

076 -06 -04 -031

OTTAWA

NAHANNI AREA

Seismic Interpretation

C. A. Dittrich -

October 11/73

Date October 11, 1973.

To- D. T. West Location  
From- L. L. Samoil Location  
Subject- C. A. Dittrich  
Seismic Interpretation - Nahanni Area

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### Object of Interpretation

The purpose of this interpretation was to establish the possibility of a structural play in the region of the Liard River to the south of Nahanni Butte. The results from the following seismic surveys were available for this purpose.

- (1) Arrowhead 100% dynamite survey shot in 1959 for Murphy Oil Co.
- (2) Flett 600% dynamite survey shot in 1972 for NOEL.
- (3) Nahanni 1200% Vibroseis survey in 1973 by Murphy.

The Nahanni survey was processed on a 700 foot datum using a correcting velocity of 11,000 feet per second and the other two surveys were corrected to the Nahanni survey.

### Structural Interpretation

The Arrowhead survey to the east of the Netla River shows regional south-westerly dip at approximately 24 milliseconds (130 feet) per mile. A north-south trending down to the east normal fault is shown to the east of the Netla River. The Murphy Netla M-31 well drilled in 1967 tested mainly salt water in the Middle Devonian Carbonates. The seismic results show that the Middle Devonian Carbonates are higher against the fault on the west end of Line GN-9 suggesting a more favourable location than the one drilled.

Lines C1, C2, C3 and C4 were shot by NOEL in 1972 using dynamite with 600%

multiple coverage. Record quality is very poor on Line C2 and the west portion of Lines C1, C3 and C4 where a very deep buried low velocity channel is indicated. The extreme west end of Lines C4, C3 and C1 show weak indications of dipping beds, possibly the result of thrust faulting. Regional westerly dip is shown on good quality reflections on the east end of Lines C1 and C4. Poor quality reflections from the Slave Point level show slight anomalous easterly dip on the east end of Line C3. This together with east dip on Line C1 between Sp.'s 9 and 1 and a flat segment on the east end of Line C4 suggest a possible anomalous feature in that region as shown on the Slave Point map.

Lines 01, 02, 03 and 04 were recorded by Murphy in 1973 using the Vibroseis energy source with 1200% multiple coverage. Line 03 runs adjacent to Line C4 and serves as a good comparison between the dynamite and Vibroseis energy sources, the latter resulting in better quality probably because of a higher multiplicity in % coverage and number of input sweeps giving a better signal/noise ratio. No effort was made to determine low velocity layer corrections which the dynamite results showed to vary as much as 150 milliseconds along the lines. Therefore it was not possible to make an interpretation tie between the dynamite and Vibroseis results.

The east end of Lines 01, 02 and 03 show regional westerly dip. Some weak indications of reflections on the west end of Lines 01 and 02 and on Line 04 suggest overthrusting from the west. A clear interpretation of the thrust faulting is not possible because of the wide spacing of seismic lines and poor reflection quality believed to be partially due to the north extension of the deep low velocity

channel seen to the south.

### Recommendations

Further seismic is necessary to confirm the indicated anticlinal feature lying between Lines C1 and C4. It is recommended that Vibroseis be used as energy source and that dynamite refraction shots be taken at  $\frac{1}{4}$  mile intervals for LVL correction determinations. Attempts should be made to avoid the thick LVL channels over which reflection quality is NR. Gravity could be used to pinpoint the location of these channels.

### Summary

The Murphy Netla M-31 well which tested salt water in a fairly tight Middle Devonian Carbonate section was drilled on the up side of a down to the east normal fault having approximately 250 feet of throw. The up side of the fault appears higher on Line 9 which would be more favourable structurally than the location drilled. There is some evidence of folding on the mapped event to the west of the Netla well. The Arrowhead Area to the east of the fault shows only regional southwesterly dip.

A weak anticinal trend is shown in the vicinity of the Liard River between Lines C1 and C4. Further seismic is necessary to determine its magnitude.

Thrust faulting from the west is indicated to the west of the Liard River. The poor quality of the data and the wide spacing of the seismic lines does not permit an interpretation in the faulted area.

*C. A. Dittrich*  
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