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IMPERIAL OIL LIMITED

PRODUCING DEPARTMENT - WESTERN REGION

GEOLOGICAL RECONNAISSANCE
OF
HAY RIVER - FORT PROVIDENCE AREA
N.W.T.

Imperial Oil Enterprises Ltd.

1966 7-1-4-61

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OF
HAY RIVER - PORT PROVIDENCE AREA
N.W.T.

by

Imperial Oil Enterprises Ltd.

1966

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In Pocket

Station Location Map

General Remarks

During the period from August 12 to August 25, 1966 Imperial Oil Enterprises Ltd. conducted a reconnaissance geological survey in the Great Slave Lake-Fort Providence area. The party consisted of four geologists, a helicopter crew, and for a portion of the period a geological technician and a cook. The four Imperial Oil Limited geologists were P. McGill, P. Purcell, J. D. Devine and J. W. Wishart. The Okanagan Helicopters Ltd. crew consisted of a pilot and a mechanic. The aircraft used was a 3-place Hiller.

In order to make maximum use of both the helicopter and geological personnel most of the outcrops were visited by only two geologists, while at the same time the aircraft was moving the other two to a different locality. By this means a large number of outcrops were examined in a rather short space of time. No time was lost due to inclement weather conditions.

The first eight days operations were carried out from an abandoned airstrip near mile post 90 on the Fort Providence-Yellowknife highway. Flights were made from this base camp in an easterly direction to outcrop localities along the west shore of Great Slave Lake, northerly as far as the LaMarte River and westerly to localities on the Cline and Horn Rivers. In addition several outcrops along the highway between base camp and Fort Rae were visited during this period.

On August 22 the base of operations was shifted to the town of Hay River and for the following three days the party examined outcrops along the south shore of Great Slave Lake. On the third day the party was conducted on a tour of the pits at Pine Point by geologists of Pine Point Mines Ltd.

Purpose and Method of Study

The principal purpose of the field trip was to spot check the paleozoic rocks in the outcrop areas in order to observe their stratigraphic relationships and physical and sedimentary characteristics. Since these rocks occur in basins to the west and south, we hoped to obtain a better understanding of the subsurface through a study of the surface exposures.

All of the outcrops visited have been adequately measured and described by others. The present party therefore did not attempt to sample them in detail. Rather, the sections were subdivided, where possible, into gross sedimentary types and representative samples were taken of each.

The enclosed station location map indicates the localities visited by the party. The numbers correspond to those in the appendix opposite the appropriate outcrop and sample description.

Stratigraphy

Rocks exposed within the map area range in age from Cambro-Ordovician to Cretaceous. Only Cambro-Ordovician and Middle Devonian outcrops were examined by the present party.

Rocks of Cambro-Ordovician age outcrop in a narrow belt along the west shore of the north arm of Great Slave Lake and northward to the LaMarte River. Successively younger beds outcrop in a westerly direction and consist of continental and near shore sands in the Old Fort formation and evaporites and red beds in the lower part of the LaMarte Falls formation. More marine conditions were indicated by dark shales and carbonates in the upper part of the LaMarte Falls formation and by the dolomite of the overlying Chedabusto formation.

The Middle Devonian unconformably overlies the Ordovician in the area west of Great Slave Lake and outcrops in a belt to the west of the pre-Devonian. It is subdivided into a basal evaporite (Chinchaga formation), a middle argillaceous limestone (Keg River formation), and an upper carbonate (Sulphur Point-Slave Point formations) which is often reefal. Basinal shale facies equivalent to the middle and upper carbonates are found in wells to the west. These are the Hare Indian and Horn River formations respectively.

Rocks of Upper Devonian age were not encountered in outcrop in the area traversed by the party. They do occur however in the southern part of the map sheet conformably overlying the Middle Devonian.

Following, in the geological section, is a great gap. The Upper Devonian-Imperial formation is overlain by Lower Cretaceous beds which occur as high topographic erosional features in areas such as the Horn plateau.

A P P E N D I X

Thickness
of Interval

Station 1

Located on SE shore of Old Fort Island.

Sandstone, yellow-brown with rust-brown streaks; coarse grained to very coarse grained; friable and porous; well rounded grains; festoon bedding, scoured bedding surfaces, even parallel laminae. 2'

Covered. 4'

Sandstone, light yellow-brown; coarse grained, well sorted, fair porosity, quartzose; massive, no apparent laminae. 1'

Interbedded clean coarse grained quartzose sandstone and argillaceous fine grained sandstone; beds generally even and parallel, 1/2" to 3" thick, commonly ripple marked. 7'

Station 2

Located on SE shore of Old Fort Island 200 yards east of Station 1.

Sandstone, buff, yellowish-grey weathering; fine to very coarse with scattered conglomerate size pebbles, poorly sorted, good porosity, festoon bedding truncated by overlying bed. 4'

Interbedded-thin bedded argillaceous, silty sandstone and thick bedded clean, quartzose, coarse grained, porous sandstone; thin bedded intervals are marked by wavy laminations and ripple marks, thicker beds are massive, not laminated. 7.8'

Sandstone, buff to brown, fine grained argillaceous, silty; wavy laminae; recessive unit in outcrop. 1'

Sandstone, buff to grey, fine to medium grained; clean, quartzose, well indurated, even parallel beds 2" to 4" thick, horizontal burrows along bedding planes. 5'

Shale, dark brown, yellow-green weathering; blocky, soft. 2'

Thickness
of Interval

Station 3

Outcrop is ridge striking east-west near centre of Old Fort Island.

Dolomite, light grey-buff, cryptograined; contains a few fossil casts lined with dolomite or calcite crystals; beds are 1" to 5" thick, outcrop is massive.	17'
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Station 4

Outcrop is cliff on north bank of the LaMarte River approximately 2 miles downstream from LaMarte Falls.

Shale, maroon and green with occasional buff to maroon, silty dolomite bands; shale is generally sub-fissile, thinly laminated with ripple marked surfaces.	24'
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Dolomite, dark grey-brown, cryptograined; thin bedded; interbeds of green shale in lower 5'.	12'
--	-----

Shale, dark green blocky thin bedded; dolomitic, contains 2" beds of dolomite; commonly ripple marked.	14'
--	-----

Dolomite; dark grey-brown; cryptograined; massive bedding; occasional blind vug lined with calcite.	5'
---	----

Shale, grey, blocky, rubbly weathering; dolomitic towards top of interval; burrowed; contains bands of small black chert pebbles.	14'
---	-----

Dolomite, dark grey-brown, cryptograined, argillaceous, beds 1" to 3" interbeds of dark grey dolomitic shale extensively burrowed.	8'
--	----

Shale, dark grey, blocky, rubbly weathering.	5'
--	----

Dolomite, buff to dark brown, crypto-crystalline to finely crystalline; scattered small corals and crinoids on weathered surface; 3 foot band of chert nodules in middle of unit.	10'
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Thickness
of Interval

Station 5

Outcrop is located 300 feet south of a point of land 2 miles west-northwest of Baker Point on the west shore of Great Slave Lake.

Shale, green and red with interbeds of gypsum up to 2" thick. 5'

Shale, red, rubbly, interlaced with veins of gypsum. 4'

Dolomite, reddish brown with green-gray mottling, argillaceous, gypsiferous; interval contains 3 one foot beds of red shale and numerous beds of gypsum 1 inch thick, also vertical fractures infilled with gypsum. 9'

Shale, red, rubbly, 1/2 inch bands of gypsum. 4'

Station 6

Outcrop located 4 miles northwest of Baker Point on west shore of Great Slave Lake.

Red beds, consisting of interbedded red shale, red and green mottled shale and argillaceous dolomite, section contains beds of gypsum 1/4" to 3" thick occurring between beds of dolomite and shale and filling fractures. 17'

Station 7

Outcrop located at west end of Foam Point on west shore of Great Slave Lake. Only west end of outcrop was examined.

Red beds, consisting of red silty argillaceous dolomite interbedded with rusty red dolomitic shale and gypsum; dolomite in beds 8 to 12 inches thick makes up 80 percent of interval. 8'

Thickness
of Interval

Station 8

Located on Providence-Rae highway approximately at mile post 138.

Shale, green, rubbly, interlaced with veins of selenite and gypsum; interbedded with gypsum, white, grey, earthy to crystalline.

4'

Station 9

Located on Providence-Rae highway approximately at mile post 130 in ditch on west side of road.

Dolomite, dark brown, cryptocrystalline to very fine crystalline; very few microvugs lined with calcite, non skeletal, outcrop is massive, no bedding apparent.

1'

Stations 10, 11, 12, 13, 14

Located on Providence-Rae highway in ditches and borrow pits between mile posts 97 and 125. All of these outcrops are pavement type. There is very little vertical section exposed.

Limestone, dark brown, cryptograined, slightly fossiliferous to very fossiliferous; calcite veining and infilling; common fossils are crinoids, brachiopods and corals; generally thin bedded with beds from 1/8 inch to 3 inches thick.

Station 15

Located on the Cline River 20 miles northeast (straight line direction) from its junction with the Willow Lake River.

Limestone, grey to buff to dark brown, cryptograined, variably skeletal; contains bands of brachiopods and crinoids, lower 8 feet is thin bedded, upper part is more massive; outcrop is slightly arched, strike of antiform is 250°.

20'

**Thickness
of Interval**

Station 16

Located on the Cline River approximately one mile downstream from Station 15.

Limestone, grey to dark grey-brown, cryptograined to very finely crystalline; contains beds with abundant brachiopods.

14'

Station 17

Located on Lonely Point on west shore of Great Slave Lake.

Limestone, light brownish grey to light brown, cryptograined, fossiliferous, mainly brachiopods and crinoids.

12'

Station 18

Located on the north shore of the smallest island of the Burnt Island group. No outcrop is present but rubble on beach is near outcrop.

Dolomite, cream, buff, weathers white, fine to medium crystalline, many vugs lined with dolomite rhombs.

Station 19

Located on northwest shore of Green Island.

Interbedded limestone and shale. Limestone is dark brown cryptograined, fossiliferous, bituminous. Shale is dark grey-brown limey, bituminous. Outcrop weathers white; bedding is contorted and undulating.

2'

Station 20

Located on Pine Point.

Interbedded limestone and shale. Outcrop is similar to Station 19.

4'

Thickness
of Interval

Station 21

Located 2 miles from Dawson Landing on road
between Dawson Landing and Pine Point.
Section not measured.

Limestone, dark brown, fine grained to crypto-
grained, bituminous, fossiliferous.

Station 22

Located on south shore of Great Slave Lake
1-1/4 miles southeast of Pine Point.

Limestone, dark brown, cryptograined; beds
3 to 6 inches thick; interbedded with shale,
dark grey to black, calcareous, fissile.

4'

Station 23

Located one mile east of Presquille Point
on the south shore of Great Slave Lake.

Limestone, grey-brown, very fine crystalline,
fossiliferous, contains stromatoporoids,
brachiopods, corals; outcrop is thin bedded
with beds 1/2 inch to 2 inches thick.

2'

Station 24

Located on the northeast side of Sulphur Point
on the south shore of Great Slave Lake.

Limestone, grey-brown, cryptograined, fossiliferous,
beds 6 inches thick.

1'

Limestone, light brown to grey, beds 1 inch thick,
cryptograined, alternating bands of cryptograined
limestone and limestone with leached vug porosity.

3'

Limestone, grey, cryptograined, beds 2 inches thick;
green shale inclusions.

2'

Thickness
of Interval

Station 25

Located 3 miles east of Breynat Point on the south shore of Great Slave Lake.

Limestone, brown-grey, cryptograined, appears varved with fine laminae; beds 1/8 inch to 1/2 inch thick.

0.5'

Station 26

Located on the Buffalo River one mile upstream from Mellor Rapids.

Limestone, brown to dark grey-brown, mottled; cryptograined to very fine crystalline; very fossiliferous, contains stromatoporoids and corals; outcrop is thick bedded with rubbly pseudo-bedding.

10'

Limestone, brown, cryptograined, fossiliferous contains fewer fossils than section below; beds 2 to 6 inches thick.

5'

Station 27

Located at pit N-42, Pine Point Mines Ltd.

Section was not sampled extensively; consists primarily of dolomite, white to buff mottled; coarsely crystalline; extensive replacement by white secondary dolomite. Bedding 2 to 5 feet thick interrupted by shatter zones with no apparent bedding. Interbeds of white cryptograined chalky limestone near entrance to pit.

70'

Station 28

Located on shore of Great Slave Lake approximately 1 mile north of Slave Point. Cobbles on beach examined; no outcrop available above water.

Limestone, light buff, finely crystalline, altered to chalky texture; contains abundant stromatoporoids.

Thickness
of Interval

Station 29

Located on west shore of Great Slave Lake
1 mile south of Windy Point.

Limestone, light grey-brown weathers very
light buff, cryptograined, fossiliferous,
contains stromatoporoids and considerable
skeletal debris.

8'

Station 30

Located 1 mile southeast of the southeast
corner of Prairie Lake. Beds dip 20° to the
west off the west side of the Presquille reef.

Limestone, light grey-brown fine crystalline
very little fossil material, grades to the
east into dolomite brown, fine to medium
crystalline; fossiliferous, mainly brachiopods
and corals.

2'

Station 31

Located 100 yards north of Station 30.

Limestone, grey to grey-brown, finely crystalline,
dolomitic in part, grading to dolomite in eastern
part of outcrop, fossiliferous, mainly brachiopods
and corals.

3'

Station 32

Located 1-1/2 miles south-southeast of southeast
corner of Prairie Lake. Station 32A is Presquille
reef; 32B represents beds adjacent to reef.

32A - Dolomite, white to buff to brown; coarsely
crystalline; vuggy; massive, no bedding apparent.

5'

32B - Dolomite, light buff, brown; coarsely
crystalline, vuggy; crudely bedded.

3'

Thickness
of Interval

Station 32 (cont'd)

Dolomite, light buff, brown, coarsely crystalline; coarsely vuggy; crudely bedded.	4'
Dolomite, grey-brown, fine to medium crystalline; fossiliferous, contains scattered corals, crinoids, brachiopods. Thin bedded with beds 1 inch thick.	2'
Limestone, dark brown, fine grained, fossiliferous, contains brachiopods and crinoids. Thin bedded, beds less than 1 inch thick.	1'
Limestone, brown, fine grained, contains abundant skeletal debris, scattered brachiopods and crinoids, beds less than 1 inch thick.	4'

Station 33

Located 400 feet north of Station 32.

Limestone, brown, fine grained; consists of cemented skeletal debris.	2.5'
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Station 34

Located on a small promontory and peninsula extending into the south shore of Sulphur Bay. Outcrop not measured.

Dolomite, buff, brown mottled, weathers white; coarsely crystalline; vuggy; massive; no bedding apparent, knobby weathering surface; bleeding tarry oil and sulphur water from vugs.

Station 35

Located on east flank of Fawn Lake bioherm. Spot samples taken.

35A - Dolomite, grey, white mottled; coarsely crystalline; fossiliferous, contains relict crinoids, brachiopods and corals.

Thickness
of Interval

Station 35 (cont'd)

35B - Limestone, grey white buff mottled;
coarsely crystalline, fossiliferous, mainly
crinoid debris.

Stations 36, 37, 38, 39

Located on Horn River between 5 and 8 miles
upstream (straight line direction) from point
where Ferguson Creek enters the Horn River.

Shale, dark grey, fissile; numerous limestone
concretions; outcrops are badly weathered and
stained with iron oxide; station 39 has a one
foot section of shaly limestone at base.

30'