

of transportation development. Highway engineers do find that there tends to be an oversight in respect of the people along side and the noise and other associated problems which are not directly the concern of the highway authorities, and that is where we would like to put our emphasis.

Senator Grosart, it seems to me that, in research programming, the opposite of segmentation may be collusion.

Senator Grosart: Collusion sounds a little like back door politics.

Mr. McTaggart-Cowan: Mr. Chairman, another specialized arm of research in transportation is in the region of perma-frost up in the Arctic. Other witnesses may have mentioned the example of the tractor trains which for years have been the standard way of moving goods in the winter in the middle north without really hurting the environment. However, they misguidedly ran a tractor train up over the perma-frost in Alaska and that did disturb the environment. They now have a gully that is presently 16 feet deep, and it won't stop there. It is an irreversible damage to the environment.

Another example is when they were putting in seismic lines in the perma-frost, they got a bulldozer blade and stripped the cover off the perma-frost, to put down their seismic instruments and the result is that now they have formed a chain of lakes up there. This again is irreversible and it is a problem which has to be tackled as a matter of urgency as one which is changing the whole environment. The problem is transferring the technology from the lower part of the middle north up to the arctic coast and it does real damage.

Professor Lloyd: This is not a matter of lack of scientific knowledge. Canada is probably the leader in basic research on perma-frost in the world, if not the Soviet Union. We have been trying to get this information to the bulldozer operator or at least to his boss.

Senator Grosart: It has been suggested to us that there is a feeling that we are a long way behind Russia in our research and development of the north and it has been rather vehemently denied.

Senator Yuzyk: I have a quotation here from Mr. R. A. J. Phillips, of the Privy Council Office, who stated that the Russians already know more about our side of the arc-

tic than we do, and that we are behind the Russians in work on arctic sea lanes. How much do we know about what the Russians know? I am referring now to the *Ottawa Journal* of November 28, 1968. He also stated that if Canadians are not willing to pay taxes they may see the arctic taken over by the Russians and the Americans.

Professor Lloyd: I think we have two separate questions here. Mr. Phillips has been in the Soviet Union and he was in External Affairs a long time ago. I have tried to go to the Russian arctic. I was in Russia six times and each time I thought I was going to the arctic and the last time I got as far as Murmansk which is just the beginning.

I think it is true that 20 years ago the Soviet Union led us both in the science and the application of science to the far north. But we have to remember that all Russians live much farther north than we do. Leningrad is up where Churchill is, or somewhere in that region. Secondly we must remember that they have been at it for a very long time.

The Chairman: And I am prepared to leave it to them in each case.

Professor Lloyd: The first crossing of Canada took place in 1789 and they did the equivalent crossing of Siberia in 1648.

Senator Grosart: The American made their crossing after us, and they have done all right.

Professor Lloyd: Another point to remember is that the Soviet Union had a determination to explore all parts of the north including the Arctic and they did it very systematically. However, from my point of view, the Russians in the Arctic do not do any better than they do in the south. They do not build any better towns and they do not use any better equipment up there. I have seen it in the south, and I am not terribly impressed with it. I do not think we have anything to learn on the applied side. They of course spend enormous sums of money and the Government has scientists working in the north over 20, 30 or 40 years. It has spread over several generations, while Dr. Löken is the third generation of Canadian glaciologists. We have something to learn from them about national policy and we have a good deal to learn about individual scientific effort but that does not indicate that we have anything to learn about the technology involved. Miss Dunbar, who is here, and who speaks Russian, may like to add a word on this.