

CONCLUSIONS
of the
VARIOUS INVESTIGATIONS
CARRIED OUT ON

P.&N.G. PERMITS 5050 to 5055
NORTHWEST TERRITORIES, CANADA

for

GROSMONT OIL & GAS LTD.

by

RAYALTA PETROLEUMS LTD.

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Off.



Abstracted for
Geo-Science Data Index

Date _____

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INTRODUCTION

Petroleum and Natural Gas Permits 5050 to 5055 inclusive, held by Grosmont Oil & Gas Ltd., are located in an almost completely unexplored part of the Northwest Territories. They are located about 65 miles west of the edge of the Canadian Shield in the Keller Lake - Lac La Matre area and only one well Imperial Lac Tache has been drilled nearby. The section as found in this well was the only real clue available as to the composition of the sedimentary section. Unfortunately, this well did not reach the granite Basement but was abandoned at a depth of 1719 feet after drilling about 320 feet of Cambrian formation.

Because of the above situation we have chosen various types of geophysical and geo-

logical investigations to try and establish;

1. Thickness of the sedimentary section.
2. Structural or stratigraphic situations within the sedimentary section which could form traps for oil or gas.
3. Establish Basement fault trends and discover any Basement topography.
4. Identify any source beds for oil.

With the above in mind we selected the following types of surveys.

1. Aerial Magnetometer Survey

This type of survey is generally run in an area where the thickness of sediments are unknown. This portion of the project was done by Canadian Aero Services Ltd.

2. Ground Magnetometer Survey

This survey was carried out so that we could have two layers of magnetic measurements and thus have a double focus on the Basement. Such data would permit us to calculate a more accurate figure for the thickness of sediments.

3. Gravity Survey

The maps constructed from the gravity data shows the configuration of the Basement topography as well as reveal any density changes within the sedimentary section. Further, the gravity data can also provide an estimated thickness of sedimentary section.

4. Fracture Analysis Survey

Separate Fracture Analysis Surveys

of each Permit were carried out.

The Permits were examined individually because of their size and the limits imposed on the size of an individual aerial mosaic by the inherent distortion error of the aerial photographs. The mosaics do over-lap and continuity from one Permit to another is maintained.

This type of survey detects any anomalous feature such as Basement ridges and hills or reef build-up within the sediments.

5. General Geology

A comprehensive examination of all available surface and subsurface geological information is included. Such a

report is necessary to provide the general setting of the area plus provide clues as to what features may be present in the sedimentary section and be responsible for gravity, magnetic and fracture anomalies.

AERIAL MAGNETIC SURVEY

The aerial magnetic survey was conducted by Canadian Aero Services Ltd., for Rayalta Petroleums Ltd. Their equipment was mounted in a DC-3 aircraft and consisted of two trailing sensors, recorders etc. Canadian Aero was required to submit an interpretation of the results and the reader is referred to their report. Mr. David K.Y. Chen, P. Geophys. of Rayalta Petroleums Ltd., also interpreted the magnetic data and although his fault patterns agree with Canadian Aero his depth calculations differ greatly. Canadian Aero assign the area a very thin sedimentary section but from our interpretation of the magnetic data plus information from drilled wells and gravity maps we know that the sedimentary section must be 3,500 feet to 4,000 feet thick.

A ground magnetometer survey was conducted along with other surveys and of course the ground magnetic map is very similar in shape to the aerial map. This second layer map enables a more accurate "depth of sediments" estimate to be made than from the aerial data alone

GRAVITY SURVEY

The results of the gravity survey are presented in the form of the Bouguer Gravity Map, three Residual Gravity Maps plus Gravity Cross-sections. The reader is referred to the comprehensive gravity report.

The two main features revealed by the Gravity Map are:

- I. The Basement depth increases to the northeast in this area giving a rapid increase in the thickness of sedimentary rocks northeast from the Imperial Lac Tache wellsite.

2. There are density contrasts

present within the sedimentary
section which could well represent
reef growth and further, there
are contrasts at the surface of
the Basement which probably re-
present Basement topography.

Topographic highs on the Base-
ment could be the locations for
future reef growth and could
form traps for basal sand units.

The Lonely Bay formation is present at
the Lac Tache well and this unit is the plat-
form upon which the Horn River reef grows.

The Lonely Bay correlates with the Keg
River formation of northern Alberta and the
Rainbow Reef grows from the Keg River plat-
form.

The gravity survey has shown that the depth to Basement increases to the northeast of the Lac Tache well and thus the sedimentary section must increase. There is a very good chance that additional Middle Devonian shale will be present above the Lonely Bay formation and this shale unit provides the seal for any Horn River reef growth. Further sedimentary section may be added to the underlying Cambrian units, but only drilling will discover this.

Reference to the Residual Gravity Maps will show that there are many density anomalies present within the sedimentary section and these density contrasts could represent reef growth.

FRACTURE ANALYSIS SURVEY

As stated above each Permit was treated separately for Fracture Analysis examination. The main purpose of such a survey is to map Basement topography as well as anomalies within the sedimentary section such as reef build-up. Reference is made to these individual reports, maps and cross-sections. It is significant that the large residual gravity anomaly (anomaly "A") which is interpreted as emanating from the top of the Basement is mapped as a Basement topographic high on the Fracture Analysis Map. Furthermore, gravity anomalies "C" and "D" are also mapped as fracture anomalies.

All fracture anomalies were assigned to the Basement and were assumed to emanate

from Basement topography. However, an anomaly of similar shape and dimension emanating from within the sedimentary section but located within 1,000 feet of Basement would give a similar type of fracture anomaly. Both gravity and fracture surveys revealed the same area of Basement anomaly

GEOLOGY

There are several excellent potential reservoir horizons within the sedimentary section. The most important is the Horn River reef, which, as previously mentioned, grows from the Lonely Bay formation platform. If enough cover is present above the reef horizon, traps could be created and the reef becomes a reservoir for oil and gas. The reef platform (Lonely Bay formation) is at a fairly shallow depth at the Lac Tache well, but from gravity, it is known that the sedimentary section increases in thickness to the northeast under the present study area. It is thought that much of the additional section will be above the Lonely Bay horizon.

Another possible reservoir horizon is the Chedabucto Lake formation of Ordovician

Age. This unit consists of gray to brown dolomite and some pin point and vuggy porosity has been noted. Further porosity could develop along the upper edge of this formation due to the leaching which would take place on a dolomite surface in Ordovician time. Under proper structural conditions this unit could hold oil or gas.

The Mazenod member of the La Matre Falls formation is another good reservoir horizon. The Mazenod consists mostly of gray bedded dolomite with a few sandy beds being present. Although no porosity has been reported from outcrops the unit does have reservoir potential. It is surrounded by the La Matre Falls shales and these would form an effective seal for the reservoir as well as being source beds.

The Old Fort Island formations is a clean sandstone unit and has excellent reservoir characteristics. However, the unit is not present everywhere, it is usually absent on Basement topographic highs.

The lithology of the Cambrian section is largely unknown but is though to consist of thick shale units with some interbedded sandstone beds. Such sand bodies would be excellent potential reservoir horizons.

CONCLUSIONS

The results of the many and various geological and geophysical examinations we have carried out on this block of permits, leads us to the conclusion that the oil and gas prospects of this area are excellent.

The geology studies have proven the presence of several excellent reservoir horizons - the Horn River reef (Rainbow equivalent), the Chedabucto Lake formation, the Mazenod member of the La Matre Falls formation, the Old Fort Island formation plus the good possibility of sand units within the Cambrian.

The magnetic surveys have proven the presence of 3,500 to 4,000 feet of sedimentary

rocks. In addition, Basement faults have been mapped and these could form traps on basal sand beds.

The gravity survey proved the presence of density contrasts within the sedimentary section as well as topographic relief on the Basement surface. The contrasts within the sedimentary section have strong similarities to known reefs we have covered in other areas. The topographic relief on the Basement could cause drape in overlying units as well as cause basal sands to locally pinch-out.

The fracture analysis survey proved the presence of several features which are located either at the surface of the Basement or a short distance above it. Many of these

features coincide with gravity anomalies.

Because of the conclusions mentioned above we strongly recommend that the gravity anomalies "A", "B", "C" and "D" be investigated with reflection seismic shooting. Further, the area has such outstanding merit that, several stratigraphic test wells should be drilled to the Basement. These wells should be located on the seismic anomalies or, if seismic is not done the wells should be located on gravity anomalies.

Respectfully submitted by:

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