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REPORT ON GEOLOGICAL SURVEY - 1980

ESSO RESOURCES CANADA LIMITED  
ALBERTA/B.C. EXPLORATION DISTRICT

MACKENZIE RIVER VALLEY AND MACKENZIE MTN. N.W.T.

**007-01-05-375**  
BY  
T.J. HAWKINGS

PROJECT 07-01-05-80-03

101

7-1-5-80-03

PROJECT NUMBER: 7-1-5-375

COMPANY: ESSO Resources

REPORT TITLE: Geological Survey

Mackenzie R. & Mtns.

COMMENTS:

ENGINEERING AND CONTROL BRANCH

ENVIRONMENTAL AND PROTECTION BRANCH

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ESSO RESOURCES CANADA LIMITED

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MACKENZIE RIVER VALLEY AND MACKENZIE MTNS., N.W.T.

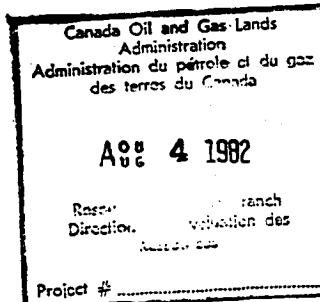
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EXPLORATORY PERMITS

L-93 GROUP LEASES (PART)

BY  
T. J. HAWKINGS  
MARCH, 1982



PROJECT NO. 07-01-05-80-03

GEOLOGICAL EXAMINATION OF DEVONIAN OUTCROPS,  
MACKENZIE RIVER VALLEY AND MACKENZIE MOUNTAINS, N.W.T.

PROJECT TIMING

June 1-8, 1980.

ESSO RESOURCES PERSONNEL

J.P.R. Irish	-	Reservoir Geology
J.C. Wendte	-	Geological Research
N.I. Corbett	-	Exploration

PROJECT OBJECTIVES

- 1) Familiarize Esso Resources personnel with the geology of Kee Scarp Formation exposures in the Norman Wells/Mackenzie Mountains area.
- 2) Examine Island River Member limestones, Wrigley Plateau area, N.W.T.

PROJECT DESCRIPTION

A short duration geological program was carried out by the above listed personnel from Esso Resources Canada Limited. The project was based in Norman Wells, N.W.T. with helicopter support supplied under contract with Okanagan Helicopters (Norman Wells Station).

A total of seven working days were spent examining north and west of Norman Wells, in the rock quarry adjacent to the Norman Wells town-site, and briefly examining one Island River limestone section west of Wrigley N.W.T. The locations of the sections visited are shown on the accompanying map, marked by an X.

It was not the intent of this program to collect new basic data, but rather to observe and to gain a better appreciation of outcrop descriptions published in internal reports and from the scientific literature. This allowed us to compare our outcrop observations with what we have seen in cores from the Norman Wells oilfield.

The majority of our working time was spent at the Kee Scarp Formation exposures along the Front Range of the Mackenzie Mountains at Mountain River, Powell Creek and Babbling Creek. A full-reef section of Kee Scarp Formation is exposed here over a strike length of several miles.

At Powell Creek and West Powell Creek, the lateral transition from off-reef to reef strata is very well exposed. Few locations show this transition so well.

We were also interested in observing the vertical sequence of strata through the Hare Indian Fm. into the Kee Scarp Fm. The boundary between these formations is transitional: it is part of a shoaling-upward cycle from the black, bituminous shales of the lower Hare Indian Fm., through the upper Hare Indian where argillaceous limestones become thicker and increasingly abundant upward in the section into Kee Scarp Fm. platform limestones.

A carbonate platform about 5 metres thick is developed under the exposed reef. On the platform, reef growth was initiated as a series of discrete patch reefs. Depositional relief over these patch reefs can be observed in the outcrop between Powell Creek and Babbling Creek. Eventually, the patch reefs coalesced and the development of the full Kee Scarp Reef proceeded.

Curiosity about the nature of the limestone beds described by Douglas and Norris (1963) to the west of Wrigley, led us to check one outcropping there. We consider their Map Unit 25 to be Island River Fm. equivalent limestones of a relatively deep water facies. The rocks contain an abundant fauna of tabular stromatoporoids, thamnopora and some massive stroms, brachiopods and horn corals. It is unclear how laterally extensive these limestones are in the Mackenzie Valley.

#### SUMMARY

The observations made during this program were not compiled into a formal report, but have made a significant contribution to our understanding of the initiation of reef growth within the Norman Wells reef. It is now clear that a thin carbonate platform did develop under the Kee Scarp reefs. The reefs grew on this platform.

Our curiosity is satisfied that Douglas and Norris were correct in their correlation of the limestones exposes on Wrigley Plateau to the top of the Fort Simpson Formation. Based on their stratigraphic position, we consider these limestones to be equivalent to the Island River limestones of the southern Northwest Territories.

REFERENCE: Douglas and Norris. 1963, Dahadinni and Wrigley Map Areas, District of Mackenzie, Northwest Territories, GSC Paper 62-33.

### OUTCROP SECTION LOCATION MAP

