

## THE OIL INDUSTRY IN THE ARCTIC

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There is general concern with progress of northern development and the role that research can play in hastening that development. Permafrost will play a major role in most phases of northern progress since it affects exploration, transportation, engineering construction, townsite location and many other factors that are taken as marks of civilization.

Possibly the measure of research effort required can be defined by the amount of activity presently in the north, together with the firm commitments already made for work there in the next 4 or 5 years. In the past 10 years some 18 exploratory wells have been drilled in the arctic and subarctic. Exact costs are not available but they are in the order of \$13,000,000 for these wells alone.

The following table illustrates more recent expenditures of the oil industry.

Year	Exploration Including Geophysics	Drilling	Total Including Land Acquisition, Overhead, etc.
1961	\$9,000,000	\$3,500,000	\$16,600,000
1962	--	--	14,100,000
1963	6,500,000	6,500,000	16,500,000
1964		Projected at about	<u>\$18,000,000</u>
		Total	\$65,200,000

Total land under lease now amounts to 112,750,000 acres of which about 13,000,000 acres are offshore. It is interesting to note the increasing emphasis on drilling-- this trend will likely continue.

In addition to the dollars already spent, additional large sums are already allocated through normal rentals or work obligations, plus work bonus deposits for work to be

carried out from now until 1970. Latest figures show these projected totals to be from \$45,000,000 to \$50,000,000 for the mainland. Additional large sums have been earmarked for work on the Arctic islands although the greatest activity is projected there beginning in 1968 or 1969 and this will depend on many outside factors.

This level of activity may be surprising. Actually there is every prospect of it increasing. The arctic is a relatively unexplored region; its future rate of development will probably be exceedingly rapid compared to the development of other parts of Canada. Certainly, if the expenditure of these large sums of money is successful in finding reserves of oil sufficient to reach available markets, then the development of at least a portion of the arctic will be assured.

Under these conditions, there is no doubt that the research planned now for the North will be of great benefit to those who must live and work there in the future. What are some of the problems to which research may best be directed?

(a) Land forms and surface cover must be recognized from aerial photographs and related to trafficability. Possibly with experience such photo interpretation can be done with the readily available standard photography; if not, changes in scale or quality may provide the solution.

(b) Transportation, particularly cross-country, is a major cost in exploration. What vehicles should be used over frost-mound tundra? How are wildcat access roads to be built? How are sources of fill recognized? What importance is the subsoil to long-term trafficability, etc?

(c) What are the problems of seismic interpretation in permafrost areas?

(d) How are foundations for housing, drill rig structures, etc? Perhaps there is enough information on hand which could be made available in handbook form to help in the selection of drill rig foundations for varying soil, terrain and time conditions.

(e) What are the most reliable sewage disposal and water supply methods for portable camps, short-term drilling camps and permanent townsites?

This list highlights only a few of the many unknowns involved in northern development. They are problems that are common to other industries, particularly to the mining industry. Wherever research can be directed to solving these problems, it will be certain of early and profitable application. In fact, the early solution of some of the more difficult problems will have a direct effect on the economic attractiveness of northern prospects. Successful well-directed research is therefore a necessary forerunner of northern development.

The information in this discussion has been prepared by the Canadian Petroleum Association and the suggestions and ideas emanate from the Muskeg and Permafrost Subcommittees of that organization.

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