak of highly social we mean that these animals show more than the manifestation of gregariousness. It does not only run in groups for a different purpose, but that the whole biology is structured about the fact that they do live together. They communicate in a certain way, and their biology is, by and large, to maintain that cohesion.

I place that into -- to me this is a significant statement. It is significant because it deals with such things as the ability of young animals to learn from older animals, to pick up the habits of home ranges that they have.

In short, this is an animal where I expect -- in fact, we have some experimental on that effect -- that they will pick up home range knowledge that's imparted to them by third party, and, normally, another caribou, and will maintain that.

Q. You go on to say that they have limited reproductions and biology that tends to conserve youngsters?

A. Yes. There is no dispute, as far as I know, about the fact they have a limited reproduction. Limited, of course, by comparison with other deer.

Now, if you take a moose, for instance -- the whitetailed or mule deer -- twinning is quite frequent. In moose, even triplets are not at all uncommon.

The caribou, on the other hand, does have one young. It's born

relatively large, relatively well developed. There is, therefore, in that case, itself, a limitation on the number of young that can be produced by caribou vis-a-vis other deer.

When I speak about the population or that the animals literally conserve the youngsters, I was trying to bring out a point in opposition to the biology of the animal, such as the moose or whitetail, mule deer, in which the youngsters are thrown out by the mother, in essence, which go out and roam, and establish their own home ranges.

Now, in the caribou, we tend to have phenomenal youngsters that are, by and large, in groups and remain in groups quite analogous to what I have found and published about mountain sheep.

Q. Now, do the barren-ground caribou have any special relationship to the biota of the tundra? By biota I mean plant life.

A. Well, the caribou Barren-Grounds -- not Barren-Ground, the caribou as a whole, the genus Rangifer, roughly appears in the Pleistocene, together with the whole biota that we call the tundra biota, and it's an animal that's able to make

use of the tundra and taiga and, of course, in the mountain regions, the alpine and subalpine regions, in a manner, of course, quite unique. It is a great journalist when it comes to food habits. It eats a variety of things that are poisonous to livestock. You could not take caribou out and put in our sheep or cattle into the same place. It just doesn't work. They are able to exploit the Barren Grounds in a very particular fashion that makes caribou, of course, quite useful therefore to human beings. We could not duplicate with our domestic stock anything that the caribou does pleasant.

Q. What do we know about caribou to explain why they return to certain calving grounds habitually and regularly use certain areas for their travels?

A. Well, I don't think that we do know the precise reasons why caribou tend to return to the same regions by and large -- because even there are some uncertainties by their return -- by and large to the same regions to calve. Simply, if you have, however, some familiarity with the behaviour of ungulates, if you are

familiar, that is, with the literature involved, then, you are familiar with a variety of customs of people that deal with ungulates. The only thing I can say is that they may be returning there because the female tends to return repeatedly to the place where she gives birth for the first time. You can read this -- make use of this fact to tie camels, for instance, down to a given area. If they want to buy a female they might buy it before it gives birth because they can make sure it will give birth in a given locality and thereafter it will return to that same locality again.

Q. Turning to paragraph nine of your Affidavit, you say, "The barren-ground caribou in the Baker Lake probably exist on a tenuous energy balance, which if upset could seriously reduce the viability of reproduction in individuals or that of the population as a whole."

Can you, please, tell us what the concept of energy balance is?

A. I see. The concept of energy balance is much the same as a budgetary balance. The concept is similiar in this case. It is a balance between the intake and expenditures.

Now, you can go and take a look at a piece of range, and you can calculate, using various measurements, the amount of energy, nutrients that it contains.

On the other hand, you cannot just take that and predict what is going to be the growth response of animals eating, because at the other end of the equation is the expenditure that the animal incurs in making use of a particular use of habitat -- in this case, of our range.

So, when we are talking about energy balance, we are talking really about the intake versus the expenditures involved. When we speak that they are -- when you say that they are living on rather tenuous energy balance, then, we probably -- in this case, of course, we do have -- there is some evidence that indicates that the animals are struggling, that they are not doing as well as they could be doing. In order to find out whether this is the case, you have to perform an experiment, and the experiment is that you take animals, in this case the caribou from the Baker Lake region, and subject them to the nutritional

regime that is superior to that they have experienced, so that you manipulate the energy balance. The end result of that is -- I am referring here to work done by the Canadian Wildlife Service by Dr. Ian MacEwen at the University of British Columbia who did one of those -- one of the few people who works in the whole area of animal science -- they did, in fact, manipulate the energy balance of caribou with the quite expected result that the caribou, in captivity at that time, on a different energy balance, of course, grew into much larger creatures -- they grew much quicker to their ultimate full size and even at the ultimate size they were much, much heavier, much larger than the caribou from the parent population which, in this case, had been caribou but somewhere from Baker Lake.

As I said, that's only one indication, because there are a whole other series that you can take into account, such things as, the reproductive rate of the population on a tenuous energy balance is likely to be low, the net survival of these youngsters is likely to be low -- there is another prediction, which has not

been verified, the pathologies in the body of those animals which is likely to be high. We also know, because I have investigated this on mountain sheep, that the behaviour changes -- it's much more sensitive if they are at the low quality spectrum rather than high quality spectrum. The low quality spectrum being when the animals are under somewhat of a tenuous energy and nutrition budget.

Q. For a herd that will be under some strain because of tenuous energy budget or balance, would harassment be more or less critical than for a herd that was in better shape?

A. I would think it would be more critical, for the very simple reason that already the animals are -- they are already misers at that stage, and their body -- their growth and development and body shape itself begins to show that. They are miserly with energy. If you can impose an additional burden, impose an additional expenditure on their lives then you would expect that it's going to do them less good.

Q. Can you give us

some examples of what additional burdens that might cause this?

A. Well, I do believe that one of the matters to be considered here is whether, in fact, harassment by means of aircraft, be it purposeful or incidental, is one of those agents. I will identify it as one of those agents, yes.

Q. Perhaps there are less -- more subtle things that -- can you give us any examples of -- I think you used the word deflection from a path?

MR. GRAHAM: No he didn't.

THE COURT: There is a limit to the amount of leading you ought to do here, Mr. Estrin.

BY MR. ESTRIN:

Q. I don't know what deflection is?

THE COURT: Neither do I.

BY MR. ESTRIN:

Q. I wasn't really trying to lead in that sense. I was asking the witness to put his mind to that question and tell us if there are other forms -- other

examples of something that affect the energy balance?

A. If you ask me what can affect energy balance, then I can say there are many things that do, of course. It may be excessive number of carnivores in the area, which make a large number of contacts with the animals. That you would expect to lead to greater energy expenditures. You expect greater energy -- you mentioned the word deflection -- if they are forced to move, for one reason or another, over an additional amount of land, additional distance in order to reach their destination, that will cause increased energy expenditures. If you have unseasonal weather, that can increase energy expenditures. If you have illnesses sweeping through the population, that will definitely increase energy expenditure -- to quite a level, as a matter of fact.

Q. What evidence is there as to the herds that use the Baker Lake area, as to whether or not they are under a tenuous energy balance?

A. Well, I already indicated to you just earlier in my testimony that it's by an accident of history that

animals from the Baker Lake area have been used by scientists to investigate the growth and development of barren-ground caribou, down at the University of British Columbia in the animal science unit.

Q. Now, I would like to turn more specifically then to the topic of harassment. I would like you to direct your mind to the types of effects that harassment can have?

A. The kinds of effects. To begin with, what is harassment itself? What is the first consequence of harassment?

The first consequence of harassment is the animal prepares itself for exertion. If it does so, it gets the body ready and tuned to do almost violent movements. In the process of that, it, of course, elevates its total metabolism -- that is the first one I am making in my Affidavit. In other words, it elevates greatly the metabolism of the body. That means if harassment is occurring often enough that it does detract from the net energy, nutrients available for growth and development. It does not have the energy readily available to produce milk for the

young, to stick that energy into the fetus -- it does not have energy to put into its bones, muscle, fat reserve, so on, and, therfore, it does not grow as large.

In short, the first consequence of harassment is that it detracts from growth, development and reproduction of the beast.

Q. Could you go on to tell us about other effects?

A. Well, I have written on this subject reasonably voluminously. If you will pardon me, I will refresh my memory. I will turn to my report that I wrote for the Berger committee on this point.

I have given you in short, a short and capsuled form of what it does. That is really the essence of it.

The rest is simply an elaboration of it, as well as the supporting evidence, as it has come from various authorities that work with diversity of ungulates, including incidentally, the caribou.

Q. You have told us about physical effects on reproduction.

A. Yes.

Q. Can you tell us

about other effects of harassment, in terms of effects, if any, in regard to avoiding or abandoning certain areas?

A. Oh! I misunderstood you. I thought you asked me to elaborate on that first point.

Q. Yes. I wanted you to go on and talk about if there were others.

A. Yes. I understand what you are trying to drive at.

The other effects are that harassment can, in short term, if intensive enough, lead to the death of the animals -- and I spoke about capture-myopathy just a short time ago -- it has to be pretty intense harassment to do that.

It can be more subtle, however. It can lead to illness. This is something that the Russians have emphasized again, again, and again, that when you are dealing with a reindeer, in this case, that if you have responsibility over these animals, you must be cautious, careful, because these animals are sensitive. They are sensitive enough that if you impose too much of your authority on them that they do show it by becoming ill --

necrobiosis -- a kind of foot rot which they claim will break up under types of stress. In fact, how sensitive these animals are is manifested in the fact that a trained observer can identify which group of ungulate, in this case -- not only caribou, but sheep or camels -- have been for as long as a week under human care, or whether that group temporarily has escaped from human care, because those animals that have escaped from human care look significantly healthier -- are in better physical condition than those which are under human care.

My point here is, that these animals are very sensitive indeed. I am only too well aware, as a scientist that deals with animal behaviour, that our occidental culture has by and large, in the variety of philosophies, denied this to animals, although asserted it for ourselves.

So, illness then reduced reproduction are some of the secondary effects of the exertion. As I said, that has to be reasonably severe.

The more insidious effects are the frequent low level harassment that quickly elevates the metabolism of the animals and keep it there.

Q. You mention in your Affidavit at paragraph ten -- I think you may have a note on that?

A. Yes.

Q. It's on page four.

A. Yes.

Q. You've said in the item that is bracketed with roman numeral three that "Harassment can lead to avoidance or abandonment of areas in which animals experience harassment, leading to a reduction in the population's range, and ultimately a reduction of the population, due to the loss of access to resources, increased predation or increased cost of existence."

A. Yes. This is based on work carried out and which harassment has been used purposefully as a tool in order to alienate animals from given areas. I am referring here specifically to the work of Dr. Bachulor. You may be aware that the red deer have been introduced to New Zealand. They have been having an enormous problem in the forest areas. Their harassment was used with purpose in order to alienate animals permanently from their home ranges. They succeeded.

They succeeded to the effect the population, that they put into a secondary habitat crash after a few years -- the very appearance of the animals changed. They went into, what I call, the low quality spectrum. They became the smallish type of animals with a low reproductive rate. Significantly, they did not return again, within the period of study, to the home ranges that they had been aliented from.

Incidentally, there are unpublished accounts, anecdote account -- accounts I get from my colleagues working in the United States, primarily, with the affects of human encroachment on wild life, particularly, of course, the mountain sheep. We do know by now -- although it is not that well documented, and not scientific but for political reasons -- that the human encroachment has, in a good many instances, led to the abandonment -- not just to the abandonment of areas -- but to severe reductions of population of the animals affected.

Q. If an animal because of harassment changes its range, can there be secondary consequences of this abandonment?

A. I would think so. First of all, the question comes to one's mind where does the animal go after it has been aliented from a piece of land. Will it go into an area in which there is an adequate amount of forage or will it not? Are there more predators or fewer? In other words, you can preceive that secondary effects could occur.

As I said, the number of instances of actual range abandonment are relatively few, that we know of, and the documentation is relatively espoused. We do know, for example, a whole caribou herd was deflected by the pipeline in Siberia. It has maintained itself -- everyone involved has congratulated themselves on what a fortunate example it has been. However, it need not be very fortunate in other cases.

Q. What about this issue as to whether or not there can be effects of harassment after the particular stimulus has finished?

A. Well, I gave you one example earlier on, a particular stimulus may have caused, as has been our example, an animal to run. The effects of

that, they carry on for quite some time. I gave you some figures that the effects may take hours to wear off. In fact, there is in the bio-energetics literature a statement that any exertion on a given day will take several days to make good. It is one of his critique to bring out a rather technical point -- work of a famous biogenetic. This is by not taking into account the after costs that are incurred. That you find in two famous textbooks of animal bio-energetics.

Q. Now, is there any evidence to suggest if animals leave their range because of harassment it is going to be more or less -- more serious or less serious with regard to a population that is a smaller relic kind of population than the main herd itself -- was at its ultimate strength?

A. Well, I can only speculate in this case.

Q. That's fine.

MR. GRAHAM: No.

MR. ESTRIN: If there is nothing that comes to mind. We do not want you to speculate.

Q. Now, have you

had occasion to categorize causes of harassment?

A. Yes, I have categorized harassment as they were available to me from, to some extent, personal experiences, and to some extent in the literature. I have not been able to go and give a category, for instance, based on the industrial activities, because I am not that familiar with some of the industrial activities that may or may not be of concern.

However, we have had, in actual field work or from the reports of colleagues and from the published literature -- we do know that the sort of things that may upset animals can be quite counter-intuitive. They may be very, very slight stimuli to our ears, to our senses and may be indeed rather great to caribou. To give you one example that's almost a famous example by now, that pertains to reindeer. That is the humming -- little humming of a wire through which electricity is passing on the telephone pole stops the animals cold. The other example -- and this is particularly based on Dr. Brian Thompson of Edinborough -- he studied in Norway to quite an extent --

the loud noises were frequently of very little consequence to the animals. However, the slight noises -- noises that can be associated with stalking, predation, noises which have -- with predation particularly -- would, in fact, startle the animals although they were quite slight or slight as the noise of the clicking of the camera -- that will get them going. I have seen moose panic at the sound of my snow shoes. They were at that time in fact quite some distance away. You would not think that at a distance of a mile, a mile and a half that snow shoes could be that odd, but they are and can be startled. At the same time, I have seen moose, for instance, lie within one hundred yards of two men working with power saws, cutting trails. I was there -- I observed the men repeatedly -- because I was at that time observing animals -- the moose were lying in meadows beside them, without any great upset.

What I am trying to bring out is that not all the things that we say a priori ought to stop animals and in fact do. What we have to do, in this case, is investigate this. We have to put

some serious efforts into understanding what are the stimuli that actually do startle, that do cause harassment. Some we know; others I am quite sure we still don't.

Q. Let me put this to you: the Inuit in the Baker Lake area have complained about stakes with coloured flags or tags attached as being something that deters the caribou or makes them skiddish or keeps them from that area. On the basis of your study and knowledge, what can you say about the validity of this?

A. I have a suspicion they are completely correct on that.

Q. Why is that?

A. For the very simple reason, first of all, you have introduced something is quite alien into the Barren Ground, something that is outside the range of experience of the animal. Secondly, if you put some stakes, are there some fluttering entities attached to it?

Q. That's what I see.

THE COURT: That's evidence.

MR. ESTRIN: I'm sorry, My Lord.

THE COURT: I'm very clear on that point. It surprised me when it came up. There is absolutely no evidence or anything attached to --

MR. ESTRIN: My Lord, I'm sorry. I should put it as a hypothetical because it will be something that will be read in as an admission.

THE COURT: I see.

THE WITNESS: If there are any ribbons attached to that which, of course, flutter in the breeze, which give off very specific sounds at the same time, then I would expect these animals to shy away -- to stay away from them. This method, that is using fluttering ribbons has been used since probably time immemorial -- since recorded history of hunting -- as means of deflecting the movement of animals.

We do know from the works of such students as Bufskin (?) -- who studied reindeer in Russia is quite, quite extensively an animal behaviourist -- that even such things as a stone that contrasts very much with surrounding countryside, thrown into the path of the caribou and left may cause these animals

to come up abruptly and shy away.

In short, there are such things as strange entities that they hit upon which should alarm them, and there is a large body of psychological research that deals with that. In fact, it's called the discrepancy principle.

BY MR. ESTRIN:

Q. Can you give us any other examples of that, please, that might be useful?

A. Well, as I said, I am speaking right now about a principle per se. I'll probably be able to find some additional ones if I put my mind to it. I cannot think of any at the present time.

Q. Now, what difference, if any, does the sex of a caribou make in terms of the reaction it may have or not have to a given stimuli?

A. Well, the sex of the animal per se is not the factor, but if it's a female with a calf, that is that a particular period of the year then, yes, there is a difference between-- in the response of these animals. In fact, some of the best evidence on this has only recently come to light in the form of a thesis from the University of Alaska in which the investigator studied the activity of caribou in the Prudho Bay area and their responses were very clear indeed.

On one hand, the males were less sensitive to the stimuli that were coming from that area. The male caribou for that reason did go on the road. They did make use of the road allowances where vegetation was greening up. The males did habituate as a consequence to some of the activity.

However, the females did not. They remained skittish. They remained away from human activity, in fact, they abandoned the area where they previously habituated-- that is to today being made use of the extraction of oil in this area. We also know, of course, from the work of a good many biologists that have studied caribou from aircraft that there are times of the year when the female, with her calves, is much more susceptible to stimuli. We do know, in fact, these caribou respond quite differently to stimuli-- not differently, but with

different levels of intensity. One of the periods in which they are particularly skittish is when females happen to have small calves at heel.

Q. Can you tell us the reason as to why they are more sensitive at these times or in these conditions?

A. The only thing we can state-- and this comes out if you study the antipredant strategy of these beasts -- is that the females act as their primary concern the safety of the calf.

The male acts as if its primary concern was to grow as large a body and as large amount of fat as possible because he does have a very strenuous activity and he does begin to disregard the dangers that come his way. We also verified this recently on the Ph.D. studies-- the same thing, segregation of sexes on the basis of their competence.

Q. What can you tell us about the place-- if harassment occurs in one kind of condition say on the barren grounds as opposed to another-- near water, close to water-- would that make any difference?

A. I have no personal experience with barren-ground caribou in this area. I do understand, on the basis of published work, in fact, that there is a difference, yes. Apparently caribou are quite a bit-- more skittish, if I may use that term, in the vicinity of crossing sites. In

fact, in the paper that was attached to my affidavit, the Study by Calef and DeBock-- they made a point of investigating the reaction of caribou in the vicinity of the crossing sites. You can see that the level of responsiveness to a rising stimuli is higher at that time point.

If I may state the following, sir: if you have observed animals, as I have, long enough, and if you followed their history as individuals-- for instance, when my mountain sheep are about to cross a valley-- it is a situation analogous to caribou-- they hang around for two, three days before the decision falls. During this time-- during the period before the migration they do act differently than they normally do. They are more excitable. They show these very features. They tend to interact with each other. They clash much more at that time, until the decision falls. Then they boom across.

Q. What can you tell us about whether caribou in large herds may react differently to stimuli than if they are in smaller groups or single animals?

A. Well, again, there is literature in the field. It simply says that in larger groups the animals tend to be somewhat less responsive than if they are in smaller groups. That is all I can say at the present time. The caribou I have been familiar with did not occur in the largest groups. They did occur in groups of something

like twenty, thirty and so on, which does not really--- does not come close to the size of barren-ground caribou populations.

Q. Now, are there certain major stimuli which caribou have been concluded to adapt to by their evolutionary process?

A. Well, sir, it is a fact that has been demonstrated repeatedly on various large mammals, that they tend to learn very, very well. This is more so a fact with the large social animals than it is with some of the solitary forms, be it in the north or in the south. We do know, for instance, mule deer habituate very readily and very quickly to people. I am not going to go in detail of why this is an advantage to the beast, but all I can say is that there are others which do not do this, like the whitetailed deer. He does not habituate very well. You can have whitetail and mule deer in the same area. I can, in a very short time, take the mule deer. But, it's the only very exception-- very exceptional, indeed, that I can do the same with the whitetail deer.

In short, there are genetic differences in the ability of the animals to learn, to habituate, to adjust themselves to the human situation. Yes, there is evidence that caribou have become habituated to human activities. The Prudho Bay example is one. It is the bull that led one part of the population-- one sex. The other sex did not follow suit at all.

Q. What about if I asked you about the evolutionary reaction to natural stimuli such as wolves. Is there any evidence through evolutionary process that they have become reactive in a certain way to wolves or activity resembling wolves?

A. Yes. This is the view that's debated amongst caribou biologists. It is held by some very prominent persons in that realm. It is a priori consideration, having worked with them. I would say it's valid.

In short, what we expect is that certain stimuli which mimic the approach of certain stimuli that have an affinity to the natural dangers of their environment who will be responded to and not be readily ignored. I suppose you could-- if you put in a tremendous amount of work in it-- teach an animal not to escape. I suppose it's possible. But, it will take almost certainly an inordinate amount of time to do so. In other words, this is in the area of the hypothetical rather than the area of practical-- the realisable one.

Q. If I can ask you following that up, what relationship, if any, would a low flying plane or helicopter moving towards caribou have to do with the stimuli that's represented by wolves.

A. There would be, I would think, a rather general similarity in the sense that there is a large object flying parallel-- moving

parallel-- to the ground and approaching at a considerable speed. There would be that similarity. The evidence does indicate that the animals are not particularly happy with it.

Q. Now, are there certain categories of stimuli which animals will never really get used to, based on your work and your experience? I am thinking not in terms of a specific activity such as a low flying aircraft, but certain kinds of movements in general or certain kinds of regular or irregular activities.

A. Well, the first category of stimuli that animals in general do not get used to are those which have an inordinate stimulus contrast built into them. That is, if something is in their vicinity and liberates a large amount of energy or seems to liberate a large amount, by and large that type of stimulus is upsetting and yet-- yet there is something else involved in here that makes the fact the study of learning in animals such a frustrating thing-- that is that some stimuli which fall way outside the normal experience of the animal tend to be ignored. I gave you an example of the power saw buzzing away. I have seen it myself. I have built cabins in the bush and mountain sheep were standing by six hundred yards away. They ignored that sound. We do know that loud noises generated, which are of a peculiar industrial human type doesn't seem to upset them to any great extent. At the same time, on the basis of this discrepancy

principle that I was talking about, the small deviations from the norm-- subtle deviations from what the animal encounters normally in its every day routine can have a much more upsetting effect on them. As I said, that is the principle involved. I will give you some examples from my own work. For example, a dust devil-- that is some wind whirling across a mountain side-- it is not a common activity but it's a natural activity. I have seen it cause panic in mountain sheep. That is the only way it can be described-- panic. The animals were fleeing, and for the rest of the day staying in cliff terrain. There is one natural but rare event that is taking place. As I said, the buzzing of the power saw did not upset them. But, this, quite natural event, in fact, did.

As far as categories of stimuli are concerned, what you have to do-- and this has not been done-- certainly not done with caribou in any systematic fashion that I know of-- is to go out and have investigations in nature and a documentation by people trained to observe. That is an important part. You have to be trained to observe. That is the first thing I teach my graduate students when they come to me to take their doctorate or their masters. I teach them to see. When that has been done then we are in a better position to say what, in fact, caribou or mountain sheep, for that matter, respond to primarily.

Q. Well, can you tell us on

the same area whether the predictability of a certain occurrence has got anything to do with the reaction that a given animal or group of animals may have? In other words, if something is unpredictable, have you seen any relationship to the reaction?

A. Yes. If you have a stimulus that is predictable in a sense-- may I give you an example that most of you are familiar with?

Q. Yes.

A. You go to one of our national parks and you will see in the national parks along the highway various wildlife standing-- the mule deer, elk, mountain sheep. These animals have learned that this noisy, stinking, vibrating entity that we call a truck rushing past them is of no concern to them. They have learned to an extent it's ridiculous. One of the examples that I gave you is that I brought back an example to illustrate to Judge Berger and the panel-- it was an animal that was killed-- what he did is he would stop cars that had passengers in them, would veer off ninety degrees when a truck came along. I have seen trucks passed literally within inches of the outside hall and simply tilted his head away. What happened is his horn grew a little bit too long and he was-- the truck caught the horn and half of his head was carried off. The point is, if you have a predictable stimulus that occurs all the time at a given place and the animal is free to move around and about and investigate, it is very likely to ignore it after a

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while, particularly, if that stimulus is not associated with something harmful. Let us say you have some sort of drilling rig standing here. From my professional judgment, I would not think that the noise emanating from that rig would have any great effect on the animals coming close to it. But, if there are human beings, which are curious -- I think most human beings are curious -- and do take a camera out and want to get some caribou pictures, that very, very soon, the animals will learn to associate the sound of the rig with pursual by perfectly innocent humans that want to take a picture, for instance.

Now, there is nothing that upsets an animal more than to have something that they have very little experience with, and react in a way that mimics a natural predator. You can scare the daylights out of mountain sheep if you, for instance, being to stalk them. In most of my own work, in order to overcome this, I have always acted in the opposite way; making noises, acting more like moose going through the countryside rather than a human being. You have to be familiar with that, otherwise you spook the animals far too much. So, if you have association between sounds, industrial activities and some category of activities that is pursual, in any way, shape or form, there should be a negative association there and the animal should be all right.

Q. The animals begin to --

A. To avoid it.

Q. I don't know if you really finished telling us what is the consequence if the stimuli is unpredictable.

A. Well, if the stimulus is unpredictable you then have the first upset. In short, the first thing that the animal does, of course, is investigate what this new stimulus is. Therefore, the observations of mountain sheep or caribou, for that matter, that are naive, that have not seen human beings walking into a camp-- I have seen it once where they walk in, investigate and they leave. But, if you have a stimulus that has-- some activity that is unpredictable, -- that can move back and forth, that can follow them at times-- if you have this unpredictability then you get upset and the upset of the animal is the first step towards the stress syndrome. This is the whole attention-- what the physiologists associate with tension, the increase in heart beat, increase in blood sugar, so on, so forth-- the increase in muscle tone, the increase in the energy metabolism. We have, for instance, mountain sheep that are recently habituated to human beings. We can measure the heart rate associated with that association. We can show you it does increase their heart rate. Since it is at the low rate-- low range of heart rate-- there is a close correlation between heart rate and energy expenditure by some twenty percent.

Q. Just by doing what?

A. Just by having-- being close to the human beingsthat may or may not begin to follow them, that may or may not try to photograph them. At the same time, the animal is bound to stay close to them because it so happens its range-- its best food sources are here. But, there is a cost involved to the animal in staying in that place, and that cost is twenty percent increase in heart rate.

Q. Well, are there basic methods by which animals guard against harassment?

A. Escape. Get the heck out of there. Move out. Yes. The other one is to investigate the stimuli that are forthcoming. If found, then, of course they adapt to it. That is a process of what we call habituation. They habituate to something that is unnatural. The process we know takes place, how it takes place, when it takes place, what rate it takes place-- that we don't know.

Q. Well, does habituation take place readily if the stimulus appears and reappears unpredictably?

A. Well, it cannot take place then. If it appears and reppears unpredictably then I would expect the animals in fact, most of the time, flee, because that is another way of getting away stimulus-- increase the distance between it and that unpredictable stimulus.

Q. Now, I would like you to assume certain facts. I would like you to assume that the caribou in the Baker Lake area have been

subject to airborne mineral surveys by a helicopter at an altitude above ground of one hundred and fifty feet and that surveys have been conducted on grid patterns which take them up and down a given area at a distance between an eighth and a quarter of a mile apart and that the helicopter in question was flying at an air speed of approximately fifty miles per hour. Would you expect caribou in the vicinity to react?

A. You are darn right I do.

Q. Can you assist us any more in that kind of situation?

A. Yes. I would think that they would take flight under these circumstances, and would try to avoid that stimulus-- that helicopter as much as possible. I would expect they would be burning energy at an exceedingly, exceedingly high rate at that, because running is an activity that's exceedingly costly. It is anywhere between eight to twenty times basal metabolism. That is how high it is. At the very, very best an animal takes in, in summer time, because vegetation is presumably at its best, only something like four times.

Q. I would like you then to assume that this activity occurred in the same general area for two, three, four consecutive years during certain weeks of the summer months, at times when the caribou would normally be in these areas. Would caribou get used to that kind of activity?

A. That would require a study

to answer.

Q. Would you be concerned about cumulative impact from repeated exposures in more than one year?

A. Yes, I would be, because I don't think that is all that the helicopter does. Now, you told me it flies at what, is it one hundred and fifty feet above ground, fifty miles an hour and that it flies relatively close transit?

Q. Yes.

A. I just don't believe that as long as there are human beings and helicopters that this is all they are going to do. It's certainly not all helicopter pilots did when I was in there-- or the airplane pilots when I was there. Of course, one can bring forth anecdotes in these matters-- how, during a flight, suddenly find yourself upside down in your seat with a pilot full of enthusiasm-- screaming here is a pile of mountain sheep, bouncing out below, and they are scattered all over below or those which have-- and I have communicated with pilots very much-- I have been on the radio wave length when I lived in isolation-- it's when I did my studies of animals and I was in communication with them-- they looked after me and showed me the pictures they took of these animals. I said, "What did you see?" Running moose, running caribou, running mountain sheep or, for that matter, a moose standing up on his hind legs smashing up at a helicopter. I have seen myself when I was with one pilot-- he was

flying me back to Watson Lake-- he took a bit of a dive and over two moose we came, one jumped up and tried to smash us. So long as we have humans and these helicopters, which are curious, and benignly curious, then there is, in my opinion, no likelihood that there is going to be just simply that grid pattern flow. There are times when deviation is made in order to look at these interesting things that are running below them, these interesting things that they like to photograph and to which I feel an affinity.

Q. Yes?

A. I would suspect if you go year in, year out and fly with the helicopters at that speed that you are going to harass the caribou and may very well cause them to leave the area.

Q. In the Calef, DeBock and Lortie study, appended to your affidavit-- do you have a copy of that?

A. Yes, I do.

Q. It's on page 205-- it actually starts at the bottom of page 204 which sets out that:

> "DeBock's data for spring migrations in 1972 and 1973 also showed that the animals were more reactive to aircraft in 1973 than in 1972."

It goes on:

> "Moreover, the differences are all in one direction,

indicating that the animals were more reactive in 1973 than in 1972.

We have no explanation for the increase in reactivity in 1973 as compared with 1972. Perhaps the animals became sensitized to aircraft as a result of the frequent overflights they experienced during 1971 and 1972, when environmental studies on proposed gas pipeline routes were at their peak."

Are you able to comment on the validity of that?

A. Yes, I am. I would say that I have my doubts. I have my doubts for the following reasons: Lortie and Calef, vis-a-vis DeBock, assumed they both used an identical method of classification. In other words, they assumed there is no difference in the ability of observers to observe. In this case, I will have to go towards the most likely explanation, and that is that very likely the difference that they noted between years, which are based, of course, on the observation of different observers, could very well be observer differences. That would be my first explanation. However, I cannot deny there is a possibility that caribou had indeed been sensitized and that indeed

there is a possibility they were more reactive in 1973 than in 1972.

Q. Have you yourself experienced any examples of wild animals becoming more sensitive because of repeated irregular exposures?

A. Only the other way around, in the sense that I have experienced that animals would accept me more, more and more if I— it's the other way around, animals would accept me more and more and more if I purposely went after habituating them. That's all.

Q. Now, you have reviewed the study that I just referred to by Calef and others, and also Mr. Darby's study, which you refer to in your affidavit. I would like to ask you, do those studies, in your professional opinion, provide the data to evaluate the effect of aircraft overflights on caribou in terms of harassment?

A. The answer to that is, no, they do not. They do not provide data to evaluate the effect. I would like to stress the word 'effect' on caribou, irrespective of the quality of work on which the authors, Darby relied on -- irrespective of the quality. Even if you do go and demonstrate that there are certain behavioural categories which can be expected. What you cannot do from that with full confidence is state that your effect is minimal if you stay a very high, as they say. The reason that you cannot do that is, because of that great unknown -- the great unknown is the physiological response of the caribou, in this case -- it's known in other creatures -- to the whole aspect of airplane experience, as they experience it, and the only time we would be able to make a judgment as to these effects is if we could study the aspects of energy in relation to the harassment.

Now, if we could study growth development at a production as a consequence, all this has to be done in order to get a clear picture as to what is the effect of airplane harassment on the caribou. Now, what I

have seen here of the Darby study and what I have seen in the Lortie -- particularly the Darby study -- is a stop gap measure. It is a stop gap measure because nothing better -- no better scientific work was available at the time when these proposals were being made. At the same, it appears to me that when Darby made his assessment of the literature that was in front of him that he did not, in fact, go into the necessary detail to evaluate whether the studies he has cited, were, in fact, valid -- they were valid pieces of work, and whether you could make conclusions of the nature he did from them.

Now, he identifies and says these were adequate studies. That's something I must disagree. I disagree violently. They are not adequate studies.

Adequate studies would entail considerably more than that. Adequate studies would entail a rather exact study of the effects, not just simply the initial response of the animals to the airplanes.

Q. Can the type of data that you would wish to see

available to make that judgment, can that data be gathered?

A. Yes, it can be.

Q. Is it difficult?

A. Yes, it is difficult, but it can be gathered.

There are a number of research groups of which mine is one, that have attempted to get a handle on this.

There is one in Wyoming working with free living creatures. The symptoms that we have been using in principle have been the reading of the heart-rate. We are recording, in fact, the electrical discharge from the heart directly. From this we are able at present to get at least a crude indication of the energy expenditures involved. These studies are of relatively recent vintage.

They are of recent vintage for a number of reasons. Adequate funding is one of the things that goes into the rate at which studies can be made. But the point is, this is available and we are starting to investigate, in fact, another system that will get us very close indeed

to the actual energy spent by individuals. That is probably next year that we will have that first system in operation on wild creatures.

Today we have a system in operation that will tell us the heart-rate of unrestrained free living mountain sheep, and if the radio technician puts the thing right, we can read the heart beat from five, six miles away.

Q. Well, in the absence of such data having been gathered by the persons who have so far taken the responsibility of advising the governments or making decisions in this matter, does behavioural theory in regard to animals and harassment suggest any conclusion to you with regard to the adequacy of the recommendations that have been made in these things to protect the caribou from harassment?

A. Well, my position at the present time is, that I cannot -- I fear for the worst. Let me put it this way, I fear for the worst, because I have reason to fear for the worst.

I have done physiological investigations with my

group. They have come out worse than expected.

In other words, what we have found is that sometimes the minimum stimulus had led to a much greater internal response of the animals that we ever expected before.

Now, I do know now that the caribou have run down below and maybe they have stopped after the aircraft have passed. I don't know what has been the cost to the animals yet. I don't know what is the after cost. I don't know to what extent this very process of exciting the animals -- this outpouring of hormones into the blood system of the pregnant female -- what effect it has on the young. I know what effects it has on the young in -- where this has been investigated in rats. It has deformities and malfunction of the central nervous system. We know this where this has been investigated. This has not been investigated in the caribou.

These are the sort of things that float around in my head. When I read, therefore, it's adequate to fly over one thousand feet of

the animals -- three hundred meters, five hundred meters -- and based on the kinds of work it has done, I have to simply shudder at that.

Q. In the studies that I've asked you to refer to and to which you have referred in your Affidavit, are the impacts of multiple flights as opposed to individual flights considered?

A. Not in this study, that I can see. No. Not at the least, as a scientific experiment.

Q. Are the cumulative impacts, if any, considered?

A. Not that I know of.

Q. If we wouldn't have data about the physiological effects and if we don't know, for example, whether multiple flights will have further impact, can you conclude that flights at one thousand feet or two thousand feet above caribou are causing no upset to the energy balance of those caribou?

A. I couldn't.

Q. Could you conclude that flights at those levels would be causing no harassment?

A. Well, we do know there are, from experimental, that flights at that level may cause harassment, depending on the season of the year, depending on the animals down below.

Q. If you don't know those things, can you conclude that there would be no effect from these activities on the routes of these caribou?

A. No, I couldn't conclude that.

On the opposite. I would very much suspect that there is going to be an effect on the movement patterns of these animals, but it would have to be studied. It would have to be investigated.

Q. The Inuit of Baker Lake, Dr. Geist, have testified that the caribou in the area no longer are found in many of the areas where they have traditionally hunted. They say that the caribou have moved away from the routes and areas where much of the mineral exploration activities have taken place in the last ten years. Would this type of phenomenon be consistent with what the response of caribou would be to harassment from such activities as low level flying?

A. I am afraid, yes.

MR. ESTRIN: I have no further questions. Thank you.

THE COURT: Mr. Graham?

MR. GRAHAM: Before we start there are some things that came out again in relation to the Affidavit.

I notice the bio-energetics, Publof's work in B.C. and in New Zealand, Dr. Thompson in Norway, the large body of psychological literature, the studies on rats -- perhaps I will start my cross-examination, but I might ask Your Lordship for perhaps a few minutes over the lunch break to consider or take instructions in respect of these matters which, as I say, were not matters that I could have conceived.

THE COURT: The alternative now would be to recess now and start at a quarter to two.

MR. GRAHAM: That will be satisfactory.

---Luncheon Adjournment

---Upon resuming

CROSS-EXAMINATION

THE COURT: Mr. Graham?

BY MR. GRAHAM:

Q. My Lord, Dr. Geist, I have a bad reaction when I get nervous I talk too quickly. The reporter has told me she's having some trouble following your vocabulary, so maybe we will go as slowly as possible.

A. We shall try.

Q. Thank you, sir.

You told us this morning about the stimuli that caused reactions in the caribou with which you are concerned. I take it, for your purposes, you have always measured the results of these stimuli by using electronic devices?

A. That's correct.

Q. And you insert --

A. Not always. I am interested in the external manifestations of the animals as well, which is an indicator of the response.

However, I want to go further than that. I have done so.

Q. The other people we have looked at, Dr. Calef, and some of the many other experts in the field, have looked at those same external reactions that you looked to?

A. They have looked

at some of the external reactions. That is those that are visible from an aircraft that is travelling very fast past the animal.

Q. Or --

A. In other words, you cannot see that much from the air. You can see plenty but not that much.

Q. In the case of examination on the ground, you would agree that they would be qualified people to examine the external reactions?

A. No, I do not agree to that at all.

Q. I am asking you now --

A. Amongst the people doing the work I consider one person qualified.

Q. Who is that?

A. That's Mr. Elmer DeBock, who has training in animal behaviour from the University of Alberta, and whose work I have known and whose work I respect, in fact.

Q. Do you consider that Dr. Calef has the necessary training to be able to observe the caribou and

the animals, how they react to those things?

A. I am not aware about Dr. Calef has in the past done work that has gone into the realm of animal behaviour literature. That I am not aware of. I know him as a person. I respect him as a scientist. However, there are differences in expertise between scientists. When we are talking about animal behaviour, special training in fact and special knowledge of background of what biased results of observations is required -- is necessary, and I suspect, but I don't know, that Mr. Elmer DeBock should be one of these.

Q. For the purposes of measuring the reactions which you refer to in your Affidavit -- and I am particularly thinking of paragraph seven of your Affidavit -- to get a full picture of those reactions, you would want to have the benefit of these electronic -- the electronic evidence as well; would you not?

A. To what are you referring in point seven? There are a number of sentences there. I want to be clear.

Q. Well, in order

to determine whether there was increasing metabolism with the concomitant increase in ventilation of heart-rate. You would want to have the benefit of your electronic evidence?

A. I would like to have the benefit of the electronic evidence in order to find out whether in fact they are received by the external manifestations by the animal itself.

Q. When you first started your experiment I understand you did them with sheep? Is that correct, you did them with domestic sheep?

A. I did them with domestic sheep. I did them with human beings. I did them with free living wild, unrestrained mountain sheep.

Q. Taking the domestic sheep first, you put them in a device which allowed you to monitor what the heart beat was; did you?

A. We did two things. We put devices into them in order to find out whether this was workable or not. We learned from these experiments which switched to radio systems that are attached externally to

the animal.

Q. This requires wires, did it, to go --

A. This does require wires. I can show you, if you so please, a picture of what it looks like.

Q. I think if you describe it to His Lordship he will have some idea.

A. That's right. What is entailed is the animal is caught first then a harness is placed on the animal.

Q. Yes.

A. From the harness -- inside the harness itself are wire leads. These go into the skin of the animal. They are embedded inside of the skin of the animal.

Q. Yes.

A. These wire leads are similar to what you would in principle have if you are sitting in a hospital and have a needle stuck in your arm and it may be maintained there for purposes of intravenous feeding, for instance. It is of that similar nature.

Q. This allowed you

to get results that would be similar to what we would get for an encephalogram, or something like that? It would be familiar?

A. It would be an electrocardiogram. It's an electrocardiogram. That is the term. That's what we are obtaining, that's correct, as well as some interference which can -- which is interference from the muscular contraction which is a very fine benefit in the following sense, that you can at night time, for instance, by virtue of listening to the discharges recognize if the animal is walking, if the animal is resting, if the animal is jumping or if it's galloping.

Q. Yes.

A. In other words, you can identify from the additional information that is coming across to us what sort of activities the animal is doing.

Q. Excuse me, sir. These discharges would be like a Geiger counter?

A. No, they are not like a Geiger counter. It is a continuous tone that is emitted. This tone is modulated electrically via the

discharges from the animal. So, it is a beeping tone that goes up and down. That can be transcribed onto a chart so that you are able then to count the heart beat, to count -- you will have segments where there is interference, so that the interference overpowers that signal. Most of the time you do get a very good heart response.

Q. You used the term this morning when my friend was examining you "basal metabolic rate"?

A. Yes. Basal metabolic rate, yes.

Q. I understand -- please correct me if I am wrong -- for your purposes basal metabolic rate is the base rate that you get when the animal is at a state of rest; is that a proper description?

A. Close, but it's not quite. Basal metabolic rate is a technical term. It is derived from a very large cross section of different species. It is defined by a specific state. The animal has to be at rest. The gut content has to be evacuated. The animal has to be

retained, in fact, for some time before this can be measured. It was one time of great interest to medicine, incidentally, and for this reason we have tremendous -- we have done great work in the 1920s and 30s on this work as a result. The basal metabolic rate because ithas been found to be rather consistent through the animal is roughly seventy kilo calories, plus or minus, W to the .75 kilograms. That is the definition of it.

Q. And that is an animal that has been in a state of rest for some time -- some controlable period of time?

A. Yes. A wild animal you do not get that.

In a wild animal you would expect to get something of the order of probably 90kilo calories, to the same --

Q. To understand the results of these external stimuli on the basal metabolic rate --

A. Pardon me, that is not what we are measuring. We are simply measuring an indication of expenditure; that is the heart-rate. Yes,

we can -- we do have a heart rate that is associated with rest and even during the day that fluctuates, because the mountain sheep, has in fact, its lowest heart-rate at night and its highest heart-rate even at rest is about three o'clock in the afternoon.

Q. When its stimuli is received by the animal, the rate goes up? Is that correct?

A. That's correct, it does. It jumps.

Q. It jumps?

A. How high?

Q. This is essentially harassment of the animal; is it not?

A. The heart-rate of the animal jumps or begins to jump -- when you speak about jumping, by this we mean a spike and it stays there for a time. That is what you obtain as a consequence of let us say going out with a dog on a leash. You obtain it that way.

If, on the other hand, the animal is resting and it goes over to the next phase, it gets up and starts to feed, you find there is an increase in heart-rate for a short duration and then the

heart-rate drops again and it is a slow drop to the next level that is associated, by and large, with a feeding activity. That is on a minute to minute change.

Q. Right.

A. What is important is, that during the course of the year -- we have now some evidence to that -- that the level of that heart-rate will be different.

Q. I am just trying to get some notion of harassment for our purposes and the court.

A. Yes.

Q. I understand you did experiments with the sheep where you found that by calling their name that this would cause a significant rise in the rate from the basal metabolic rate; is that not correct?

A. No, this is not correct. That you do not find. Not the way. This is the case: what I have referred to -- are you referring maybe to the film that was earlier on referred to?

There it is sufficient for a human being to approach a sheep in order --

Q. That is domestic sheep?

A. Yes, to do various thingswith it like get it out into the pasture, stimulate it so it can run a bit so you can get the measurements for the heart beat. That, of course, does raise the heart beat. Of course.

Q. Enough to constitute harassment in a technical term, in which you use the term?

A. Well, harassment is an external activity. We are talking right now about the response of the animal that takes place.

Q. Of course.

A. I would not, on the basis of a single spike, speak, for instance, about harassment.

For instance, since you are interested in over flights by helicopters, one of the populations that we are working with, the wild sheep, living relatively close to Calgary outside the National Park, has been subjected to helicopter flights on an almost regular basis. This is one group of animals that habituate it. We can show there that

an over flight will cause an increase, for instance, in the heart-rate, but it will not stay very long. It is only a matter of minutes before the animal settles down. The second over flight causes virtually nothing. So, they are familiar -- very familiar with that object, as much as they are familiar with people that are close by, which are there day in and day out.

Q. This is like the effect on the domestic sheep where it might move and do something but settle down quickly?

A. We find that the animal settles down indeed at times very quickly, but not always. The animal that's in the vicinity, for instance, of humans -- we have seen this again and again -- . that it may have a series of spikes which continue on, on and on. If you begin to add this up it amounts to about a twenty percent increase in heart-rate, as long as this association lasts.

Q. Yes.

A. That would be called at least a mild form of harassment to the animal.

Q. So you get sort of predations -- mild harassment?

A. Oh yes.

Q. And then the greater harassment, as your evidence has been this morning, that leads to death?

A. Yes. That's correct.

Q. Which, I suppose, is the prime example of shooting the beast?

A. No.

Q. That is not harassment because the death is instantaneous?

A. That is not the case at all. Shooting is shooting. I'm not speaking of harassment of these circumstances because I was talking about harassment when we are doing something short, in fact, of killing that animal without, in fact, -- I think the technical term should be confined to that without necessarily touching even the animal.

Q. Yes.

A. For instance, if you go and chase that beast with a vehicle and it collapses thereafter and is dead, that is death due to harassment.

Q. But harassment

in the less grave sense, which you were earlier using in relation to the sheep, what you are concerned about, I take it, are the results that you set out in paragraph seven and those results being -- I am now not talking about the internal responses which you were particularly interested in as opposed to the external responses which other people are --

A. In am interested in both of them.

Q. Just looking at the internal responses, you refer to raising the tonus of skeletal muscles?

A. Yes. Fine.

Q. And increasing metabolism with the concomitant increase in ventilation and heart-rate, as well as alteration of the hormonal homeostatic mechanisms that increase the conversion of glycogen?

A. Glycogen is animal starch.

Q. Fat and protein into blood sugar?

A. Yes.

Q. Then the other is resorption of the electrolytes from the

kidneys, etc.?

A. Yes.

Q. That, I take it would also -- all those items referred to in paragraph seven would result equally from normal exercise, to some degree or other?

A. Yes.

Q. From my walking around the room?

A. Yes, some degree. In other words, when we are talking about harassment, it's excesses, above and beyond those normal exercises that you are performing.

Q. I understand that the Registrarof this Court jogs every morning. All of those things that you talk of in paragraph seven would be happening to him as he was jogging?

A. Yes.

Q. In fact, in that circumstance they would be beneficial to him; would they not?

A. As a matter of fact exercise is quite beneficial. You are correct. The level of it is important, though.

Q. And the form of exercise or exercises would be equally beneficial

to animals in some circumstances as well?

A. The point is that the animals are moving under normal circumstances. We are discussing the additional burdens that are being placed on them. Let's not forget that, for instance, such a task is migration by the caribou is also a burden and it does cost energy. We suspect -- I suspect, at least, that it is one of the reasons that maybe these animals are somewhat smaller than those that are freed from that task, which I referred to previously to some experimental work that was done.

Q. The ones taken to British Columbia?

A. Yes.

Q. They were fed a different diet?

A. Yes.

Q. You would expect any animal or human being fed a different diet than that which it was used to would show a decrease in the animal fat if he was fed less protein and less carbohydrates and an increase if he was fed more; wouldn't you?

A. You would find some sort of response, yes. Here we are

talking about energy balance, sir.

Q. Right. As far as caribou are concerned -- and looking again at paragraph seven -- I take it that if they were climbing a hill or swimming a river or doing any of the things that are normal to a caribou of the things you are referring to in paragraph seven, that would be happening internally to his body?

A. Yes. If they happen to be moving during the day, for instance, versus moving at night, there is going to be a difference there because we have discovered that. We have discovered that when animals move at night the heart-rate is higher for that same equivalent activity presumably because he can see less well, presumably, because of excitement. Yes.

Q. But with caribou, for example, and now we are looking at their normal activity -- obviously it is not a result of harassment because they are doing it, I take it -- but what sort of normal things would harass them in a sense in which you use the term? Would the cry of a wolf provide a harassing stimulus?

A. I would think mosquitoes in very large numbers would cause

a considerable harassing stimulus. That is not just an I think, it is in fact recorded as doing just that.

We are well aware that the mosquitoes can lead in reindeer to loss of body weight, to a change in the internal functions of the stomach, to ulcerations of the gut as a secondary consequence of that, because hydrochloric acid is not produced. We are aware that they go down in weight considerably. We are aware they may even die as a consequence.

Yes, there are natural elements in the environment that may cause harassment.

Q. Wolf crying would be another; would that be?

A. Well, I don't know that exactly. To what extent -- I would suspect, yes, but I cannot verify it. I have not been able to do this sort of work with caribou.

With mountain sheep it is a crystal clear response; but two kinds.

One, the heart-rate jumps right away in the pursuit of a coyote

or when we bring in a dog or when we bring in a human being that is walking a dog at that time.

Q. What about other activities? Are there some activities that create more of the results you refer to in paragraph seven? For example, would mating be a very strenuous activity that would create all the reactions you set forth in paragraph seven?

A. For the bull it would be a strenuous activity, as they do lose body weight in the process. In fact, it's quite likely that we have in caribou the same phenomenon as we have in mountain sheep and some probably more than ungulates. It would be a very, very high level of activity of individual bulls or males at mating time. It's associated with an early death of these individuals, yes. That is a very heavy form of activity and a natural form of activity.

Q. Speaking of the unnatural or those provocations or stimuli that might result from nature --

A. Provocations is good.

Q. I take it that

those provocations which would be particularly harmful, from our point of view, would be those that relate to the activity of a predator or might be perceived by the animal that might relate to the activity of the predator?

A. Or micro-predator?

Q. Yes.

A. Or micro-predator like mosquitoes, black flies, or whatever we have along that line -- the stable flies, black flies, mosquitoes of several species, horse flies, deer flies. When it is all over there are no flies.

Q. Looking at other types of predators, is it a stalking that gets -- that starts to have the harmful effect -- the continuous stalking of the animal by the predator?

A. By the predator?

Q. Yes.

A. If it is perceived in the process of stalking, yes. Only if it is perceived in the process of stalking. That is the condition to it. Yes, because then it starts to move and running is an additional burden.

Q. From your experience, would small herds of caribou or single caribou

being stalked by an Eskimo on a skidoo with a view to shooting it, would he be likely to perceive that?

A. If you put it in those terms, if it's being -- you cannot stalk on a skidoo, to begin with. You can run at it with a skidoo, yes.

Q. Yes.

A. If you run at it with a skidoo and you do that -- well, if you run at it with a skidoo the animals would run and it is a harassing stimulus, yes.

Q. Would being shot at, for example, and missed --

A. Be a harassing stimulus?

Q. Yes.

A. I think, sir, that depends on the experience of the animal.

Q. Right.

A. We do know, for instance, that for elk which are hunted and which in Wyoming have been instrumented with a system similar, but not quite like ours, that the slamming of a car door, the slowing down of a truck, the firing of a rifle a quarter of a mile away from the animals did lead to a response in heart-rate which

relatively soon settled down.

However, I also know that at least externally there may not be at times a response. I have shot and killed sheep which collapsed instantaneously and it led to no panic response on the part of the individuals.

However, I also know that if one of the animals acts abnormally and, of course, andindividually hit by a rifle may act abnormally -- it may lie there and kick, for example -- that then the animals do respond with positive signs of fear. They completely respond with a lot of curiosity -- jumping and running back and forth. If you do the following dirty trick, to stick a paper bag in a sheep's mouth, it does not spit it out but it goes through a series of unnatural activity, discrepancies from the normal behaviour. That raises -- well, alarms the individuals quite a bit. You see them going back from the individual, returning, going back and until the bag has been lost out of its mouth and everything returns to normal.

So, if you ask me, is it possible that a caribou shot and

kicking on the ground alarms other caribou, the answer to that is, yes.

Q. Do they run off and express these stimuli that result from this harassment?

A. I can say they run off, yes.

Q. Would it take them some time to recover from that experience?

A. In the same fashion I would think that it would take them to recover from any running -- from any physical exertion.

Q. As a biologist, would you recommend that hunting of caribou be stopped until such time as you can fully analyze with your electronic machinery the effects of such hunting on the caribou herds?

A. That is not a scientific question, that is a political one.

Q. I am asking you as a biologist?

A. I can try to answer you.

Q. Yes.

A. As a scientist I cannot answer that. As an individual I can.

Q. You can?

A. Yes.

Q. As an individual then.

MR. ESTRIN: My Lord, the witness is here as an expert. I suppose we are entitled to give our opinion. Mr. Graham, I am sure, will give us his in his questions. Of course, the expert is here to answer expert questions going to his credibility and skill and reputation.

THE COURT: I don't know that the answer would be of any more value than yours or mine might be, Mr. Graham. I question if it is proper.

BY MR. GRAHAM:

Q. I will not pursue it, My Lord.

It just seemed to be pertinent in respect to the earlier evidence that some activities should be stopped until studying be done. I don't know why the witness will not commit -- why he puts this activity into a political category.

Did you not find your

answer to Mr. Estrin's question about stopping mining activity until further studying be done --

A. I did not answer.

Q. Pardon me?

A. I think you can check back the record. I did not answer on that point. I did not answer on that point that mining activities should be stopped.

Q. Just aircraft, I take it would be your evidence?

A. No. My point was that we should be better informed on this activity, which we have been putting on relatively recent years on to the animals to that extent.

The same does not quite apply to hunting. An animal hit with a bow and arrow, for instance, takes a longer time to die than one hit by a rifle. That has been an activity that I am quite sure is in existence as long as bow and arrows are in existence, right from the upper period.

Q. As I understand your evidence, sir, that your concern is with the survivors, not the one that got

killed?

A. Pardon me?

Q. Your concern is with the survivors -- the rest of the herd -- not the ones that got killed?

A. My concern at the present time is not only with caribou. My concern at the present time is to, in this instance, to answer questions that lie within my competence and experience.

Q. Right.

A. As I said, I can answer that to you as a private citizen.

Q. Not as a private citizen. What I am interested in is your opinion as a biologist as to whether, in fact, any activity that causes harassment to these animals, as referred to in your Affidavit, should be stopped if it is within the legislative competence or power of parliament or of the police to stop it until such time as the affects on the herd may be studied so you may determine what the internal response to those stimuli are?

A. Again, I could answer to you that question pertaining to mining activities as a private citizen

whether it should be stopped or not. If it is something that we are investigating and have a considerable concern, because we have reason -- a good reason -- to suspect it's quite, quite damaging at this time and particularly --

Q. I did not ask you -- excuse me -- I did not ask you about mining activity.

A. That's right.

Q. I asked you specifically about other external stimuli and I put it in the context of hunting.

A. And whether hunting should be stopped and the consequences of hunting should be investigated?

Q. What the results are on the rest of the herd, the survivors, that have expended energy in running away?

A. As I said, as a scientist I cannot give you an answer to that.

Q. I take it then when my friend asked you the question this morning about aircraft you were not --

THE COURT: Just a moment, Mr. Estrin. Let's clear this up.

We have not heard the question.

BY MR. GRAHAM:

Q. I take it that when you answered my friend's question this morning with respect to aircraft activity being stopped, that you were not answering as a scientist as well?

A. I'm sorry.

MR. ESTRIN: Before the witness answers the question, My Lord.

THE COURT: Yes.

MR. ESTRIN: I did not ask the witness, as far as I can recall, and from my notes, whether it was his view that these activities should be stopped. I asked him can he say -- if you don't know certain information, whether there is not going to be any impacts from these activities and whether or not certain things have happened in the Baker Lake area, whether or not that would be consistent -- I never asked him his opinion as to whether these things ought to be stopped.

BY MR. GRAHAM:

Q. I'm sorry. I understood the question to be whether time should be taken to enable studies to be done. I understood that to be the purport

of his evidence. That is really what you would like to see done; isn't it, sir? You would like to see more thorough studies? Your objections to Dr. Calef's paper is that it has not gone into this subject in enough depth?

A. I am not objecting to Dr. Calef's paper. He did a piece of work quite incidental to other work. I am glad he did it because it was the first attempt at gathering information that was relevant.

I am objecting to that paper being used as a foundation for regulations. That is what I am objecting to. I am stating that these regulations -- the intent of the regulations is laudable and we should have much firmer evidence for it in order to bring out regulations that we can enforce, that we can agree upon.

Q. Yes.

A. That was my point.

In a similar vein, if you wanted to ask me, is it important to know something about hunting so that hunting can be regulated in a better way, the answer, of course, has to be, yes, on that as a

scientist in this case.

Q. For the same reasons that you would apply to the regulations that we've been talking about, about these other activities?

A. Yes, indeed.

Q. Actually, have you ever had an opportunity to study hunting of the Kaminuriak Herd, for example?

A. I have not been at Baker Lake. I probably never will be at Baker Lake. I'm sorry. I have not been in that country.

Q. Have you observed hunting of the Kaminuriak Herd at Eskimo Point?

A. I have never been in that country.

Q. By that country", you mean the Keewatin district?

A. The Keewatin district. I have been in the Northwest Territories just a few times across the border, barely across the border, as a biologist.

Q. The caribou that you described to my friend this morning that you have done work with,

those were largely British Columbia, were they, sir?

A. B.C. and the Yukon Territory.

Q. The ones in British Columbia, were they living in the mountains?

A. They are living in the mountains. These are the large mountain caribou or Osborne caribou.

Q. Osborne?

A. Yes.

Q. I take it they would be quite different in some ways?

A. They are --

Q. They would be quite different from the barren-ground caribou?

A. They are different in body size, basically.

Q. Yes.

A. They are very similar in the social behaviour. That is, in fact, one reason why I have not published what I observed -- at least not published in detail what I observed when I was observing and taking data from these animals.

The reason was that Dr. Unvoesqueark (?), of the University of Stockholm, published his observations on the behaviour -- social behaviour -- of reindeer, which matched so very, very closely with my own observations of these mountain caribou, that I felt it was necessary only to mention in one paper of mine in 1966 that very fact, namely, that my observations and his matched, except for a slight -- some slight differences.

This very slight difference was, in fact, reported relatively recent in 77, in the doctoral dissertation also done on a reindeer. So, when we come to such things as social behaviour of animals and talking about the caribou, they tend to be very similar indeed.

Q. For social characteristics?

A. For social characteristics, that's correct.

Q. I take it the diet would be quite different between those animals and those in the Keewatin?

A. The diet of the caribou is different throughout the Arctic,

too. This is a very opportunistic animal. When you are familiar with the various studies of what they eat, for instance, they do cover a very, very broad range.

Q. Actually diet is one of those things -- it is an important component in determining the energy balance that we here talking about here.

A. Yes, the diet and the expenditure, of course.

Q. The caribou in the Yukon that you observed, were they living in circumstances similar to those on the Barren Grounds or in the Keewatin or would they also have been like the Osborne, living in the mountains?

A. My observations when I was in the field, has been confined pretty well to the Osborne caribou, because I was interested in them. This was one of the unstudied caribous -- largely unstudied caribous.

I have seen barren-ground caribou. In fact, I have been out with Dr. DeBock -- Dr. DeBock is mentioned here. I have seen the caribou in the Yukon but, of course, I was not studying those.

Q. You mentioned one thing this morning that was interesting to me. You gave evidence about caribou being nervous before they were to go over a water crossing. That was a result of your observations of the Osborne caribou, was it?

A. No. That was not the result of my observation.

I think I made it clear at the time when I spoke about this that I was making reference here to a piece of work by, in fact, Calef, Lortie and DeBock which have made these observations. I also stated that this harmonized with my observations done on other species of animals like mountain sheep and also with what is found in the literature of elk for major water crossings. So, that falls right in it and is quite consistent.

Q. In that respect you are prepared to rely on evidence by Dr. Calef?

A. Yes, indeed, because you must examine evidence piece by piece.

Q. Just before I leave the question of hunting, I was curious about two things in paragraph eleven of your

report.

The first was the use of the word anthropomorphic?

A. Oh yes.

Q. That's in respect of observers of caribou. Can you define for us what your meaning of anthropomorphic is in that context?

A. Anthropomorphic is the assumption that the sights and sounds and understandings of human beings can be transferred directly to animals. That is anthropomorphisis. It is anthropomorphism to see a film called Bambi. That is a film that contains a lot of anthropormorphism. The animal acts out the role of the human being.

Q. Would you say, for example, that someone like Dr. Calef was guilty of this anthropormorphic behaviour in his observations of caribou?

A. I have no reason to believe at the present time that Dr. Calef, because on the studies he has, I would say he has not been guilty of that. In fact, this is in no way a reference to the work of Dr. Calef or Lortie and Mr. DeBock.

It is, however, a reference to works which one does find by otherwise perfectly competent wildlife biologists doing if they have to do some behavioural work. Then this can at times creep in.

Q. This is something we have to all guard against?

A. Pardon?

Q. This is all something we have to guard against, imputing human responses to animal behaviour?

A. Yes. In interpreting the animal within the confines of the human, yes. However, may I --

Q. Yes.

A. This is not a contradiction of what I am stating. If I am trying to explain something to you or to anyone else then I am going to have to rely on analogies, simile and metaphors because that is what our language is based on.

In that case, I ask from myself the right at times to speak in human terms about an animal, for the simple reason that I am trying to

bring a point across, that I'm trying to use language as a vehicle of communication. I will back off from that thereafter if we are in the deep enough discussions on that matter in order to identify that this is indeed an analogy that is being made or a metaphor -- simile.

Q. In our specific context, the analogy which you make to stress, which is the concept of --

A. Yes. This is not -- you think this is anthropomorphisis?

Q. I am asking you if you think this is anthropomorphisis?

A. It was first made on a rat. That's what he was writing on -- when he first studied it -- when he spoke of the adaptive syndrome. This was based on rat experiments.

Q. Ascribed to humans?

A. Oh yes, because in medicine it is eminently acceptable procedure to use animal models to study pathologies and conditions. Eminently reasonable.

Q. Are you aware of any studies which have been done to date

For this reason, I always made a point of observing other animals and taking some time out from my major study to do it. Caribou were available to me in B.C.

Q. Were you able to get close to these caribou in observing them?

A. Yes.

Q. How close?

A. I have never made a point of approaching them excessively close. I have made that point with a number of other animals. To me, they were interesting whenever I could observe them through a spotting scope at a distance when I knew my activities would not influence them. I have been within a few feet of them, and occasionally running into them in the timber. But, unlike the moose or mountain sheep, so on, I have never attempted to close the distance too much.

Q. You never had the experience where they actually came into your camp or near where you were camping or anything like that?

A. They came close to my camp and ran past my cabin, but rarely

had a drilling rig. I said, assuming. That's what I have made. I have no personal experience with a drilling rig in the field of caribou. I have no reason, however, to doubt it. That's what I was trying to bring across, that these animals would pass close by to that rig.

Q. Are you aware of any reports to that nature, either in the literature or brought to your attention?

A. I am aware of reports, in the broad sense of the word reports, yes, that there have been experiences of this kind. Yes, I am aware.

Q. I take it you are aware of the work of Dr. Bergerud?

A. Tom Bergerud, I am aware of it, yes.

Q. He published a paper The Role of the Environment in the Aggregation Movement and Disturbance Behaviour of Caribou, which I believe was given at a symposium in 1970 --

A. I was the editor on that paper. In fact, I rewrote parts of it.

Q. Pardon?

A. In fact, I rewrote

That was a part of the paper you reviewed and edited?

A. Yes, indeed. You can go one step further.

Q. Yes?

A. In British Columbia, Newfoundland, some caribou have been attracted to the sound of chain saws.

Q. Yes.

A. Because lichens-laden trees have collapsed. Here we are talking about incredible exceptions.

Q. Would you agree with --

A. As I matter of fact, I also made this point in the paper that I produced for the Berger Inquiry. So, we can at times deal with ungulates that have learnt to associate with human beings and take advantage of that situation, yes. Yes, that can happen.

As a matter of fact, I will go even further. If you give me enough time, I will make him dance on his hind legs -- the caribou that is. It can be done.

Q. His Lordship might object if I offer to take you up on

that?

A. I would love to.

Q. Just again, just so we can pin down one other observation, I would like your comment on from Dr. Bergerud's paper, and it is contained in the same paper, he states:

> "Caribou are tolerant of civilization. The Avalon Herd in Newfoundland uses ranges within one mile of a well-travelled highway. The Humber Herd winters on ranges where cars and trains are heard daily.
>
> Caribou in the Gaspe Bay Peninsula, Quebec, feed in the winter on arboreal lichens, on trees recently cut by loggers. The behaviour of Barren-Ground caribou of crossing roads and railroads and even through passing through communities is well documented."

A. Yes.

Q. That was part of

his paper that you edited?

A. Correct.

Q. And when he refers to "herds" there he would be referring to the whole herd, males and females?

A. He would probably be referring to the relatively small herds of caribou that you find in the Newfoundland environment. Yes, it does.

Q. The term "herds" refers to males and females?

A. Yes. You are quite correct if you are trying to bring out the point that caribou can, under some circumstances, habituate to human beings. That is quite correct. It can happen.

Q. But more than that, isn't it correct that when Bergerud says that there are documented cases of herds passing through communities, I mean, you know of those, don't you, where the herd -- the Beverly Herd will come down from Northern Saskatchewan?

A. I don't know the particulars on this. This is witnessed by Dr. Bergerud.

Q. For us trying to

grasp the significance of noise, the events that would serve these stimuli, would it be proper for me to say that the stimuli appears to have the greatest effect of a noise if it is of a duration like the idea you mentioned of walking across the ground towards the caribou or a predator stalking its prey?

A. No. I am speaking about association; not duration. Stimulus itself can be almost irrelevant.

Q. Yes.

A. If it's stimulus that alerts initially, it gets the animal's attention. But, its response to that stimulus is then a function of its experience. If you have, for instance, a herd that cannot escape -- no matter where it runs -- it cannot escape the activity you find on a highway, that cannot escape activities of hikers, for instance, going through the countryside, then, it is our experience that indeed they settle down and accept it. They do not leave that area.

Like one population of sheep that I know in British Columbia in the Ashnola region (?), which cannot in British Columbia escape human attention,

has more or less accepted it. It stays about three hundred yards away from human beings, because where ever they run, there are human beings. They cannot escape.

But, if you have a situation where animals can go into areas that are vacant, they do.

Q. I was directing my mind more to trying to get yourself to focus on this question of the duration of the noise or stimulus that causes the caribou to express all these internal activities that you set out in paragraph seven of your Affidavit?

A. Fine.

Q. If that is something of short duration and then passes on and then the caribou runs for a short distance and stops --

A. That's the point.

Q. Yes.

A. It's the after effects.

Q. Yes.

A. If your caribou does run --

Q. Right.

A. -- if it does go

through exertion there is going to be an after cost pay.

As I indicated from our work done with mountain sheep where we have had the opportunity to watch it, it can be for hours after that. As I indicated also earlier in the bio-energetic text books, it states the after cost may last for days.

Q. Depending how far they go, how badly -- how much their exercise?

A. That is correct.

Q. And it is the question of the recovery time that's important?

A. It's the question of the recovery time and question of frequency which they are associated with that. So, you see what my testimony in this regard is, that if you increase frequency of stimulus to a very great rate, so the animals cannot escape from it, they learn to accept them.

Q. Yes.

A. But it is a very high rate indeed.

Q. Without getting into

the animals which are enclosed, take the situation which you described to Mr. Estrin this morning of the aircraft flying back and forth doing grid work. I take it from what you told him, the problem isn't just the aircraft -- really it's not really the aircraft going regularly back and forth?

A. It's not only. It is a problem, but there is the additional problem which I elaborated on.

Q. The pilot?

A. The pilot.

Q. Which, in your view, is likely to deviate from a path, which he might.

A. Could deviate.

Q. And that's --

A. No.

Q. And that's serious?

A. The whole work is. This is just an addition. In other words, if you have low-flying aircraft flying at that slow speed -- what does my memory tell me, fifty miles an hour?

Q. Yes.

A. To fly at that slow speed with the fluttering and shuttering that is normally associated with loud noises that emanate from it and the animals run around --

they do not run around in straight lines, they do it in semi-circles -- again the beast appearing over top of them -- even without the deviations of chasing, I would consider that a pretty, pretty stressful situation.

Q. You are assuming a large herd -- going back and forth and over top and across the herd, are you, at the elevations put to you this morning?

A. At the elevations put to me this morning.

Q. You're not talking about going across the herd at two thousand feet, one thousand feet?

A. Then we have some evidence to this effect that the response will be less, but we don't know what the cost still is.

Q. In terms of the internal response?

A. In terms of the internal response, that's correct.

Q. One other thing you touched on this morning was the proposition that was put to you that the Inuits have reported no caribou are no longer found in areas where there has been

mining activity, I think was the term used this morning -- exploration, particularly aircraft I think probably in the context of our case. I took it you agreed that their absence from those areas could be consistent with the explanation that my friend put to you about the Inuit?

A. That's correct.

Q. But this, again, is an area where we are missing the effect of the research you say we should do? Is that correct?

A. That's correct.

Q. In fact, this conclusion could be consistent with several other factors; could it not?

A. Yes, it could.

Q. A smaller herd, for example?

A. That is an outside possibility, but you have such things as weather factors that come in and bring things in a very --

Q. Over hunting? If there is over hunting?

A. Could be. It depends on how the hunting is done. It's not simply a matter of killing animals, it's

much more than that. It is how the process of hunting takes place that is important as well.

Q. The presence of predators?

A. The presence of predators, maybe.

Q. Change of a feeding pattern in the animals themselves?

A. In this case I would ask for a cause to the change of the feeding pattern.

Q. Would you --

A. Let me put it this way: it's conceivable that these are some things that could happen. Yes, it's conceivable.

Q. Well, does the literature show, and would you agree, that caribou do not always go every year to exactly the same place; they move around?

A. Caribou tend to be quite loyal to the area where they give birth, although they can shift --

Q. To the calving area?

A. To the calving area.

Q. But outside those areas?

A. The wintering grounds can at times shift around and about. This has been known for quite some time. Yes.

Q. They will be found in one area one year wintering and in another --

A. As I said, they tended to be reasonably consistent. You may suddenly have a move out of one area; that's been on the record, yes.

Q. We are not certain what the reason is for that moving out, scientifically?

A. No, we are not certain, that's right.

MR. GRAHAM: Thank you very much.

THE COURT: Mr. Heintzman?

MR. CHAMBERS: With Your Lordship's permission, I will go first, before Mr. Heintzman.

CROSS-EXAMINATION

BY MR. CHAMBERS:

Q. Mr. Geist, you said you did not, in fact, conduct any field work with respect to barren-ground caribou; is that not correct?

A. With respect to barren-ground caribou, that's correct.

Q. Particularly involving this apparatus that you've described?

A. No, sir. Not yet.

Q. Based on any such observations, you could offer no scientific opinions about the displacement of caribou due to stimuli, such as were described to you?

A. On the contrary; I think you can.

Q. Yes.

A. We do have bodies of information dealing with that subject. It would be an extraordinary event if another large mammal would not fit the pattern that is at present emerging.

Q. I see. I take it, then, this is mere hypothesis on your part, in as much as you have had no actual field work?

A. Yes.

Q. That is, with respect to barren-ground caribou I'm directing my question to. So, your hypothesizing the behaviour of barren-

ground caribou?

A. I am not hypothesizing about the behaviour of the barren-ground caribou. I am placing an expectation.

Q. In any event, you have not observed yourself any behaviour of barren-ground caribou in response to stimuli?

A. I have not done a study. I have observed it; but I have not done a study.

Q. Now, we know that people like Dr. Calef have done some studies in this area. We know, of course, you said you did not regard this as sufficient. Did I understand you correctly in saying that?

A. That's correct.

Q. Nevertheless, you do accept Dr. Calef and other people like him for their work, as authority -- to a limited degree or provided that your -- you said that you accepted them but you basically accept their observations and their conclusions about behaviour of caribou in response to stimuli on the basis of their work, limited though as it might have been?

A. Well, we are dealing here in a grey area. In fact, it is a very grey area.

I stated earlier on that I was very happy to see that the work was done.

Q. Yes?

A. Very happy, because we were simply -- he was simply taking advantage of an opportunity.

I claimed also that I was not very happy that this preliminary work -- this work which was not directed -- in fact, that answering the question what effect had the harassment -- I was quite unhappy that nobody had gone beyond that -- that this work was being used in support of regulations. So, I can be quite happy on the one hand with the fact that some work by quite good scientists had been done. I can chime them for loss of opportunity where a little bit more additional effort would have been required to make it quite a good study, within the limitations that any of the behaviour studies have, yes.

Q. Nevertheless --

A. But at the same time, I cannot accept these studies as support

-- strong support, as has been suggested in the document. That's the point.

Q. Nevertheless, you accept the accuracy of the observations of these people?

A. Well, let's go back to accuracy of observations in this case.

Q. For example -- let me particularize.

MR. ESTRIN: My Lord.

MR. CHAMBERS: I speak about --

MR. ESTRIN: Mr. Chambers, just a moment, please.

My Lord, I am afraid I have to rise because Mr. Chambers does -- he has an unfortunate habit of going on with several questions.

THE COURT: The witness was in mid-answer, Mr. Chambers.

BY MR. CHAMBERS:

Q. I'm sorry. I meant to limit him to particulars. I did not want general answers.

THE COURT: Perhaps you might ask a more limited question.

BY MR. CHAMBERS:

Q. It was my intention. I had no intention to cut Dr. Geist off in any way.

My question that I am interested in is this: you read the literature, of course, about observation of caribou due to induced harassment?

A. That's correct.

Q. And of course you are also aware this literature speaks about the responses of caribou in terms of distance and intensity of activity depending upon the altitude and speed with which these aircraft fly?

A. Yes.

Q. Is that not correct?

A. Yes.

Q. So, you have no reason to doubt that, in fact, the animals behaved in a manner in which they were purported to have behaved?

A. Sir, I have reasons to doubt the accuracy of the distances.

Q. You do?

A. Yes, I do. That was a point that I made in my report to the Berger Commission. I dwelled at great length

on it. These were distances judged, not measured.

Q. Yes.

A. I have doubts as to the observers, doubts as to the wisdom of taking different observers, lumping their data without having a common base of making that classification of behaviour. I went and pointed out that the classifications themselves were so crude that one could not repeat these results and obtain much the same answers. I pointed out the contradictions between individuals relying on these subjective evaluations in that report. This is all a public document that is available for perusal.

Q. At the same time, Dr. Geist, I am confused. I must admit that. At the same time, you do accept, within their limitations, the work done by Dr. Calef and others?

A. I accept part of it.

Q. Which part?

A. Well, I accept -- as I indicated to you, we are dealing here with some indications that harassment

is taking place. That I am accepting. I am accepting the fact that, despite the rather crude methodologies applied, there are some consistencies in that data. Yes, I do accept that.

Q. Fine. Except those you quarrel with in completeness, in your view, on this methodology?

A. I am quarrelling -- I'm not even quarrelling with those papers per se because I indicated to you that for a first go around we, in fact, -- before we started we knew nothing. This is probably an adequate response but for the first go around. That was years ago, however. We should have done better in the meantime.

Q. Do I understand correctly that the ill effects of this harassment would be proportionate to the frequency and duration of the stimulus provided --

A. No.

Q. -- by harassment?

A. No.

Q. No?

A. No, that's not the case. I tried to make the point that

beyond a certain frequency of a stimulus, impinging on an animal -- beyond a certain frequency of a stimulus -- habituation begins to set in. So, a very infrequent harassment does very little harm. A frequent harassment is something animals can at times, and under certain circumstances -- and we are not clear -- the scientists are not clear on this -- habituate to that activity. It's that grey area in between that is dangerous to the animals.

Q. What about duration? Would duration have a very strong effect?

A. Again, it could. It need not be.

If by duration you mean that the animals are being continuously moved?

Q. Yes.

A. Yes.

Q. That's what I am --

A. If you mean that by duration you may take a series of repeated over flights, then, I would expect that during, let's say that one hour or so of repeated over flights, that may be some habituation has taken place.

Q. Supposing there is

re-inforcement to a stimulus -- say a stimulus like a gun shot, for example -- you have a stimulus of a longer duration that lasts say -- I don't know -- fifteen minutes to half an hour?

A. Yes.

Q. That's disturbing them. The animal, then, in response to this stimulus, runs.

A. Yes.

Q. Now, am I right that while this stimulus goes on there is re-inforcement in the animal's behaviour causing it to run continuously?

A. I can think of examples where that would be true, yes.

Q. So, the severity of this, of the ill effects due to running, that's what we are talking about now, would certainly depend, to a large degree, on the duration of their stimulus?

A. Yes.

Q. And its re-inforcement?

A. Yes.

Q. Whereas -- just to confirm this -- stimulus of relatively short duration that would cause the animal to run only say a few hundred feet, would

not be serious?

A. It depends, again, how hard the beast runs. As I indicated, your four hundred feet, it may take him one hour to recover from that.

Q. Now, in your paper, this Big Game Harassment is harmful, it is one of the articles referred to in your curriculum vitae?

A. Is that published in Oil Weekly?

Q. Yes. You have described there the metabolism of caribou and how much food they consume and so on.

A. Yes.

Q. And particularly what deficiencies of the running of animals would create and so on.

One point you say is that thus running a herd of one hundred caribou, assuming they behaved in the manner described, would cost a minimum of two hundred pounds of forage. Is this serious? As a single incident, of course not, but, if it is repeated often enough then it becomes another story.

A. Yes.

Q. So, we talk here

about frequency. That is a factor?

A. Yes. I will stand to that. Of course.

Q. And duration of stimulus is another very important factor. Therefore, would you agree with me, sir, that a person on a snowmobile chasing an animal for say half an hour, twenty minutes for that matter, might cause the animal to die?

A. Yes.

Q. Of course.

A. Of course.

Q. Particularly, am I right, in extremely cold weather?

A. Yes, indeed.

Q. Because the animal breathes harder and, therefore, he may freeze his lungs?

A. Not only freeze his lungs but it will do damage.

Q. Am I also right that a stimulus of a relatively shorter period, say over flying aircraft that is momentary, one minute, causes the animal to run one hundred yards, two hundred yards?

A. Yes.

Q. It may not cause any

damage at all?

A. That's correct, it could be, as individual stimulus. Yes.

Q. Am I right that in view of your close study of the barren-ground caribou in their behaviour --

MR. ESTRIN: The lack of --

THE COURT: The lack of.

BY MR. CHAMBERS:

Q. That the lack of your study -- I am grateful for Mr. Estrin's assistance to remind me of my shortcomings.

MR. ESTRIN: I want you you to be accurate.

BY MR. CHAMBERS:

Q. In view of the lack of your experiments and detailed study of the barren-ground caribou, am I right that you have, therefore, no opinion to offer about any effects of such things as aircraft -- low flying aircraft on the migration of these herds?

A. Not quite. I have an opinion and which I can offer as a scientist.

Q. Based on what? Before you go on, based on what?

A. Based on what?

Q. Yes.

A. On the sum total of available knowledge that is suggested, taught, discussed, written about, used in my experiments. I have an expectation, therefore, and also I suppose as a scientist -- pardon me, as a citizen's right to raise my voice about that expectation. That expectation is that, yes, it's conceivable.

Q. Fine. Does hypothesis --

A. This is a fact.

Q. It is hypothesis on your part?

A. It's expectation on my part. I am not using the word hypothesis because hypothesis is a scientific account of the statement. It is a technical term.

Q. Would you agree with me that you have no scientific data?

A. I have no scientific data on barren-ground caribou, of course.

Q. Or any change in any migration pattern due to low flying aircraft?

A. No, there is no scientific data at present because it has not been studied on that. That's correct.

Q. Now, we have heard,

of course, that caribou were traditionally hunted at crossings -- at river crossings and water crossings generally.

A. Yes.

Q. And that hunting them in the water was very common -- still is a very common denominator.

Now, would you say this kind of hunting is stressful to the animals?

A. The animals experiencing it immediately, yes.

Q. This would cause some animals, perhaps the ones that are not being killed, to run?

MR. ESTRIN: My Lord, before the witness answers -- I'm sorry again to rise -- my friend is asserting there is evidence in this case of animals being killed in the Baker Lake area in the water. That I do not believe is the evidence. He is asking him to assume that. That may be another matter.

THE WITNESS: Let's assume that.

THE COURT: I think the evidence of this being done is that that's the historical way -- efficient technique. Whether it is followed today or not, I don't

think the evidence is clear yet, anyway.

BY MR. CHAMBERS:

Q. Assume that -- or we know as a matter of historical opinion that caribou were hunted in water, and, therefore, were relatively defenceless?

A. Yes.

Q. While you do that, you would only get a few, of course, and the bulk of the caribou escapes?

A. Escapes, that's right.

Q. Would you agree, it is a very stressful experience to the ones that would escape?

A. It is stressful as an experience for the ones that are escaping, yes.

Q. And we also heard as a matter of historical opinon that caribou hunters were frequently hidden in blinds at river crossings?

A. Yes.

Q. So, when the caribou emerged from the water, they would then pounce on them -- these are my own words -- it is the way I understood the evidence.

A. My understanding --

and this is a second hand understanding of the hunting techniques -- has been that the caribou were observed on the migration, that the band guards were permitted to move on and through and that the hunting activities set on after the band guards of the caribou had been moved through -- I raised this very point in my report to the Berger Commission as, in this case, strictly a hypothetical thing because I was not aware this, in fact, was going on.

However, under these circumstances the experience of the animals that had been in contact with the human hunters is not likely to be terribly relevant to the migration of the beasts, because the band guard of the population has moved through and has moved through without the experience of human's having impacted them.

Q. But you would agree, would you not, Dr. Geist, that this type of hunting -- the dramatic way I just described -- it would be harmful -- I'm sorry, it would be stressful to the animals?

A. Yes. There are different levels of stress, of course, involved. I think it would be even more stressful if you would grab a hold of the animal, hold on

them and let them go. So, what the animal is experiencing is, by and large, escape, except for those individuals that fall by the wayside due to, I believe, spear thrusts through the small of the back.

Q. This type of hunting, especially by spears and the hunters emerging from blinds, would be a stressful situation to the herd?

A. To the herd that's affected.

Q. Yes.

A. Not to the herd that is beyond.

Q. But, it may be stressful to the point that it may cause the herd to run?

A. Swim.

Q. Yes. Well, when they are on land, they might then run?

A. Yes.

Q. Now, you are also aware, are you not, of tagging operations by the Wildlife Service?

A. Yes, I am aware of the tagging operation by the Wildlife Service.

Q. Are you aware as to

the technique that is being used?

A. I am aware that caribou have been caught in the water.

Q. They are caught in the water and tags are attached to the ears?

A. That's correct, and let go after.

Q. Let go?

A. Yes.

Q. Am I right, that this is regarded as extremely stressful to the animal?

A. I would think that would be right, yes, on the basis of experiments that we have done with mountain sheep and measure their response thereafter. That's correct. Yes.

Q. Is it not true that animals were shot in the area far removed from the crossings at which they were tagged? Is this not correct?

A. I did not get it.

Q. The animals were killed and tags were collected at spots far removed from the crossings?

A. Yes.

Q. Is it also not

correct that notwithstanding these tagging operations that animals return to these crossings quite regularly?

A. Sir, this is true in the sense that a fraction of the animals with the ear tags attached do return. I tried to make a point earlier on, that this is also true, for instance, in the experiments that were carried out in Alberta with prong-horn antelope which were caught. The only difference was that a close tab was held on all the animals that were captured and tagged. It was found that a certain percentage of these animals died several -- even several days after they had been captured. In other words, there is a loss associated. They have been harassed, in essence, to death and the damage they have incurred is termed capture-myopathy.

Q. Does the literature also disclose --

A. Pardon me?

Q. Does the literature on the subject also disclose -- the scientific literature on the subject -- to the vast majority of the animals that there are no long-lasting effects?

A. No, it does not.

Q. It does not?

A. No.

Q. The majority are ill-affected?

A. Pardon me. It only says that about 85 or so percent of the animals have survived. It does not follow the survivers to find out whether, in fact, they have suffered a decrement, whether they have suffered decrement in total life expectancy, whether they have suffered a loss in reproduction, whether that cohort of animals caught does not have in the next winter a high mortality than the cohort of animals that's not been so exposed. That literature is silent.

Q. Does the literature in any way reveal the opposite -- that there were, in fact, such detrimental effects that you fear or that you say you fear that might ensue? Is there anything in the literature on that, that there are still outbursts due to harassment, due to tagging operations? Is there anything -- any opinion expressed in the literature?

A. Yes, there is, and it is along the lines as I've expressed it. That is fear, in other words.

Q. Is there any positive evidence that this is what, in fact, happened? Not only fears, but that this, in fact, is what happened? Is there any evidence to that?

A. There is, to my knowledge at the present time, no evidence of the kind that you have asked -- in the specific instance that you've asked; namely, that animals have been captured and handled, so on, suffer one or two years beyond that a certain decrement in life expectancy, for instance.

There is some other literature, however, that shows, for instance, that in extreme, close association with human beings and some extreme unnatural circumstances surrounding the animals, leads to very significant population changes. But, unfortunately, this is not done in North America. It's done in Africa, in this case, with animals. So, there is evidence that the kinds of end results that we are concerned about here, in fact, can happen. The only trouble is that it's not done here on this land. The particular trouble is that it has not been done for the caribou.

Q. I take it there are

no barren-ground caribou in Africa?

A. Of course not.

Q. So one can only hypothesize from the behaviour of some other species in Africa?

A. Which is valid procedure.

Q. Which might happen to the animals on the Barrens. Am I right -- I believe you said this yourself -- that there are certain differences in different species -- subspecies in South Africa?

A. There are certain differences, yes, depending --

Q. The white-tailed deer behaves differently from caribou?

A. Yes.

Q. The caribou are more social animals than the white-tailed deer?

A. Yes.

Q. And a host of other differences?

A. Yes. Somewhat.

Q. Therefore, I take it that one has to take this hypothesization of equating behaviour of one species of animals with another, with a grain of salt; will you agree with that?

A. No, I do not, because there are certain generalizations that are possible. These are the generalizations that arise really from the study of the physiology of animals and learning mechanisms. We have not discovered that learning mechanisms in different species of mammals are vastly different. They are the same mechanisms. They may be better expressed here or there. There are some slight differences between higher primates or lower primates, for instance. But any time you test these animals with the expectation of finding anything different what you find, in fact, is the tremendous similarity they do have.

When you go into the whole field of bio-energetics, it's not the peculiarity of the species that affects the parameters of energy expenditure, it's the science, surface area, it's state of reproduction -- its reproductive state at any particular time. In other words, the species significance is meld into just simply the parameters of the difference in body size and shape.

Q. Dr. Geist, I mean particularly responses to stimuli, one

cannot hypothesize, to use --

A. Oh yes.

Q. You would agree with me on that?

A. Yes. That's right. What we have -- I would explain you the reasons why I agree with you and the way you have just now formulated the question -- that is, we do have a set of valid expectations -- valid in a sense that they do come true -- when you investigate them, and at the same time we do find there are some slight differences which, if we study, we discover and are able, therefore, to correct the total picture in turn. There has been, of course, a paucity of data of heart beat on the caribou in this regard.

Q. In fact, any real data, would you agree -- there has been a paucity of absence of any real data of the kind that you would like.

A. For instance, how caribou learn. Exactly. Is that what you are referring to?

Q. No. How they react to stimuli?

A. How they react to

stimuli?

Q. Yes.

A. On the contrary, there is some work available. We have the Russian, Bufskin, who wrote a whole book in which he goes through and does say, in some detail, how these animals respond to a variety of stimuli. He shows how the stimuli have been made use of by people in the herding of caribou, for instance. He goes through that. There is the paper that you have -- that we have had referred to Dr. Bergerud's paper. He goes through and describes the kinds of stimuli that caribou, in his observations -- he has done a lot of observations about caribou that do respond. There is literature -- a large body, in fact.

Q. Well, what I had in mind was more limited questions.

I am talking about more particular stimuli of the kind, for example, of low-flying aircraft at one hundred and fifty feet, flying fifty miles an hour over a herd of caribou.

THE WITNESS: What about

that?

BY MR. CHAMBERS:

Q. Is there any evidence at all how the caribou react internally, to put it more - -

A. How the caribou react internally?

Q. Yes.

A. There is no evidence on that.

Q. All we have is Dr. Calef's and similar studies.

A. We have other studies that show the external manifestations in the beginning, but not physiological response. You are quite right on that.

Q. Are you aware of any body of opinion in your field to the effect that areas that have been over flown by aircraft have been vacated by caribou?

A. No, sir, I have not.

MR. CHAMBERS: Those are all the questions I have. Thank you.

THE COURT: Ms. Koenigsberg?

MS. KOENIGSBERG: If I may, I just have a few questions.

THE COURT: If you only have a few, we will finish them before the recess.

MS. KOENIGSBERG: I'm sorry, My Lord.

THE COURT: If you have only a few questions we will finish them before the recess so the witness can be excused.

CROSS-EXAMINATION

BY MS. KOENIGSBERG:

Q. Dr. Geist, I missed out on something fairly fundamental to this discussion, and that is really a definition of the word harassment, as you are using it. If you can just help us to the extent of giving us, let's say, the minimum activity which you would classify as harassment?

A. Is it permitted to read from a document?

THE COURT: Certainly.

THE WITNESS: Thank you.

BY MS. KOENIGSBERG:

Q. Tell me the document you are going to read from?

A. The document I am reading from is a report from the Berger Commission called Harassment of Large Mammals

and Birds.

The term harassment is applied to actions which, on one hand, may only cause some excitement in animals; but on the other hand, may lead to panic, severe exertion and consequent damage or the death of the animal. Thus, the harassing stimulus is one which precipitates excitement, physiological state which is not always readily detectible externally. Since an individual may control its skeletal muscles while internally its organ muscles are preparing for instant exertion.

The term harassment, as you can see, is a term that has to be qualified with respect to the effect that it has over a period of time.

It is qualified by the intensity of the response that the animal shows to it.

Q. Would you agree with me that its use, as you are using it, scientifically, and particularly in relation to animal behaviour or the study of animal behaviour is somewhat different from that which is of its use in general English usage?

A. This may be the case. I say this may be the case because the way that I've been using the term harassment is very much how it has been used in relation to animal studies in the last decade. For instance, there have been documents produced in the United States on summaries of information pertaining to harassment. There is one in Colorado that comes to mind and, in fact, the little article that was referred to previously in my Oil Weekly was used a quick explanation of the whole harassment and all the attachments thereto in that case.

So, I am quite confident that when I am talking with colleagues about harassment, with other scientists, that we by and large understand what we are talking about. However, there may be a problem when we are talking to a larger public. If you would like to lead me on into that, I have not preceived of this problem but I would be glad to answer it if I can.

Q. I don't know if it leads to that problem. My concern is this: in reading your Affidavit, as a lay person, it would appear that you are

including a much broader range of activity in the word harassment than if I were to read the dictionary definition of the word harassment that I would otherwise include. In other words, you are including activities which a lay person might classify as minor disturbance; is that fair?

A. Let's stick with minor disturbance. Minor disturbances can avalanche themselves into rather detrimental consequences. In that case it's harassment.

Q. Let me understand you. Are you then saying that a minor disturbance -- for instance, the sound of a snow shoe, which you, I believe, mentioned is something which caused a startled response or observable response on the part of the animal in your vicinity. I think probably most lay persons would use the term minor disturbance as a very small, practically soft sound?

A. That's correct. That is our preception of it.

Q. And you would include this in the term harassment?

A. I would include that as being a harassing stimulus.

Q. Yes.

A. If it does lead to the animal's responding by extreme alarm and running off, yes.

Q. So, it is the consequence of the activity rather than the activity itself?

A. The effects. Oh yes. That is the focus that we must have in this case.

Q. So that we might not include in the term harassment a mining drill if we didn't see a caribou running across the tundra as a result of hearing it.

A. If you could demonstrate that the mining drill --

Q. Or any loud noise?

A. That the animal does not respond to it, it would not be harassing stimulus.

Q. I think I begin to understand how you use the word harassment.

Now, being of that category of human animals who are curious, in your Affidavit, and in particular paragraph 11 of your Affidavit, it begins:

"Harassment may be caused by stimuli and situations too inconspicuous or subtle for the uninitiated or

anthropomorphic observer to grasp."

I take it that is being a human observer?

A. Yes.

Q. Then it goes on but it's crossed out?

A. Yes.

Q. Can you tell me, and perhaps I should read it -- can you tell me why it was crossed out?

"Sights which we think should be frightening to caribou -- such as hunters, kayaks, villages, dismembered caribou carcasses, gut piles or blood at traditional river lake crossings need not be terribly alarming to migratory caribou, as evidenced by their continual return to these crossings, as well as by their direct responses for they seem to ignore the activity of killing, butchering, hunters and their work."

A. Okay. Information to that effect is contained in some incidental observation -- contained in writings by scientists -- who have made some observations incidental to this.

I personally have not seen

it. I cannot personally tell you that. I cannot personally attest that this is information that has been well enough documented, that has passed critical stages and reviewed and, therefore, be the kind of evidence that I think that I could defend. I cannot defend it. I have no personal experience on this line.

THE COURT: Perhaps we would see more Affidavits like that if more deponents were careful about what their lawyers put in front of them.

BY MS. KOENIGSBERG:

Q. The point is well taken, My Lord.

I would like to follow that up very briefly. Would it be your evidence then that you might expect some kind of activity of the type which you've described, that is stalking or predatory activity even if associated with the hunter, might be sufficient to deflect a herd of caribou from its traditional or ordinary migratory pattern and, conversely, that if one were to find herds of caribou meandering around a runways where airplanes frequently land, one would assume the principle we would apply is that that kind of stimulus is not harassing.

A. When you are asking

the question deflect the herd, that can have two meanings. Will it deflect the herd in the sense of incidentally making it change and the animals continue on the normal route. The answer to that is, yes.

If sufficient hunting takes place on a given herd, the herd experiences -- all the animals -- most of the animals experience what you have suggested; namely, a kind of hunting that's associated with a lot of disturbance to the animals. If that is so, then it is conceivable, though not demonstrated, that the herd might, in fact, deflect in such a fashion that it does not return in subsequent years.

Was there some other part to your question?

Q. I think you have -- and the converse of that, as I understood your evidence, is that if one were to find herds or parts of herds of caribou around runways where airplanes seem to land frequently, in particular, when the airplanes are in the act of landing, then one might apply in your principle to conclude that they did not find that kind of stimulus harassing or startling?

A. The airplane -- the landing?

Q. And the association?

A. I indicated earlier on there is a possibility due to a variety of circumstances that the animals have habituated to that. That is feasible. But, I am also aware of something else, and that's because a friend of mine, Dr. David Kleine, from the University of Alaska -- he visited us two, three weeks ago and gave a seminar on this very matter at our University to a group that's interested in responses of caribou, to the whole activities of the Alyeska Pipeline. He showed us one example of how public opinion can be manipulated. That was a group of photographers that photographed -- we saw the photographs -- it was a Hercules Aircraft landing. You could see the aircraft in mid-air, the caribou grazing in front of it. If you take a five hundred millimeter telephoto lens you can telescope the distance enormously. The animals are peacefully engaged in their normal activities. The writer, because it was an advertisement, states that they are able to make industrial activities and the life of caribou coincides -- they go with each other.

And then Dr. Kleine showed the next picture which was taken just a few seconds later when the aircraft had, in fact, turned and had

now -- it was now very close to the caribou.

The picture showed a stampede that was in process. The tundra was wet. There were clouds of flying waters and caribou antlers and legs mixed into it as the animals took off.

You see, it's valid that some caribou have habituated to the aircraft. However, it is also unfortunately true that a large number have not. One can go out -- a complex subject matter such as biology -- and find the antecdote that fits whatever view one wants to bring forth.

It is this reason why we have to try to, in an objective manner, get at the evidence so we can make a decision, one way or the other. It is conceivable that industry and wildlife get along. I am consulting in that very area. But, in this question of harassment of aircraft activity and caribou, the questions or answers that we can depend on are not in. Whatever we know about the subject matter itself simply indicates that we must know much more about it -- in respect to caribou -- is presently available.

Q. I have one last question. In your earlier testimony, as I

understood it, in talking about recovery rate from either electronically or external observations of activity, it seemed to me you were saying recovery rate is correlated, to some extent, with the amount of physical activity observed?

A. That appears to be the case, yes.

Q. Do I understand it that the less activity -- physical manifestation of activity that's observed, the faster the recovery rate?

A. That is something I would say yes to.

Q. So, that if one were to see a caribou rise and stand at a particular stimulus, one might say there had been an observable reaction, but in terms of cost to that animal, it would not be as great as if one were to see it actually run even a short distance?

A. That's correct. The only other point is how often is that caribou forced to rise? How often is it forced to forego eating?

Feeding is very important. It needs the time to get all the food it can into itself in order to produce milk, in order

to grow a large body, in order to grow the antlers. It is a matter of frequency. How often does that take place? What is the additional cost imposed on top of whatever else is going on that the animal has successfully managed to deal with it.

Q. One last thing. I think a number of stimuli were proposed to you as potential stimuli, under the category of harassment. We have heard a fair bit of evidence about motor boats going up rivers and so on. Would you expect that motor boats -- the sound of an outboard motor would be a harassing stimulus?

A. Well, I indicated to you in earlier evidence that if there is a roadway, be it made of water or concrete, and traffic moves along it, be it by boats or be it by cars, that we do know of instances where animals have habituated to them, including caribou.

However, it is a matter of the frequency with which these are being used. It is a matter whether the cars or boats stop and the animals preceive that they are being followed. It is not just simply therefore a matter of hearing a motor. We do know of examples where hearing a motor may mean

an escape or it may mean a moving towards that source, as you have read in the paper by Mr. Bergerud, of which I was aware of that example, as I am aware in British Columbia where felling of trees may cause caribou to approach, in fact, that stimulus. It is not a simple matter.

Q. Just on that point, do I take it that as far as barren-ground caribou are concerned, that when one makes an observation that a caribou does not startle at the sound of a motor boat, let's say, that one merely applies the assumption that the animal is habituated in order to explain that?

A. No, you can't. It can be either it is naive in the sense it's never met this sound before. It's meaningless. It does not respond to it.

The other possibility is that it's habituated, of course, and it has heard the sound before and it is going to ignore it.

Q. Those are the two assumptions you would apply?

A. Pardon me?

Q. Those are the two assumptions you would say to explain that?

A. Those are the two possible assumptions.

MS. KOENIGSBERG: Thank you.

THE COURT: I'm sure Mr. Estrin may have some re-examination. We will take a ten minute break.

THE WITNESS: Thank you, sir.

---Short Recess

--- upon resuming after the recess

THE COURT: Mr. Estrin?

MR. ESTRIN: My Lord, I do not feel Doctor Geist needs any further stimuli so I do not intend to harass him.

THE COURT: No re-examination.

MR. GOLDEN: My Lord, our next witness is Doctor Milton Freeman.

MILTON M.R. FREEMAN, BURLINGTON, ONTARIO: SWORN

EXAMINATION IN CHIEF

THE COURT REGISTRAR: Would you state your name, complete address and your occupation for the record, please.

THE WITNESS: Milton Freeman. I am a teacher. My address is 579 Woodland Avenue, Burlington, Ontario.

MR. GOLDEN: At the outset, may I have Exhibit A for Identification.

Before I begin the examination of Doctor Freeman, my Lord, I have discussed with him the means by which the second volume came into being, of the three-volume study. We have always treated them as one project. It is only because of weight and convenience that they were not bound together. It contains the supporting documents. I must say at the outset, again, I do not have any concerns about this volume going in as an exhibit, but I feel in view of the kinds of objections that have been made in respect to prior exhibits, that my friends might very well object to the content of volume two becoming part

of the record.

It contains a number of articles which do represent the opinions of authors that might either or might not bear on these questions. Since they are not before the Court, that is the people themselves are not before the Court, I think it better not to enter volume two.

I have mentioned this to my friends and asked them if they wished to have it tendered for any reason-- I would not pull it back, as it were-- if they did not wish to then I propose to withdraw volume two and simply tender this exhibit, which I will be doing in a few moments, as volumes one and three.

MR. HEINTZMAN: My Lord, I was asked if I-- my position wasn't volume two-- my position is that none of the volumes should go into evidence, but if any volumes go they have all got to go in. However, my position is none of them go in.

THE COURT: Well, we have got the maps from volume three in evidence now. They must go in. They have been extensively referred to.

MR. HEINTZMAN: You mean the particular maps referred to?

THE COURT: Yes. I believe it's 86/7/8/9 that were referred to in direct examination and, then, a number of the surrouding maps were referred to in cross-examination. I would have to go back to the earlier volume of my notes and find out which maps were referred to.

MR. GOLDEN: If the only matter in question is volume two-- I said this really out of consent and courtesy for my friends. I don't care. If my friend says all three go in I will put all three in. It contains some studies on the technology of the study itself - that is of the project. Then it has some discussions of the methodology and that sort of thing and, then, contains articles on the pre-history by various authors, and I think you have heard the names of all of them at one time or another, and contains articles by the previous witness. It also contains other articles on cultural considerations. It was intended to be a complete record of the learning that had been gathered as a result of the project. However, for purposes of evidence I wasn't at all certain that I could justify its admission. That is why I am withdrawing it, so I do not get into a hornet's nest over the admissibility over something I do not care about.

THE COURT: Mr. Graham, you were going to say something?

MR. GRAHAM: If my friend has not finished.

MR. GOLDEN: I am finished. I am advising the Court then that I am withdrawing volume two and not tendering it. I do that because I asked that all three be made as an exhibit for purposes of identification.

THE COURT: Are you still of the same view, Mr. Heintzman? Do you want volume two

in there?

MR. HEINTZMAN: My Lord, I do not want any of the volumes in there.

THE COURT: I appreciate that.

MR. HEINTZMAN: Am I required to say more than that? That is my position.

THE COURT: I assume volumes one and three are in. We are at the point where they are to be identified by Doctor Freeman. If they are, they will be marked. If they are not, they will not be.

MR. HEINTZMAN: We will have to deal with them when we get to that point.

THE COURT: Volume two is proposed to be withdrawn as an exhibit at this point and not fight about it later.

I guess if you want it in you will have to put it in because Mr. Golden isn't.

MR. GOLDEN: I will make it available to any Counsel who want to put them in.

THE COURT: All right.

MR. GOLDEN: Thank you, my Lord.

Q. Mr. Freeman, you are the Milton M. R. Freeman who swore an affidavit in this matter on the 20th of April, 1979?

A. Yes, I am.

Q. Your curriculum vitae is attached to that affidavit.

My Lord, may we take the affidavit of Mr. Freeman as having been read in?

THE COURT: Yes. If there are

no objections, the affidavit is taken as read.

AFFIDAVIT

I, MILTON M. R. FREEMAN, Professor, of the City of Burlington, in the Judicial District of Halton, make oath and say as follows:

I am presently employed as a full Professor in the Department of Anthropology at McMaster University, in the City of Hamilton, Ontario.

Now shown to me and marked Exhibit "A" to this my Affidavit is a true copy of my curriculum vitae.

I was the supervisor of, and assisted in the preparation of a 3 volume study entitled "Inuit Land Use and Occupancy Project". This study was conducted under the joint sponsorship of the Department of Indian Affairs and Northern Development and the Inuit Tapirisat of Canada. This study was commenced in September of 1973 and was completed in the fall of 1975.

The purpose of this study was to obtain a verified record of Inuit land use and occupancy in the Northwest Territories. The data on which this study is based was obtained from interviews with living Inuit as well as archaeological evidence.

Parts of this study refer specifically to the Baker Lake Area. They are as follows: pages 92 to 94, page 105 and pages 109 to 115.

This study establishes that

the Inuit have been in occupancy in the area of Chesterfield Inlet, just east of Baker Lake, since 1255 A.D. plus or minus 90 years.

Since 1959 I have been actively engaged in study and research regarding Inuit land use. In the course of conducting this research I have acquired an understanding of the Inuit culture and how the Inuit relate to their environment.

The ways that Inuit come to know things about their environment is preconditioned by their culture and very different from the western scientific methods that we are used to. One of my own professional concerns has been to try to understand more about their process of understanding.

Over the years that the Inuit have lived on the land they have evolved a very deep dependence upon the resources of the land. They developed a very comprehensive relationship with their environment as a necessary precondition to physiological and cultural survival. As far as the people in the Baker Lake area are concerned, their dependence on caribou is so great that I would assume that they have much greater knowledge than we have been able to elicit from them.

The Inuit's knowledge of caribou and caribou behaviour is accumulated from empirically tested knowledge passed on from older generations. It is subsequently applied in any given situation by syntehsizing from all of the important factors of the total environment, and all of their

acquired knowledge of caribou behaviour, an overall picture as to how the caribou will most likely behave in that particular situation.

The ability of an Inuk hunter to be able to predict caribou behaviour and hunt successfully has always determined his survival and status and is still considered to be the very essence of being an Inuk.

Even though in recent years the Inuit people have been living in settlements such as the Hamlet of Baker Lake, this has not diminished their dependence on the land and on hunting. The Inuit have both psychological and cultural needs as well as economic and physiological needs that must be satisfied and are satisfied by their relationship with their environment and specifically by their ability to hunt and eat caribou. These needs have not decreased, if anything they have increased by their recent centralization into the settlement of Baker Lake.

Caribou have a special importance to the people in the Baker Lake area because of the fact that this area is an inland area. Inuit in coastal communities are more able to satisfy their need to hunt by hunting marine animals, none of which are available to the Baker Lake people.

As a result, all of the survival and cultural needs of the people of Baker Lake have been met by the caribou. Caribou supplied them with materials for their fabricational needs,

their clothing, their tents, their boats, their fuel for lamps. There was virtually no part of the caribou that was not used in some way.

Obtaining accurate data on average annual caribou harvest by Inuit is extremely difficult. One of the highest estimates I am aware of for the Baker Lake community is approximately 4,100 caribou per year.

There are approximately 130 "hunter-families" in Baker Lake. Therefore, each "hunter-family" is taking approximately 31 or 32 caribou per year if we assume this estimate of 4,100 per year to be accurate. This is far below the average kill of approximately 200 caribou per year that we know that each Inuit hunter family traditionally required to survive when they lived out on the land and hunted with dog teams. This higher figure was traditionally required to feed the dogs as well as to provide for every necessity of life. The present estimate indicates a healthy dependence on caribou at this time.

The Inuit have a strong preference for caribou meat as opposed to other food sources. Part of this preference is aesthetic and part of it is biologically determined. The actual feeling of satisfaction and of well-being that is associated with being well fed is tied up with the consumption of caribou for both aesthetic and biological reasons. Being able to hunt caribou at certain seasons of the year is crucial for both

dietary and cultural reasons. When analysed, the seasonal patterns of hunting which are ingrained in the Inuit culture are found to be based on extremely rational reasons.

The Inuit culture has traditionally been a hunting culture. Hunting has always been central to their culture. It is valuable to this culture not only as an end in itself, but also as a means to other ends. Social ends such as the transmission of cultural values as to what is appropriate behaviour and the socialization of children are all given substance by relating them to the central activity of hunting.

I make this affidavit pursuant to rule 482 of the Federal Court Act, and for no other or improper purpose.

CURRICULUM VITAE

MILTON M. R. FREEMAN

BORN:

April 23, 1934, London, England

CITIZENSHIP:

Canadian

ADDRESS:

579 Woodland Avenue, Burlington, Ontario L7R 2S3

EDUCATION:

B.Sc. (Zoology), Reading University, England, 1958.

Ph.D. (Physiological Ecology) Zoology Department (1958-61) and Marine Sciences Centre (1964-65) McGill University, Montreal 1965.

Graduate Seminar, Ecological Anthropology, University College, London 1962-64.

FIELD RESEARCH:

Central Iceland (1952); West Norway (1955); West Spitsbergen (1957); Belcher Islands, N.W.T. (1959, 1960, 1961, 1978); Southampton Island, N.W.T. (1961, 1970); East Baffin Island, N.W.T. (1964); Grise Fiord, N.W.T. (1965,1966-67, 1970); Holman Island and Resolute Bay, N.W.T. (1974).

PROFESSIONAL ASSOCIATIONS:

Canadian Sociology & Anthropology Association: Member, SSRCC sub-committee (1972-74).

American Anthropological Association: Fellow.

Arctic Institute of North America: Fellow. Member, Fellows Committee (1973).

Marine Biological Association of the United Kingdom.

Canadian Society of Wildlife & Fishery Biologists: Member, Population and the Quality of Life Committee (1970-71).

Institute of Society, Ethics and the Life Sciences.

Canadian Population Society: Charter Member.

Canadian Ethnological Society.

International Work Group for Indigenous Affairs: Founding Committee Member.

Society for Applied Anthropology: Fellow. Member, Regional Accreditation Study Committee, Canada (1979-).

APPOINTMENTS:

Canadian Arctic Resources Committee: member, Social and Cultural Committee (1972-73).

Social Science Research Council of Canada: member, Human Environment Committee (1972-75).

International Social Science Council: member, Standing Committee on Environment (1974-).

International Union of Anthropological and Ethnological Sciences: Chairman, Commission on Man and Environment (1977-).

Association of Canadian Universities for Northern Studies: Chairman, Research Committee (1978-).

Department of Indian and Northern Affairs: member, Publication and Research Information Committee (1978-).

POSITIONS:

Field Investigator, Fisheries Research Board of Canada (Walrus Study, Hudson Bay, 1961).

Research Demonstrator, Biology Department, Queen Elizabeth College, University of London, 1962-63.

Research Scientist, Northern Coordination and Research Centre, Ottawa. (Study of Eskimo Sled Dogs, 1965-67).

Assistant Professor, Departments of Biology and Sociology and Anthropology, Memorial University of Newfoundland, 1967-68.

Assistant Professor and Killam Research Associate, Department of Sociology and Anthropology, Memorial University of Newfoundland, 1968-71.

Social Science Consultant, Abt Associates Inc., Cambridge, Massachusetts, 1968-69.

Associate Professor, Department of Sociology and Anthropology, Memorial University of Newfoundland, 1971-72.

Associate Professor, Department of Sociology and Anthropology, McMaster University, Hamilton, 1972-1976.

Director, Inuit Land Use and Occupancy Research Project, 1973-75.

Professor, Department of Anthropology, McMaster University, Hamilton, 1976-

Adjunct Professor, Faculty of Environmental Studies, University of Waterloo, Waterloo, 1977-

PUBLICATIONS:

Observations on the Kayak - Complex, Belcher Islands, N.W.T. National Museum of Canada, Bulletin 194:56-91. 1963.

An Ecological Study of Mobility and Settlement Patterns Among the Belcher Island Eskimo. Arctic, 20(3):154-175. 1967.

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RECENT RESEARCH FUNDS:

1973-74	Department of Indian & Northern Affairs	$ 73,400.00
1974-75	Department of Indian & Northern Affairs	269,000.00
	McMaster Presidential Committee on Northern Studies	2,500.00
	Social Science Research Council of Canada	2,880.00
1975-76	Department of Indian & Northern Affairs	190,000.00
	Inuit Tapirisat of Canada	75,000.00
	Science Council of Japan	1,100.00
1976-77	Inuit Tapirisat of Canada	40,000.00
	Department of Indian & Northern Affairs	4,250.00
	McMaster Arts Research Committee	500.00

1977-78	Guelph University-Donner Foundation	$ 3,850.00
	McMaster Presidential Committee on Northern Studies	2,000.00
	McMaster Dean's Development Fund	375.00
	McMaster Arts Research Commit ee	825.00
1978-79	Canada Council (GRIPES Program)	1,389.00
	Social Sciences & Humanities Research Council of Canada (Leave Fellowship)	10,470.00
	McMaster Arts Research Committee	490.00
	McMaster Presidential Committee for Northern Studies	2,680.00
	McMaster Dean's Development Fund	100.00
	Social Sciences & Humanities Research Council of Canada (Conference Grant)	1,690.00
	Social Sciences & Humanities Research Council of Canada (Research Grant)	30,282.00

BY MR. GOLDEN:

Q. Doctor Freeman, you have stated that you were the supervisor of, and assisted in the preparation of a three-volume study entitled Inuit Land Use and Occupancy Project. Volumes 1 and 3 of this study are before you now. Can you just briefly tell his Lordship, please, how the study came into being and what its purpose was and then describe briefly the methods that were used to create them.

A. Yes. This project was

initiated jointly by the Inuit Tapirisat of Canada, the National Brotherhood and Federal Department of Indian and Northern Development in the fall of 1973.

The purpose of the study was to document explicitly or detail explicitly the land use practices of the Inuit in the north today, and to speak of their occupancy. That is to say, all the derivatives, cultural attributes that are related to the use of the lands and also to document as best we could the history of occupation of these lands back as far as we could using whatever conventional and appropriate methodologies we judged to be the best means of achieving those ends.

The study was carried out over a two-year period. It consisted essentially of two parts.

The first part is reported in volumes 1 and 3. This was based upon extensive interviewing of Inuit hunters and also, in some cases, other adult Inuit who had material to bear on the subject in their communities all across the north-- the thirty-three communities, in fact. The idea being was to obtain individual land use histories of these people through their own lifetime as hunters or as land users, in the case of a woman who won't perhaps be hunting but would be gathering and using the land for other purposes.

This then resulted in a series of biographies, if you like-- land use biographies which are aggregated community by

community and are reported in as best and most concise form in volume 1.

Volume 3,which is also tendered here,are the maps which were prepared from this exercise, where people marked on the maps the areas they used, the extent of their land use through different periods of time.

There is another purpose which is reported in volume 1, and that is the occupancy. Occupancy consists of those values and sentiments and thoughts and various intellectual involvements of the Inuit which are dependent upon their use of the land which originate from and sustained by their continuing involvement with the land. This is reported also in volume 1.

Another purpose of the project, which is the subject of volume 2-- I don't know if you wish me to speak on that.

Q. You may discuss it, but we are not tendering it, but if it will help in your discussion, by all means.

A. Very briefly, volume 2 consists of those background materials which were not gathered from Inuit. That's why we put them in a separate volume. Those background materials would help people reading volume 1, who have no prior knowledge or perhaps limited prior knowledge of Inuit culture. We thought it would be useful to explain some of the things which might be implicit in things said in volume 1. Therefore, we explicated them by

using the best available authorities. In some cases, this consisted of asking people-- anthropologists, archaeologists-- to gather the data and write it up concisely for us.

In other cases, we utilized materials which previously had been published because we considered them to be reputable accounts and there would be no point in commissioning studies which would largely have to be based on the authority of people whose work was already written.

Q. Now, how long did the study take to complete?

A. Well, it took approximately two years. Then it took nearly another year to publish it because of the technical complication of doing the mapping and so on. Two years in preparation.

Q. We have already had the evidence of Tony Wellend, who was the director of-- serving under you for the Keewatin Region. He has told us a bit about his work in relation to this study. He referred to what they called a Verification Meeting in Baker Lake. There were a number of them. We have some exhibits here with respect to Baker Lake.

Was there a verification meeting at Baker Lake, and tell us if you were in any way involved with it.

A. Yes. I believe it was October or it might have been November of 1974-- by that time the field work had been completed and

written up by Mr. Wellend. And as was the practice with most of the other reports from the other communities, the report was circulated, sent back to the community in summary form. The maps which subsequently published were sent back in draft form. A meeting was held for the purpose of gathering together all the hunters in the community where they could examine the maps visually-- they were very large wall maps that were prepared-- and check them out and also have a verbal presentation of what had been included in the written report which had already been sent to the community ahead of our arrival by I think about a week or ten days. The people were to satisfy themselves that the information that they had given us previously had been accurately transmitted into their document which subsequently was published.

I was involved with that verification meeting which took place over a period of maybe four, five days.

Q. The meeting took four, five days?

A. Yes.

Q. How many people were involved?

A. We had about-- I can only estimate-- I think we had about 70 to 80 hunters in the community that attended that meeting and, in particular, some individuals who were considered to be especially knowledgeable, and these were usually older men that were expressly asked to come to that meeting

by organizers of the meeting in Baker Lake.

Q. Referring first to volume 1, you have referred in your affidavit to pages 92 to 94. Look at that and tell us if those are the pages generally entitled Northwest Keewatin District which include references to the Baker Lake area.

A. Yes, they do.

Q. Then I see also that you refer to page 105. There may here be some confusion-- a typographical error-- I gather the central Keewatin Region, starting at page 105, that that portion would continue through to the end of page-- the beginning 108 which then talks about the northeast Keewatin Coast?

A. Yes.

Q. It's really pages 105 to 108?

A. Yes. That speaks of the Baker Lake area.

Q. It is a slight error, my Lord.

THE COURT: Pages 109 to 115?

MR. GOLDEN: It should be pages 105 to 108. Then there is a further reference, I understand, in the end at page 114.

THE WITNESS: That's right, there is a short summary dealing with the contemporary situation.

BY MR. GOLDEN:

Q. I think I know how that

mistake arose. I apologize. No real consequence.

The question is, are those the references in volume 1 specifically dealing with Baker Lake area itself?

A. Yes, that's right. It's pages 105 to 108 and then on page 114.

THE COURT: When we speak of volume 3 of the Baker Lake area we are speaking of the area which the Baker Lake hunters claim they hunted, fished and trapped into, so on?

THE WITNESS: Yes. That's probably how the other pages got included.

BY MR. GOLDEN:

Q. I would think Mr. Wellend indicates-- I don't want to direct the witness to it particularly-- Mr. Wellend indicated this part of the report deals with hunters who reported while they were a resident in Baker Lake-- there was a cross-examination that overlapped and that's a separate matter.

We have had referred to us in volume 3 certain pages which are contained in what's called the Atlas. They start actually at the maps numbered 87/88/89/90. Are those the results of the work that was done with respect to the same region?

A. Yes, they are the maps.

Q. Based on your studies and your knowledge and your research in these areas, is it your opinion that the portions to which I have referred to in these two volumes represent a fair

depiction of the land use in relation to hunting, fishing and so on that is referred to in them?

A. Yes. The report of the third one was finished in 1974. We feel confident it is a fair representation of the land use up to that period in time -- to that date.

MR. GOLDEN: Thank you. My Lord, I might go to other matters now. May I have the two volumes together marked as one exhibit.

MR. HEINTZMAN: My Lord, I object to the introduction of those documents. I don't think it is satisfactory for the editor of this report to testify that he thinks the work was done satisfactorily to thereby qualify these documents as admissible through him.

He is qualified only to put them in if he is an expert, has done expert work and can give his opinion on certain matters which otherwise are hearsay. It is clear that the reports done by Mr. Wellend were his reports done by him. All of the other matters in these books fall in the same category. It's not satisfactory to call somebody else and have them admissible in that way.

MR. GOLDEN: Perhaps before the objection continues, I didn't realize we were going to get the objection of this nature. I can ask a few more questions relating to this matter before that.

THE COURT: Yes.

BY MR. GOLDEN:

Q. Doctor Freeman, referring back to volume 1, to the pages we referred to, what, if anything, did you do with respect to that text?

A. Well, Mr. Wellend's responsibilities were to carry out field work in these communities in the Keewatin and to provide a report based upon that. The field work occupied many months and more than one hundred interviews. It was an exceedingly voluminous documentation and supporting material in the form of tapes which were translated and which were available. On the basis of this I had to edit it for conciseness, and also for some consistency of style with other reports which were coming in from other areas of the Northwest Territories so that it could be a unified report.

Now, there was a fair amount of consultation with Mr. Wellend during this phase, and also during the actual field work when I travelled up to the Keewatin and met with him and a number of his field workers to ascertain that things were, in fact, going satisfactorily and there were no problems.

Q. This may seem obvious now, but was the field work conducted under your direction?

A. Yes, it was.

Q. Did you subject any of the material that is in the text, to your own scientific discretion and knowledge?

A. Well, insofar as we had certain expectations of what sort of land use we would

have described-- that would be described and we had devised a methodology to handle this in a way so that we could record the data electronically for computers and so on, we were undertaking a consistently-- consistent mapping of process which would have to be consistent over one and a million square miles. Therefore, there was considerable concern on my part as the director of the study that the work that was done was done according to fairly rigorous methodological standards.

Q. I see in the affidavit, in your curriculum vitae, you are described as an anthropologist. Do you have any specialty within the field of anthropology?

A. I hope so.

Q. Can you describe it for us, please?

A. Well, I am a social anthropologist which means I am not an archaeologist or linguist. My concern is to understand the social behaviour and the cultural implications for the people of that society, understand some of the rationale behind their behaviour and how their behaviour can be said to conform to rules, rules of their own society, their own culture. Most of my professional work has been conducted on Inuit societies in the Canadian north for a period dating from about 1958.

Q. Doctor Freeman, one last question: the result of the study in relation to Baker Lake to which I have already referred you, would they represent your opinion in terms of the statements

made therein?

A. Yes.

Q. I realize they are largely factual, but would you add the quality of your opinion to them?

A. Yes. I think the point is we were not breaking new ground. There is a considerable body of literature, as this Court knows, relating to Caribou-Eskimos and many other Eskimo groups-- Inuit groups-- and essentially there were, on my part anyway, certain expectations as to what data we would come up with. It was just a question of insuring the people in the north were providing this data and that we do not rely on published records. However, as the person who's assuming responsibility for the quality of the work, naturally I subjected it to whatever external checks I could find. If there were inconsistencies, I would ask for clarification.

Q. Just a moment, please.

I tender these as exhibits, my Lord.

MR. HEINTZMAN: My Lord, what we have to do is have a cross-examination on the nature of this study before you admit it as evidence, which he is competent to testify with respect to.

THE COURT: Being completely in the dark as to what the evidence is, I will sit here and listen to a bunch of cross-examination that I will not understand. I don't see how I will come to a sensible conclusion as a result of that particular

process. This is not a medical doctor to be called to testify as an architect. I do not quite understand how I could-- how such a cross-examination would benefit me in the absence of having the material.

MR. HEINTZMAN: My Lord, what you do have to do is determine whether this man is an expert in all of the matters referred to in these volumes. It is only in that eventuality that it is admissible through this witness. The standard procedure is for the witness to be examined as to his competence and to testify with respect to the matters which is sought to examine him upon. One of them is these three volumes. Unless your Lordship is satisfied that he is an expert in archaeology, anthropology, sociology, et caetera, throughout the whole of the Northwest Territories then this evidence is not admissible because that's what we have.

MR. GOLDEN: My friend is misreading. We have not tendered volume 2. I now know why. One and three deal solely with the factual descriptions. If my friend wants to make an objection, I will deal with the argument. I have not made argument on the admissibility yet.

THE COURT: If all we are concerned with in this law suit is the Baker Lake area, it would strike me that only the pages that are directly concerned with Baker Lake might come. At least we can get Mr. Heintzman off the whole Northwest Territories.

MR. HEINTZMAN: I think we can

start with that.

THE COURT: And into somewhat more manageable geographic context.

MR. GOLDEN: Well, of course, I could not care a less about the rest of the text. I have specifically referred to those pages. I have the inherent horror of tearing those books apart.

THE COURT: Having already seen them I don't frankly see the great benefit in tearing volume 3 apart. We would have to go back and find out which of the maps were referred to in cross-examination and so on.

MR. HEINTZMAN: I am quite prepared to do that and tear my volume apart because I think that's what we have to do so your Lordship has an accurate record. Insofar as volume 1 is concerned, if we can narrow it down to the study of the Keewatin, then, I can deal with that matter from thereon in. But with the greatest of respect, I don't see how it's relevant or admissible to put in matters relating all the way from the Belcher Islands, east, to the Mackenzie River.

THE COURT: Mr. Golden, are you satisfied that pages 92 to 94, 105 to 108 and 114 of volume 1-- that you really want in as far as being relevant to this law suit?

MR. GOLDEN: Those are the references for which I tendered the two volumes.

THE COURT: Yes.

MR. GOLDEN: May I make my submissions in support of the admission generally?

THE COURT: All right.

MR. GOLDEN: Perhaps we can overcome this.

THE COURT: Yes.

MR. GOLDEN: I think my friend knows that we don't want to rely on any of the other material. If he doesn't know now then I tell him that and tell your Lordship. We are not about to argue it at any time. It is a report. It was prepared and published. It was prepared in conjunction with the Department of Indian Affairs and Northern Development. It was published by that agency. I even hesitated to pull volume 2 and did because I didn't want to have to justify the sociological studies and that sort of thing as admissible.

When it comes to tearing apart volumes 1 and 3, it seems to be an inordinately extreme thing to do. I would object to it. It's not on the acetic grounds, but I think there is a limit of how we can negotiate the admissibility of evidence. If the document is a fair representation-- the witness is the author of the entire document, as it turns out, and it says that it is as a result of a research project, for which he was totally responsible.

Now, Doctor Freeman is a scientist in his own right. He has testified he has applied scientific knowledge and skills for the preparation of this particular report. It represents his opinion. If your Lordship reads it, your Lordship will notice it's largely a statement of observed fact.

There is not very much opinion type fact in it where a witness-- an expert witness often reaches to the writings of others and says, well, now, we know this happens and that happens-- he doesn't have to testify from his own personal knowledge.

Doctor Freeman is certainly in that position with respect to this report. More than that, he happened to have a hand in actually doing it, and more than that he happened to have responsibility in doing it. I can see no reason why it should not be admissible. I do object to the document going in in scraps of paper. I think that's-- aside from the aceticswhich horrify me, I think it is a disservice to the people who worked on it. Tearing it apart for the purposes of the Court, I would just rather we did not do that. If your Lordship pleases, I can certainly agree to undertake now to confine the matters in argument to the portions that we've already referred to.

THE COURT: Well, I wasn't concerned with the tearing apart of volume 1 because those pages can be xeroxed and then we can put those in. I am concerned about tearing apart volume 3 because it is in colour and it will not reproduce. I think as far as I am concerned that we can admit the pertinent pages of volume 1, have copies of them, and volume 3 can come in in its entirety. I will certainly not be referring to it beyond the maps that are specifically raised during the examination or cross-examination. Those are difficult enough to follow.

without voluntarily going into many other maps in the book as well.

MR. HEINTZMAN: My Lord, that seems to me to be a reasonable compromise, subject to this, that I may reserve and maintain my objections as to the admissibility as to the information contained in the pages marked as exhibits because, in my view, they are inadmissible because this gentleman is not an expert (a) in this area and (b) he did not prepare this study and (c) there are matters referred to in it that fall completely outside of his expertise. If your Lordship would like to have it marked as an exhibit, subject to that objection, that seems to me a workable way.

THE COURT: Mr. Heintzman, it's coming in as expert evidence. If you succeed in your cross-examination in shaking the expertise upon which it's founded then you will I suppose have achieved what you set out to do.

MR. HEINTZMAN: My Lord, my only submission would be to you that the expertise of the witness is a matter of initial ruling. That is clearly established in all the authorities. If your Lordship wants to note my objection and deal with it on that basis that I suppose is the most reasonable working procedure.

THE COURT: Okay. Mr. Graham?

MR. GRAHAM: My Lord, I am quite content because what I was concerned about is that which I drew your Lordship's attention to

yesterday about the affidavit and then you suddenly find you have a lot of documents not prepared. This was referred to in the affidavit of Doctor Freeman. In that sense, nobody is caught by surprise. I don't object on that ground. But I do think it is rather unusual procedure to have had the witness, who wrote this in the box the other day, and now we find it coming in through Doctor Freeman. I mean, I wasn't prepared to cross-examine that witness because I didn't realize-- he wasn't even qualified as an expert or anything else. He said he was a sociology student or had a B.A. or something. He is the author. Now we have Doctor Freeman. We could have examined him in the box the other day. Now we are getting somebody else to cross-examine.

THE COURT: It seems to me that Mr. Wellend was the author of this material. I don't know whether in fact he was.

MR. GRAHAM: His name is right at the top of this report.

THE COURT: You are one up on me because you have seen it.

MR. HEINTZMAN: My Lord, I asked him if he was the author and not Doctor Freeman specifically.

THE COURT: You can proceed perhaps with your examination on the full volume there, Mr. Golden, and get the xerox copies of the pertinent pages and get them marked.

MR. GOLDEN: My Lord, I don't

propose to ask the witness any specific question with relation to those pages in the text. I think it will take too much time by the time we read portions in. It will be simpler if when the documents come in to refer to them. I ask we get the Registrar's office to make xeroxes so we can get them back shortly. For the moment we will leave them here.

Q. Doctor Freeman, going on to other matters, how long have you been engaged in study and research regarding the Inuit and their use of land?

A. Well, at this point in time I suppose about twenty years.

Q. I should like, if you would not mind, to have you expand somewhat on what you said in paragraph 7 of your affidavit in relation to your understanding of the Inuit culture and how the Inuit relate to their environment, as you say in your affidavit, includes the land. Can you help us with respect to the Inuit relationship to land and the degree of organization or lack of organization, if you will -- whatever you find -- with relation to Inuit in the use of that land.

A. Yes. I think my interests in this problem -- this particular scientific problem -- are those of an ecologist. I use that term to mean somebody who is concerned to obtain a rather realistic view or rather a comprehensive view of an adaptation of people or society, if you like. Consequently, my concern in understanding languages is in relation to

not only what resources from the land are people using, but using and coming to rely upon, but also what type of organizational features of their society, what type of underlying values and sentiments even and beliefs which reinforce and codify their behaviour. It's not just making guesses as to-- it is not just a question of making guesses as to where animals might be or even having informed opinions, but what type of human organizational structures do people organize themselves into -- do they constitute -- to maximize their chances and minimize their efforts in obtaining the resources that they do require. So, if in fact my concern is-- to find out, first of all, how people are spread out geographically, if you like, on the land, and what is the basis in terms of resources that are in those locations and also what types of social functions do those types of human aggregations satisfy for purposes of an exploitative-- coherent exploitative pattern. Perhaps I can just say one thing: this requires being an ecologist by orientation, and this means that one does take a longer term view of this. One isn't concerned with saying in this moment in time people are doing such and such, because the real significance of that behaviour at that moment in time may be delayed, and I mean it may be preparatory with something that takes place next season. That is to see things in terms of an adaptation which is viable or gives viable fit and adapts society to its environment over a reasonable short run.

Q. In your study of this area

of your work you draw on the resources and researches of other disciplines. Of course, you are an anthropologist and it covers others. Just referring to the areas of anthropology and referring to other scientific disciplines.

A. Yes. I think anthropology is broad enough itself, being itself ecologically oriented and that brings in concerns with environmental science and biological sciences and so on.

Q. In relation to the concerns that we have in this Court with respect to the subject matter of this action, we are dealing with an area which is commonly known as the barrens but we have come to learn during the evidence that it should not be regarded as one but perhaps more than one area. As you know, we are dealing with the Baker Lake region generally. I would like you to draw your attention in giving your evidence primarily to the area which, generally speaking, surrounds Baker Lake, say to the radius of one hundred miles or so, just to keep us out of the woods as it were.

Doctor Freeman, have you been able to reach any conclusions with respect to the degree of organization and cultural identification with the use of land by persons living in these areas?

A. Well, there are two lines of attack I suppose to find this out. First of all, we know something about how Inuit-- we have information on Baker Lake. We also have information on the adaptations of Inuit in other regions, some of

which are more closely similar to the barren grounds or Baker Lake area than others, but then there is also a concern to use comparative approaches which go even further and to try and obtain clues, analogies, if you like, or models of how these societies behaved based on the evidence of perhaps hunting and gathering societies elsewhere, who are also at that particular level of-- or organized in a similar way. We called this the band level society. They are not chieftains or states or nations in the sense that sometimes those terms are used, so that the technical term would be a band level society.

Q. Please go on. Help us by describing what happened.

A. Well, what can one say? Band level societies, generally, are societies which have quite a low population density. The people are nomadic and they tend to exploit a variety of resources in their areas, and tend to be generalists in terms of economic orientation, unless that's clearly impossible because of the restrictions on resources.

They tend to be societies which have particular types of political organization, particular types of economic organization, social organization, and certain types of leadership, certain types of marriage patterns, so on. We sometimes regard them as being very flexible. One of the reasons for this is that they have problems often of dealing with environments which perhaps from our agricultural basis would be seen to be somewhat

marginal. It is not at all necessarily true that they are marginal to the people concerned, but these tend to be areas that geographers would call marginal lands. They don't usually support agriculture.

The people in question then have a particular type of organization and culture and values which best suit them for living in that type of an environment and exploiting resources which often themselves are nomadic. This is one of the bases in these societies. I think the important thing is that we look for patterns. We are not just concerned to attach ourselves to say, as an anthropologist, one small camp, which might be five, six people, and from that obtain all the information about society which might encompass anything up to three, four hundred people. It may be even more. So, consequently we see the units as being units of a much larger coherent organized society and very much interacting, interdependent, mutually dependent on interaction with other units within the society.

We can certainly recognize what we called bands, even though units of the bands might be small camps of twenty, thirty people. But, the band is an aggregation of these camps which forms a definite sense of community. This is one of the defining characteristic of a band. The people there, for a number of reasons-- common language, dialect, having a common ideology or value system, having commonality in terms of the land they use and a degree of interaction which would be more frequent with people

within their bands than people outside of their bands -- this all constitutes a very coherent society which anthropologists have no problem in identifying any more than the people have a problem knowing where the boundaries are.

Q. Now, what are the characteristics by which we might identify-- you mentioned language-- are there any other bonds that might pull together a society such as the nomadic hunting peoples that we have heard described?

MR. HEINTZMAN: My Lord, before this line of questioning goes on any further, I want to object to it. It is not referred to in the affidavit. This affidavit is directed specifically towards the relationship of the Inuit to caribou. There is nothing in this affidavit relating to band societies, the kinds of things which Doctor Freeman has been testifying about. I object to him testifying on that. Particularly, we have not even established that this witness has any expertise with respect to band societies in the Baker Lake area.

On both those grounds, I submit this evidence is inadmissible.

MR. GOLDEN: Paragraph 7 of the affidavit reads:

> "Since 1959, I have been actively engaged in study and research regarding Inuit land use. In the course of conducting this

research I have acquired an understanding of the Inuit culture and how the Inuit relate to their environment."

How they have done that is by band. We are dealing with the witness-- the witness is dealing with that paragraph and that statement.

In paragraph 9 the witness has said:

"Over the years that the Inuit have lived on the land they have evolved a very deep dependence upon the resources of the land. They developed a very comprehensive relationship with their environment as a necessary precondition to physiological and cultural survival. As far as the people in the Baker Lake area are concerned, their dependence on caribou is so great that I would assume they have very greater knowledge than we have been able to elicit from them."

Now, certainly if the witness drops a word like band in the course of discussing this it doesn't become inadmissible because he hasn't

mentioned that word in the affidavit. I think my friend should take more care to assess the central meaning of what is being said than to watch for each individual word as it comes out of the witness' mouth.

MR. HEINTZMAN: The way this evidence is going, my Lord, is towards a discussion of band societies and relationships for various groups of people, none of which evidence my friend sought to elicit from his very own witnesses in Baker Lake. I was the only person who sought to elicit that evidence.

Now, I see us going in a direction relating to that kind of evidence. I will object strenuously to this witness' testifying about that matter because I am not prepared to cross-examine him based upon that affidavit. It does not speak to that issue at all.

If my friend has accidentally got into this area, fine, but he can accidentally get out of that area. With the greatest of respect, I submit that the witness is confined to what is stated in his affidavit.

MR. GOLDEN: I am taking the witness to the point of organization that is necessary to deal with the question of how they relate to their environment, how they relate to the land and how they relate to the utilization of caribou.

THE COURT: Well, under the rule the witness is entitled to explain or demonstrate what is in his affidavit, or parts thereof. If that's

what he is doing, which is not yet obvious, then, he is entitled to do that. I am kind of with Mr. Heintzman. We are getting a little bit beyond where it's obviously connected with either paragraph 7 or 9.

MR. GOLDEN: My Lord, we can deal very briefly with that. Doctor Freeman, I would like you to discuss, if you would, please, the methods by which-- the manner by which the Inuit living, as you have described them, come to deal with their environment? For example, what utilization they make of whatever organization they have in relation to hunting. I am not now speaking so much of the Inuit living presently in Baker Lake, who we examined up there, but I am talking about the culture as it has evolved in the recent past, but certainly behind the days of the settlement in Baker Lake.

THE WITNESS: Well, I think there is continuity, your Lord, between the way the Inuit are doing things today and the way they always have done them insofar as some continuity-- and I qualify that-- insofar as even if behaviours may change on the surface-- very often behaviours are supported or justified or can be rationalized in terms of values which may be very persistant.

Now, clearly the Inuit, if they are trying to categorize them, and Baker Lake Inuit in particular, would be regarded as people who share things, people who cooperate-- there's a high degree of cooperation-- and so on, and this is in

terms of material goods, but also information, and clearly hunters, who as I have said earlier, discussed the rather low density of the land and have limited ability to see and scan, that require the information collection of neighbouring people-- the people that are living in neighbouring camps to spread this intelligence-- to spread the information about where caribou are and so on. So, we see people living in a certain area, and we cannot regard them necessarily in isolation. The society as a whole is concerned to harvest the resources and see it through and to fuel its biological requirements for food. The people will make a best estimate as to where they should be at a certain time for a certain harvesting, exploitative activity. However, should their best estimate fall short for caribou, for a reason which could not be anticipated-- generally speaking society understands that and understands that it has to build an insurance. The distribution pattern of people over the landscape reflects this, that people cover off the options in small groups.

Q. Can you describe how that happens?

A. For example, in relation to caribou crossings-- and I think the Court has heard how important seasonal hunting a caribou is at the crossing places in the fall-- you may have a certain number of potential crossing places, but nobody can say that we are one hundred percent sure that the caribou or a large number of caribou will--

or any one caribou will cross. They have various-- presumably various probabilities-- rationalizing that this is the best place to be on the basis of the evidence they have. But, the society itself is made up of more than just one camp. So, a large number of camps have four, five. Each camp may be found at a different point along the potential area where people will cross.

Q. Where caribou may cross?

A. The caribou may cross near this particular water cross. Should one camp find caribou don't come,well, then, they just move at the end of the season to-- they go to another camp that has more success in caribou hunting at another time of the year. This is what I mean by information, it is shared to make these best estimates of where to be, but also the production themselves from the hunt will be shared, because this year you may have good luck and next year you may not and you require this type of cooperation, this type of sharing resources. So, this is one organizational feature then that we studied and are concerned about-- a degree to which people have networks throughout the larger society than just the immediate society with just a few families gathered together.

Q. Is there any other way in which these networks or this degree of organization affects the use of the men. Are there any negative things -- I am thinking perhaps of the commonlaw idea, if I may put it that way, of excluding people from possession; is there any concept of that? If you had your caribou crossing and somebody else didn't, was there any concept that you would keep another person off?

A. No, I don't think one can speak of this caribou crossing as being mine or anything else like that. There are clearly rules that govern the disposition of resources and the access to resources or the locations and so on. These are set out quite formally, if you like, in the sense that people in the society understand them. They are, if you like, codified. And it relates to prime occupancy. It relates to more or less the claim that an individual might state by using an area, in an informal sense, surrounding some other area, and these resource harvesting areas may be known to form sort of a complex of things. So, an individual may be associated with Ferguson Lake, this end of Schultz Lake or some other lake because he tends to exploit things over a period of time in that general

area. But, there is no sense that people can -- the important thing in a society like this is that people co-operate, that people work out an effective way of minimizing conflicts, and that means no matter how informal these rules may be that people necessarily understand them and obey them and know how far they can go before they cross over and cause offence. So, some of the clues are very, very subtle and very difficult for anthropologists sometimes to understand. I think the members of the society understand them. In that sense, it's perfectly functional.

However, it would not ever get to the point where an individual could ever say that he had exclusive use to anything, including anything that he owned, anything placed in a cache and gathered by a person and intended for their own use, presumably. They just did not put it in there for charity.

Nevertheless, the underlying assumption is if somebody else used that cache, they had a need which was greater than your need at that moment in time and, therefore, it explains a way and it minimizes the potential conflict that will arise The people will believe charitable things of other people because they don't know and will

not make a hasty decision which will precipitate conflict in the society.

Q. I think we have a few things to learn from that.

I would like to go to another area. That is the question of the ability to predict and understand caribou behaviour, to which you referred to in your Affidavit. This is the ability in the Inuit to predict and to understand it.

First of all, how does he acquire that and, secondly, to what degree is it important?

A. Well, I think we have to see that traditionally hunting was clearly of prime importance in the society. The young people would have been expected, if they were male -- if they were boys -- to at a very early age start acquiring competence as hunters or preparing themselves for future competence as hunters. This would require an apprenticeship of many years duration which starts quite young, where a youngster would hear the stories, would hear the information being recounted, and, then, when old enough would accompany his father, uncle or whoever was appropriate and witness things and have things explained. They go through a whole process of soaking up the

very large body of information which people have accumulated over many generations.

So, each man goes into the action of hunting -- or the occupation, if you like, of hunting -- equipped with the information accumulated, which his father, grandfather, so on before him, have brought along. Essentially this is tried out through experience, individual practices, these things he has learned, and modifies them according to his own strength.

Some people have better eyesight than other people. Some people have more patience. So, they will adopt different strategies. There is a vast range of strategies open to hunters for hunting. They can bring in changes and prefer one technique over another technique according to their own personal predisposition -- those things they find they do best. Even in hunting, they can become specialists within certain techniques.

Now, very often hunters reject particular techniques. There are hunters in some areas, that I know, who, at an early age, acquired an aversion say for going in kayaks. This may be from a bad experience or something. That particular aspect of hunting is something they do not do.

However, they will spend the season when other people will be hunting in kayaks, and they will be doing other things. They make their contribution that way. But, there is a great deal of flexibility with the range of techniques that the Inuit learn.

Q. You mentioned earlier -- I took you off it by another question -- when I identified the period and said that I would like to get behind the settlement of Baker Lake you said that some of the matters you were discussing were not necessarily -- did not necessarily disappear to the settling of Baker Lake.

Could you help us, please, to identify the elements in the culture -- if I may put it this way -- may have survived the trauma of settlement in a southern type of community?

A. Yes. Well, the justification for me saying that -- perhaps I should have said this earlier -- is because not only is hunting a means to an end -- it is a way of making a living -- but it is also an end in itself. I mean, hunting itself is satisfying and validates certain types of things. Unless some other equally satisfying means of validating one's manhood or one's

sense of cultural identity as an Inuk, a member of a hunting society comes along, then, we would expect that hunting persists in some form, even in a modified form. It is to satisfy that particular need, the particular expectation of society.

The other thing, of course, is that hunting itself is not just a question of going out and killing animals. I think it is very important to stress that for the court. We are concerned with the acquisition which is going out and killing animals, if you like, but it is made up of various parts, like acquiring the knowledge to enable you to do that, the stalking, the scanning, the actual killing and the retrieval, so on -- all the things that go into the complex of successfully harvesting an animal.

But, beyond the acquisition we are concerned with the distribution of the material which has been obtained, whether it's caribou, fish or whatever, and this accords to certain rules. This, therefore, supports the idea of sharing and co-operation, because the people will share along the established network, which are these bonds, that this flexible society requires to maintain, and keep operational to exchange information and

goods and to be a coherent society, and for all sense, of other communities.

Then beyond distribution you have the consumption of the goods. Sitting down and consuming caribou meat will have certain built in pluses, if you like or certain attributes -- like sitting down and consuming Kentucky Fried Chicken or something wouldn't have this to the caribou hunter. So, in effect, there are many component parts. So, we would expect, even if hunting becomes difficult because people are living in Baker Lake, nevertheless, because there are so many outputs from hunting -- never mind the new sorts of inputs like skidoos and things and so on -- however, there is a whole lot of importance in terms of doing things that are comfortable and in a way which make sense of a coherent way for society that fits in with these other values like sharing, co-operation and generosity and not being stingy which I suppose is important. You cannot always be generous because you don't always have things to be generous with, but you can manifest by not being stingy even if you have very little by sharing very little.

All these things are reasons why hunting will continue, and the values underlining it, the behaviours associated with

it -- will continue to have salience in a society like this.

When I said we can recognize there are changes in terms of people's behaviour from before they were in Baker Lake and now they live in Bake Lake we can also expect there are a lot of things that are perhaps under the surface which can manifest, validate, which can be actualized by some level of hunting and which are very difficult to actualize when one doesn't come and have to substitute other behaviours completely to achieve those ends.

MR. GOLDEN: Thank you very much, Dr. Freeman.

I have one slight problem, My Lord. I have been able to get the pages xeroxed but page 93 seems to have lost a little of the xeroxing. It is complete but somewhat hard to read. I shall like to re-do page 93. It will just take a moment. I think we should file it while Dr. Freeman is still in the box.

THE COURT: He may still be in the box tomorrow.

MR. GOLDEN: Those are all of the questions I have of Dr. Freeman, My Lord.

THE COURT: I guess we will recess for the night as soon as you get this exhibit filed. We will see you at 9:30 in the morning.

MR. HEINTZMAN: May I have the one article that we referred to today by Dr. Irving that was marked as an exhibit? It is the hangover from this morning's proceedings.

MR. GOLDEN: Out of the book?

THE COURT: The one from the book, yes. It's I-9.

MR. CHAMBERS: My Lord, if I can ask the court to release Exhibit D-1 to us overnight that would be extremely appreciated because the witness in our case will have to testify to things pertaining to it.

THE COURT: All right. That is fine too. The Registrar will take care of that for you after we recess.

The article by Irving was Exhibit I-9.

MR. GOLDEN: The Registry Office being much more sane than I think we are have closed for the day and I cannot get the page redone.

THE COURT: In that case,

perhaps you will not close your examination in chief until the first thing in the morning.

MR. GOLDEN: Perhaps we might then have volume three marked. It is one of two parts of Exhibit P-22. That will be P-22 perhaps B because of the consecutive. P-22A would be the xeroxed portion of the volume one. It is seven pages in length. I better make sure that's exactly what we need. There was also a reference to page 114.

THE COURT: That's correct.

MR. GOLDEN: That was not included. I will have to have that included as well.

THE COURT: All right. Well, you can do that over night and you can finish your direct examination in the morning.

---COURT ADJOURNED TO June 1st, 1979 at 9:30 a.m.