PROGRESS REPORT

HELIUM EXPLORATORY OPERATIONS

MANITOBA

INTRODUCTION

This report deals with the potentially Helium bearing Winnipeg formation, which consists of the Winnipeg Shale and Winnipeg Sand The object of the report is to analyze the data acquired in the drilling of two wells in the Lake Manitoba area of the Province of Manitoba These two wells were Peerless Lundar Prov 16-15-20-6 WPM completed June 13, 1962 and the H H Peerless Sarnoil Lundar Prov 14-17-20-5 WPM completed July 14, 1962

TOPS

	H H Peerless Lundar Prov 16-15-20-6 WPM		H H Peerless Sarnoil Lundar Prov 14-17-20-5 WPM	
Formations	E-Log	Subsea	E-Log	Subsea
Stony Mtn Shale	489	/ 344	448	/ 392
Red River	556	/ 277	512	/ 328
Winnipeg Shale	974	- 141	933	- 93
Winnipeg Sand	1043	- 210	1000	- 160
Pre-Cambrian	1116	- 283	1069	- 229

WINNIPEG SHALE - H H PEERLESS LUNDAR PROV 16-15-20-6 WPM

The H H Peerless Lundar Prov 16-15 well encountered the Winnipeg Shale at 974 (-141) feet This shale section had a total thickness

of 69 feet The Sand/Shale ratio was calculated to be 43/26 or 1 65 The Winnipeg Shale in most wells in Manitoba consists predominantly of green waxy shale with occasional thin sand lenses In this well, however, the Winnipeg Shale had a sand facies with minor shale beds The lithology of this section was as follows

Sandstone white, quartzose, fine grained, well sorted, friable and slightly pyritic in part.

Shale minor, green, waxy, soft, sticky

Numerous chips of Granite rock composed of white angular Quartz, Feldspars, Biotite and an unknown black mineral

The E-Log over this section showed excellent porosity in the sand bodies, but water saturation readings indicated high salt water reserves

WINNIPEG SHALE - H H PEERLESS SARNOIL PROV. 14-17-20-5 WPM

The H H Peerless Sarnoil Lundar Prov 14-17 well encountered the Winnipeg Shale at 933 (-93) feet This Shale section had a total thickness of 67 feet The Sand/Shale ratio was calculated to be 15/52 or 288 which is considered quite shaly Samples consisted of a green, waxy, sticky Clay with occasional numerous floating sand grains, and the E-Log showed the section to be predominantly shale, only slightly sandy in part

WINNIPEG SAND - H H PEERLESS LUNDAR PROV 16-15-20-6 WPM

The Winnipeg Sand in the H H. Lundar Prov 16-15 well was encountered at a depth of 1043 (-210) feet The total thickness of the section was 73 feet. The Sand/Shale ratio was calculated to be 53/20 or 2 65 The

lithology of the section is sandstone white, fine to medium grained, unconsolidated, well rounded sand grains, and traces of Kaolinite and Pyrite with no cut stain or odor The average drilling rate for the section was a fast one minute per foot, indicating excellent porosity At 1110 feet Granite wash was encountered which had excellent porosity with no shows of hydrocarbons Water saturation calculations indicate the wash to be in the minor critical zone of the water saturation tables Therefore a test was run, but results were negative due to lost circulation material mudding off the formation.

Basement rock was encountered at 1116 (-283) feet

WINNIPEG SAND - H H PEERLESS SARNOIL LUNDAR PROV. 14-17-20-5WPM

The Winnipeg Sand in the H H Peerless Sarnoil Lundar Prov 14-17 well was encountered at 1000 (-160) feet The total thickness of the section was 69 feet The Sand/Shale ratio was calculated to be 53/16 or 3 06 The lithology of the section is sandstone white, quartzose, medium grained, slightly calcite to kaolinitic in part, friable to unconsolidated in part, occasional glauconitic and pyritic stringers The E-Log read excellent porosity with high water saturation calculations

WINNIPEG SHALE CORRELATIVE RESULTS

The Winnipeg Shale in the H H Peerless Sarnoil Lundar Prov 14-17 well was encountered 48 feet higher than in the H H Peerless Lundar Prov 16-15 well which is 3 1/2 miles to the west This higher elevation is considered regional, but here regional rise is significant because of the possibility of a stratigraphic trap down-dip from the Lundar Prov 14-17 well

The cross-section enclosed shows three distinct sand bodies within the Winnipeg Shale in the Lundar Prov 16-15 well These same sand bodies have undergone a facies change in the H H Peerless Sarnoil Lundar Prov 14-17 well In the Lundar Prov 14-17 well the electric log describes a Shale section with only two very thin S P kicks indicating some disseminated floating sand grains It is apparent that the three sand bodies present in the Lundar 16-15 well have shaled out in the second Lundar Prov 14-17 well This shaleout clearly indicates the presence of a stratigraphic trap down-dip from the H H Peerless Sarnoil Prov 14-17-20-5 WPM well

This indicated trap down-dip from the Lundar Prov 14-17 well should contain Helium By referring to the Baroid Chromatograph charts contained in the Lundar Prov 14-17 well report, traces of Helium were detected in a few samples above and below the Winnipeg Shale section, but the greatest concentration of traces occurred through the Winnipeg Shale section This Helium anomaly present in the impermeable Winnipeg Shale of the Lundar Prov 14-17 well may be a result of further up-dip penetration of the elusive Helium gas The source or reservoir is to be found in the postulated stratigraphic trap down-dip from the Lundar 14-17 well

The Chromatograph analysis of fluid samples was not used during the drilling of the Lundar Prov 16-15 well, which was drilled first, and drill stem tests run were not considered valid due to mudding off the formation by lost circulation material The depths at which Helium traces occurred in the Lundar 14-17 well are marked in red on the enclosed cross-section

It is also of interest to note that in the most westerly well H H Lundar Prov 16-15, the samples in the Winnipeg Shale contained

numerous Feldspars, Biotite, Quartz and an unknown black mineral These granite type rocks are indicative of an igneous intrusive body or possibly an adjacent granite ridge In many proven areas Helium is closely associated with buried granite ridges or igneous intrusions According to Bate (1960), Jodry and Henneman (1960), and Sawatzky, Agarwal and Wilson (1960), the most prolific source rocks for the generation of Helium are widespread granitic rocks which have a high content of radio-active minerals, since Helium is one of the end products of the disintegration of radio-active minerals For example, Helium found in the Kansas-Oklahoma area is associated with buried granite ridges or igneous intrusions, as is also the case in the Rattlesnake field of the San Juan county, New Mexico

CONCLUSIONS

In summarizing the Winnipeg Shale study we have arrived at these favorable conclusions

1 A stratigraphic trap exists between the 16-15 well and the 14-17 well, a distance of 3 1/2 miles

2 Helium source granitic rocks were found within the Winnipeg Shale of the H H Lundar Prov 16-15-20-6 WPM This well is down-dip from the postulated stratigraphic trap

3 The Baroid Chromatograph analysis detected a concentration of Helium traces through the Winnipeg Shale up-dip from the postulated stratigraphic trap This Helium anomaly was found in an impermeable

shale and is probably up-dip seepage of the elusive gas from a reservoir down-dip to the west

4 Based on the above conclusions, an ideal location for finding commercial reserves of Helium is at the pinchout point of the sand facies of the Winnipeg Shale This pinchout is situated east and up-dip from the first well drilled H H Peerless Lundar Prov 16-15-20-6 WPM, and could have great lateral extent

WINNIPEG SAND CORRELATIVE RESULTS

The Winnipeg Sand in the H H Peerless Sarnoil Lundar Prov 14-17 well was 50 feet higher regionally than in the first well, H H Peerless Lundar Prov 16-15 The H H Peerless Sarnoil Lundar Prov 14-17 had a Sand/Shale ratio of 3 06 as compared to 2 65 in the first well This higher ratio indicates a better sand development in an easterly direction

One obvious discrepancy between the two wells is the apparent granite wash encountered at 1110 feet in the H H Peerless Lundar Prov 16-15 well This lower zone has apparently disappeared in the up-dip well H H Peerless Sarnoil Lundar Prov 14-17 well Therefore, a lower stratigraphic trap may be present down-dip from the H H Peerless Sarnoil Lundar Prov 14-17 well As has been presented in the Winnipeg Shale discussion these granitic rocks are a main source in the generation of Helium

Drill stem tests run over the Winnipeg Sand in the H H Peerless Sarnoil Lundar Prov 14-17 well recovered 900 feet of slightly salty water

Samples of the fluid was sent to Baroid Labs of Houston, Texas The results received are as follows

Drill stem test interval - 1002 - 1073

Bottle No 1 200 parts per million Helium = .02%

Bottle No 2 1500 parts per million Helium = .15%

Bottle No 3 2000 parts per million Helium - .2%

Bottle No 4 1500 parts per million Helium - .15%

These measurements were made from the gas bubble trapped between the bottle top and the mud surface This apparently is not a true reading Helium is a highly elusive gas, and therefore, a great percentage was undoubtedly dissipated during testing, catching and shipping of the sample, as certainly was the case with respect to the drilling mud samples which contained traces of Helium

CONCLUSIONS

1 The granite wash of the first well H H Peerless Lundar Prov 16-15-20-6 has electric log characteristics that indicate the wash to be in the water saturation critical zone for possible hydrocarbon or Helium production There is no granite wash present in the second well drilled H H Peerless Sarnoil Lundar Prov 14-17 up-dup 3 1/2 miles to the east Therefore, a granite wash pinchout must occur down-dip to the west of the Lundar 14-17 well

2 The Winnipeg Sand is better developed and porosity is higher in the second well H H Peerless Sarnoil Lundar Prov 14-17-20-5 WPM

3 There were excellent Helium shows in the drill stem test samples sent to Baroid of Houston However, these Helium shows present in the Winnipeg Sand drill stem test recovery may be a result of marginal penetration of the Helium gas trapped down-dip in the granite wash pinchout

SUMMARY AND RECOMMENDATION

The shaleout of the lenticular sands in the Winnipeg Shale and the pinchout of the granite wash in the Winnipeg Sand from the first well, H H Peerless Lundar Prov 16-15-20-6, to the second well, H H Peerless Sarnoil Lundar Prov 14-17-20-5, indicates the presence of a stratigraphic trap in both sections The excellent Helium shows throughout the Winnipeg formation of the H H Peerless Sarnoil Lundar Prov 14-17 well is likely the result of marginal penetration of the Helium gas from the postulated stratigraphic traps down to the west The highly porous and permeable Winnipeg Sand, however, could also provide a reservoir for the accumulation of Helium under certain stratigraphic conditions which further explanatory operations should uncover The measurable quantities of Helium detected in the drill stem test fluid from this formation cannot be discounted

In concluding, it is recommended that the first in a series of from four to eight exploratory wells be located to the west and down-dip from the H H Peerless Sarnoil Lundar Prov 14-17 well This location would appear ideal for the discovery of Helium in commercial quantities based on information accumulated to date

Respectfully submitted,

Joseph Sabo

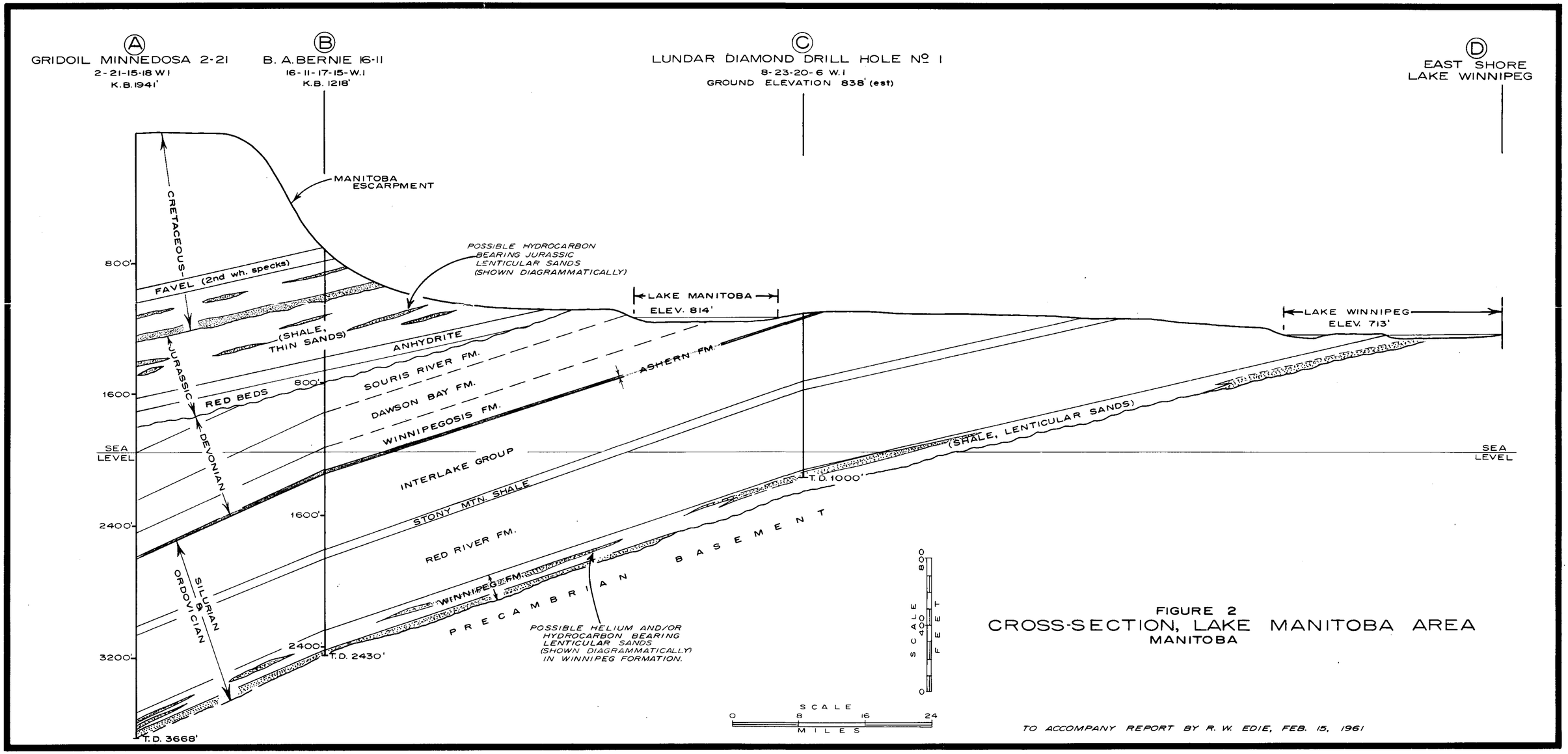

FIGURE 2

CROSS-SECTION, LAKE MANITOBA AREA
MANITOBA

TO ACCOMPANY REPORT BY R. W. EDIE, FEB. 15, 1961

H.H. Peerless Lundar Prov 16-15-20-6 WPM

KB 833

W

3½ miles

H.H. Peerless Sarnoil Lundar
Prov 14-1-20-5 WPM
KB 840

E

Tr Helium

50 feet below Sea level

900

Tr Helium

933 (-93)

Tr Helium

Helium

Tr Helium

974 (-141)

1000

1000 (-160)

Tr Helium

1043 (-210)

Helium

1100

1116 (-283)

TD 1124'

TD 1093

Red River Limestone

Winnipeg Shale

Helium Seepage*

Winnipeg Sand

Granite Wash

Basement

MANITOBA HELIUM PROSPECT

CROSS-SECTION OF THE WINNIPEG FORMATION

H.H. PEERLESS LUNDAR PROV. 16-15-20-6 WPM

- H H. PEERLESS SARNOIL LUNDAR PROV 14-1-20-5 WPM

SCALE Vertical 2" = 100' - Hor - broken

* Helium Shows

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