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PRELIMINARY AND FINAL REPORT

on

THE HARE INDIAN RIVER

N.W.T.(Canada)

IMPERIAL OIL LTD., CANOL PROJECT

Assignment No. 17

By: Lt. John E. Harrison Party Chief
R. A. Hewstock Assistant
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Date Submitted: August, 1943

Read and Accepted by: Merrill Link

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LIST OF ILLUSTRATIONS

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Chapter I.

I N T R O D U C T I O N

The Hare-Indian River has its source in a lake near the South Arm of Great Bear Lake and empties into the Mackenzie River near Good Hope. The entire river was traversed with two canoes by Party "K", which consisted of Lt. John W. Harrison, Geologist, Mr. R. A. Hemstock, Assistant Geologist, Mr. E. Bauder, Helper.

Outcrops are fairly consistent throughout the length of the river, with the exception of thirty miles near its mouth where no strata are exposed. The Ramparts shale mapped by Dr. A. W. Nauss on the banks of the Mackenzie River, was not observed on the Hare-Indian. Aerial photographs were available for the entire area. Due to low dips in the area, dip readings were obtained by the use of a plane table and alidade wherever possible.

A traverse of the river, prepared from aerial photographs has been prepared. (Inclosure No. 1, three parts). All strikes and dips, structural trends, and formation boundaries have been recorded on the traverse. A cross-section of the area accompanies the Report. (Inclosure No. 2).

Chapter II.

T O P O G R A P H Y

The general topographic appearance of the Hare-Indian River region is quite different from that of the Norman-Carcajou area. In

the latter conspicuous anticlinal ridges and escarpments are absent, while in the Red Indian River area (Ramparts Plateau region) the topography due to low-dipping, ledge-forming rocks of the Paleozoic resind one of North Central Texas and parts of Oklahoma.

Chapter III.

S T R A T I G R A P H Y

Sediments of Silurian, Devonian and Cretaceous age were found, and their descriptions are as follows:

Silurian

There are approximately 750 feet of limestones of Silurian age in this area. These beds outcrop roughly in the upper one-third of the river area. The Silurian section consists of alternating massive and bedded limestone, which forms high cliffs but is often obscured by high talus slopes.

The Silurian-Devonian contact is not exposed. No strata older than Silurian were found. The following section is compiled from an outcrop near the outlet of Lake Jacomet and an exposure observable in photograph 324V-21. The letter to the left of the rock description is for fossil and lithologic sample identification.

Bed "H", because of its characteristic slabby talus, and bed "W" because of its white color, are good horizon markers and can be traced lithologically for thirty miles.

(Table on following page)

Bed Letter	Thickness	Description
		Devonian contact not exposed
	5	Limestone, light grey to white finely crystalline (sometimes powdery) rubbly. Grades laterally into massive limestone.
	13	Limestone, light grey bedded. Layers 4 inches in thickness.
	35	Limestone, light grey, rubbly with 4-inch beds of massive limestone. Grades laterally into massive limestone.
	30	Limestone, dark grey crystalline, massive.
	125	Limestone, grey, massive, finely crystalline with Halysites and Orthoceras.
	47	Talus
W	72	Limestone, grey coarsely crystalline, containing quartz crystals and chert. Weathering light grey and white. Forms low rounded benches and cliffs 5 to 10 feet high. Grey chert beds weather white and form bands on cliff.
	40	Limestone, light grey, very coarsely crystalline, containing quartz filled vugs. The bed forms low benches.
V	60	Limestone, grey hard massive with many vugs filled with brown quartz crystals. The bed contained three prominent tan and white chert bands each three feet in thickness. Forms prominent cliff, weathering tan, yellow and red.
	144	Talus Covered.
S	11	Limestone, light grey brittle, massive, with a tan smooth hard weathered surface. Few calcite vugs. Small areas are covered by thin layers of quartz crystals.

Bed Letter	Thickness	Description
	19	Talus Grey paper thin limestone? (Not in place)
	13	Limestone, grey to dark grey, massive and bedded, weathering tan, brown and yellow, carrying both lenses and masses of chert.
	47	Talus, Light grey, nearly white, paper thin, platey, crinkly limestone. Five feet thick. (Not in place)
M	25	Limestone, grey and light tan, bedded (4" beds) finely crystalline, hard. Weathering light tan or grey with moss. Bed forms prominent slabby talus. Contains 6-inch intervals of soft tan sugary limestone. Lingula sp. (?)
L	4	Limestone, light grey, very hard, massive to bedded, finely crystalline, with lenses of white chert. Capped by one foot of light tan sugary limestone.
	6	Covered
	49	Limestone, alternating massive to platey and thin bedded, grey to nearly white and light tan, finely crystalline, weathering tan and grey. Thin bedded limestone is crinkly and is both powdery and brittle.

Devonian

The Devonian sediments are represented by 218 feet of the Bear Rock, and 365 feet of the Ramparts formation.

In this area the Bear Rock consists of three prominent members: (1) a gypsum bed at the base, overlain by (2) a very petroliferous bedded limestone which is, in turn, overlain (3) by a limestone breccia interbedded with 3-foot massive limestone beds.

The asphalt in the Bear Rock occurs in thin lenses seldom greater than a half inch in thickness and in cavities up to one foot in diameter. All the Devonian limestone has a strong petroliferous odor and many beds are very porous.

The Ramparts formation consists of a series of platy limestones with two highly fossiliferous zones. In the upper part Petraeoda and Martinia sp. (?) (Waters) were found at the base.

Identification Letter	Thickness (feet)	Description
		Ramparts formation
X	1/7	Limestone, grey to brown, both massive and rubbly, petroliferous, highly fossiliferous. Forms low cliffs and rounded ridges weathering ten. Fossils: Atrypa spinosa, Pleurotomaria sp. ? Euomphalus, Productella, Atrypa reticularis, Pugnoides, Proetus, Zaphrentidae, Favosites, Phillipsastrea, Stromatoporoid, Cystiphyllum, Alveolites, Schizophoria, Heliophyllum, Orthoceras, Cladopora.
	36 plus	Covered
	27	Limestone, grey and brown, irregularly bedded (lensing and nodular condition) rubbly, very fossiliferous. Forms low mounds. Fossils: Pleurotomaria, Euomphalus, Proetus, Odontocephalus, Crinoids, Schuchertella.
		Covered (?) Gently sloping area with talus similar to strata in bed "J" below.
		Limestone, petroliferous, rubbly, highly fossiliferous. Bed underlain by 10 inches of brown, slightly petroliferous shales.

Identification Letter	Thickness (Feet)	Description
		Ramparts Formation
T	44	Limestone, brown to dark grey, platy, highly fractured, slightly petroliferous. Top of cliff formed by all beds below.
	56	Limestone, dark grey to brown, massive and platy, dense, brittle, fossiliferous (at base) weathering white to tan. Fossils: Ostracods, Martinia (Mature)
	Total - 365 feet	
		Bear Rock Formation
	147	Limestone, dark grey to tan (oil stained) massive, petroliferous, porous, weathering tan to black, carrying asphalt and calcite in lenses. Local erosion surfaces occur with up to 15 feet of relief. Contains zones of limestone breccia up to 20 feet in thickness with fragments of angular limestone having maximum thickness of four feet. The fragments have bedding planes.
	53	Limestone, dark grey to brown (oil stained) dense to very porous, petroliferous, bedded, containing cavities up to 12 inches in diameter filled with asphalt and lenses and vugs filled with calcite. Asphalt and calcite are associated. Beds of grey soft, petroliferous, limestone with maximum thickness of 3 feet and thin grey shale partings are interbedded.
	11	Gypsum white, irregularly bedded and interbedded with green bentonite. Bed contains three feet of dark grey to brown bedded, dense, petroliferous limestone.
	Total - 111 feet	

Chapter IV.

S T R U C T U R A L G E O L O G Y

The Bare-Indian River has a slightly crescent shape around the north end of the Franklin Mountains. The large meanders of the river are controlled by broad gently plunging anticlinal noses, which radiate from the mountains. The anticlinal trends are designated on the river traverse (Sheet No. 1) as A, B, and C. The direction of plunge of the trends are as follows: A - North 39° West, B - South 2° East, and C - South 22° East.

Chapter V.

C O N C L U S I O N

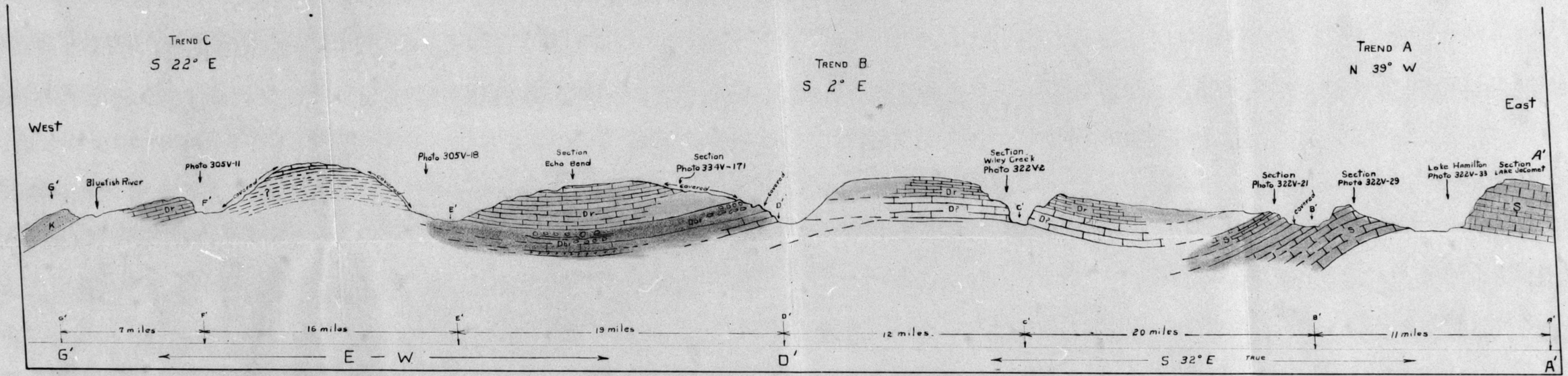
The Devonian strata in this area should be an excellent reservoir bed. North of this area the Devonian rocks are covered by either Upper Devonian or Cretaceous strata. In this area seismograph work would be of value.

HARE INDIAN RIVER AREA
CROSS SECTION A' THROUGH G'

Party-K Assignment-17

September 1943

Vertical Scale: 1"=500'



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AREAL GEOLOGICAL MAP
HARE INDIAN RIVER
PLOTTED FROM AERIAL PHOTOS
305V-1 to 29
324V-160 to 179
322V-1 to 33
ASSIGNMENT NO. 17. PARTY K
SEPTEMBER 1943
SCALE
10 MILES
FEET
LEGEND
Dr Ramparts Formation
Dbr Bear Rock Formation
S Silurian
Formation Boundary
Strike and Dip
Photo Center
Scarp
Cross Section G'
Cross Section F'
Cross Section E'
Cross Section D'
Cross Section C'
Cross Section B'
Cross Section A'
GENERAL STRIKE & DIP
TREND C S22°E (Mag)
TREND B S22°E (Mag)
TREND A N39°W (Mag)
MACKENZIE RIVER
Pringle Creek
Dev Sil
This map cannot be reconciled with the enclosed cross section.
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