

ECONOMICS IN GEOPHYSICAL EXPLORATION*

by

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INTRODUCTION

This paper will be confined to discussion pertaining to the Seismic Explorations of Western Canada. Those familiar with Seismic Exploration are aware of the wide cost range involved. In making an estimate of the probable cost in any exploration program, it should be possible to narrow this range to useable figures.

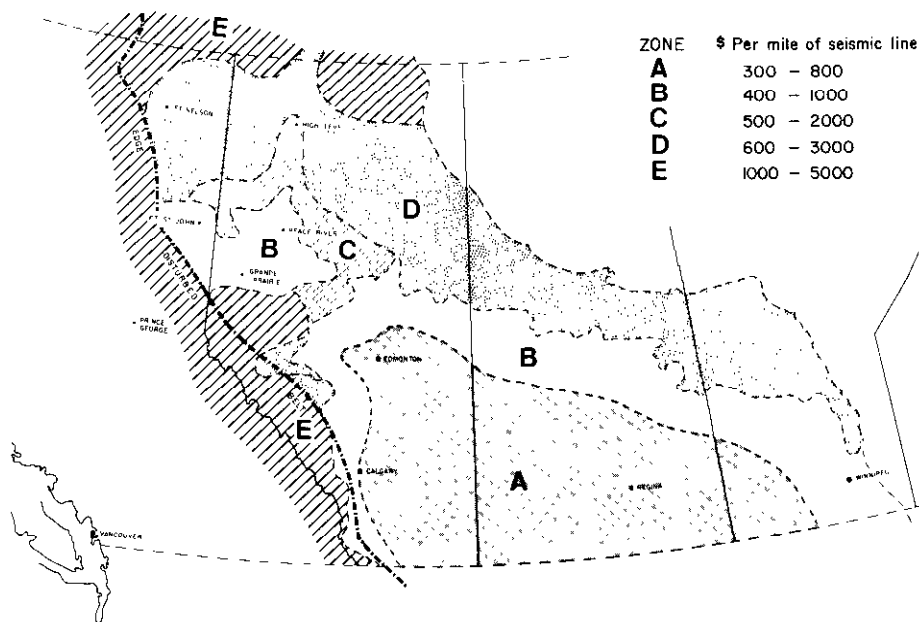


PLATE 1.—Seismic cost zones for Western Canada.

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Plate 1 shows *Seismic Cost Zones for Western Canada*. This has been prepared from past experience and represents, in general terms, what cost ranges might be expected.

Zone "A," which may be described as the Plains area, roughly corresponds to the developed area of Western Canada where a good network of roads exist.

Zone "B" (Parklands area) is reasonably accessible. However, the road system is inferior to that in Zone "A."

Zone "C" is generally accessible but covered with bush and muskeg.

Zone "D" is bush and muskeg with poor accessibility.

Zone "E" contains the Foothills area as well as the northern Muskeg areas with poor accessibility.

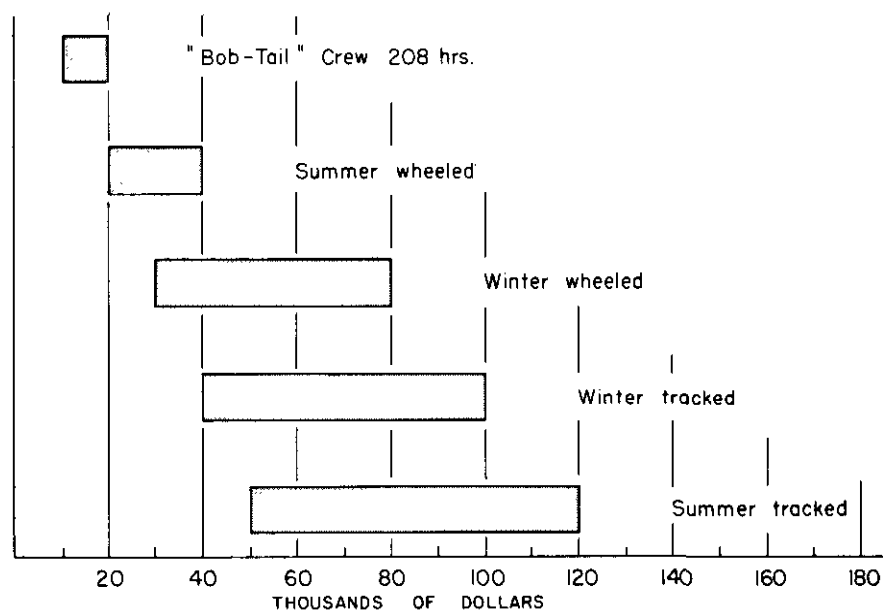
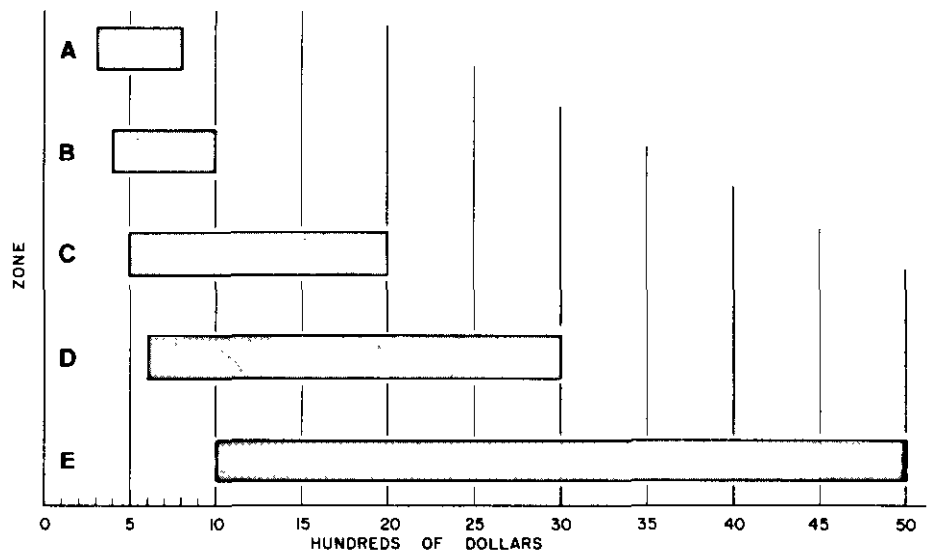


PLATE 2.—Cost per seismic crew month.

It will be noted that the cost per mile of seismic line ranges from \$300 per mile in Zone "A" increasing with each zone until reaching \$5,000 per mile in Zone "E." This range also covers conventional 100 per cent coverage at the lower figure to multiple coverage such as C.D.P. methods at the higher figure.

The Cost Per Seismic Crew Month is shown in Plate 2. Here the range is arrived at by using a very small crew working 208 hours a month up to a large tracked crew working in excess of 400 hours per month. The amount of supporting equipment such as extra drills, dozers, and portable camps greatly influence the monthly cost. The range noted here varies from \$10,000 to \$120,000 per month.



Effect of C.D.P. "common depth point", multiply single coverage cost by 1.2 to 2.0

PLATE 3.—Cost per mile of line.

The Cost Per Mile Shot as shown on Plate 3 is the most usual yardstick used in cost analysis. Here we see the range of costs as experienced in different cost zones of Western Canada. C.D.P. requires a large increase in the number of shot holes per mile, which is the largest contributor to increased costs. Another cost of interest here is the cutting and clean-up cost. \$100 to \$500 per mile cutting—\$50 to \$410 per mile clean-up.

Use of helicopter can add to costs ranging from \$100 to \$600 per mile. The cost range shown here is from \$300 to \$5,000 per mile.

The Cost Per Acre of Land Evaluated by Seismic is shown in Plate 4. This becomes of interest when comparing different amounts involved in acquiring and exploring land, and important where the expected produc-

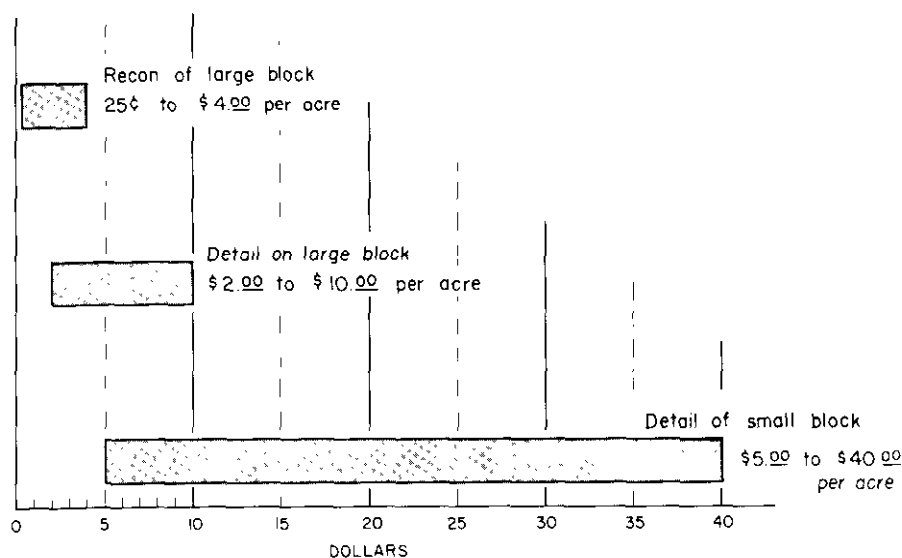


PLATE 4.—Cost per acre evaluated.

tion is marginal. It will be noted that reconnaissance on a large block may cost in the order of \$0.25 per acre, whereas detail on a small block could run as high as \$40 per acre.

Plate 5 shows a *Representative Curve* of what the costs might be with relation to the production rate experienced by the crew. The "desirable range" is that rate of production that can be maintained without having the quality suffer. This supplies the key to unlocking costs. Normally, one is well paid to make the necessary effort to operate within this range. The rates of production shown here are arbitrary figures and would have to be changed to fit a particular area, e.g., the rate shown here might represent miles per day in a bush operation employing C.D.P. method.

There is probably no easy way of determining a cost estimate of your Seismic Exploration Program. However, if it is possible to determine the range that is involved, then further refinements in an estimate might be made with a detailed look at any proposed program.

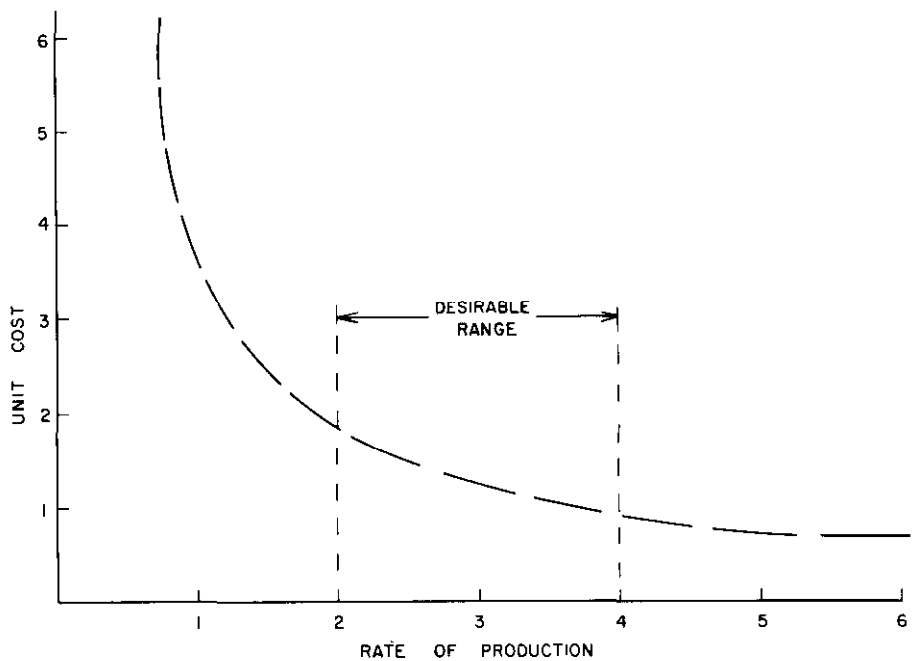


PLATE 5.—Production versus unit cost.