

CALGARY, ALBERTA

REPORT ON 1952 FIELD WORK
in the
SLAVE RIVER - GREAT SLAVE LAKE AREA
by
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for
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District Exploration Supervisor

The California Standard Company

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Summary

The following report, including maps, is submitted in compliance with Section 30 of the Territorial Oil and Gas Regulations. Work credits amounting to approximately one-quarter of the field party costs were applied to N.W.T. Permits.

Field work in the Great Slave Lake area during 1952 was carried out by Mr. A.E. Kliske, company geologist. Transportation was provided by a 16-foot canoe, a 45-foot cabin boat and a Beaver float-plane during the various phases of the operation. The party consisted of two geologists A.E. Kliske and W.J. Koop.

Stratigraphic work was confined mostly to Upper and Middle Devonian rocks with some Ordovician and possible Silurian outcrops. The accompanying areal geology map indicates the distribution of the mappable stratigraphic units. Precambrian granite and gneiss outcrops along Slave River south of Fort Smith and borders the subject area on the east. A basal sandstone - shale unit approximately 130 feet thick overlies the Precambrian on the north arm of Great Slave Lake. Red sandy dolomite at least 150 feet thick overlies the basal unit, and both of the above units have been designated as Ordovician. Roughly 300 feet of anhydrite, with some dolomite beds, overlies the red bed sequence and is considered to be possible Silurian (Fitzgerald formation) or Devonian. The Pine Point formation of Middle Devonian age is exposed on both the north and south shores. Thickness of the Pine Point dark limestone appears to vary, with a 600 foot limestone interval assigned to the Pine Point formation in the Nintzi Point well. The Presquile dolomite formation, at least 300 feet thick, overlies the Pine Point limestone. Coarse crystalline, often vuggy, dolomite constitutes the Presquile both in the type area and at Sulphur Bay on the north shore. The Slave Point formation consisting of 300 feet of brown fossiliferous limestone rests on the Presquile dolomite. Strata assigned to the Upper Devonian are in ascending order: Frobisher formation (925 feet green shale), Hay River formation (650 feet plus, pale fossiliferous limestone), and Kakisa River limestone. The latter unit is exposed along the upper Kakisa River and is truncated by the pre-Cretaceous unconformity.

Introduction

Field Program

The Slave River - Great Slave Lake area was traversed as is indicated on the accompanying Index Map. A 16-foot prospectors

canoe furnish transportation on all river traverses and on some lake traverses as well. For the greater part of the work along Great Slave Lake a 45-foot cabin boat was chartered from Mr. Fred MacNiski of Hay River, N.W.T. On several occasions Mr. Gordon Cameron of the California Standard Company flew the party and equipment to the more remote portions of the area.

Topography

The Mackenzie River lowland occupies the northern part of the area; the southern part is at a higher elevation, and is separated from the northern part by a low north-facing escarpment. Topographic relief is afforded by the canyons cut through this escarpment. Rounded hills are present along the north arm of Great Slave Lake, and in the Pine Point area south of the lake.

The territory south of Great Slave Lake is well drained by several rivers of fair size. In contrast with the south shore, the north shore is very poorly drained. The shore line of Great Slave Lake is very low and shelving except along the north shore where in a few places hills are present near the lake and deep water occurs adjacent to them (eg. Windy Point, Moraine Point). Outcrops are usually very small, along the lake shore, and frequently consist of only a single pavement-like bedding surface just at or below water level. Islands in the lake commonly consist of bed rock.

Stratigraphy

The following table of formations indicates the successive stratigraphic units and their approximate composite thicknesses.

	<u>Formations</u>	<u>Thickness</u>
Cretaceous	--- Unconformity ---	not examined
Upper Devonian	Kakisa River limestone Hay River formation Frobisher formation	not defined 650'+ 925'+
Middle Devonian	Slave Point formation Presquile formation Pine Point formation	300'+ 700'+ to 600'
Devonian ?	Anhydrite - dolomite	300'
	--- Unconformity ---	
Ordovician	Red Beds Basal Sandstone-shale	150'+ 130'+

Ordovician

Basal Sandstone-shale

On the north arm of Great Slave Lake 90 feet of shale and sandstone is exposed about 75 feet stratigraphically below fossiliferous Ordovician dolomite, which forms the caprock of an escarpment west of the north arm. A composite section between Red Rock Point and Old Fort Island is as follows:

<u>Description</u>	<u>Thickness, feet</u>
Overlying beds: Ordovician dolomite	
<u>Claystone</u> , slightly silty, medium grayish green, breaks out in irregular spheroids; contains traces of black, carbonized plant remains; includes a few irregular weathered interbeds	11'
* <u>Clay</u> , sandy, unconsolidated, yellow to dark green; includes minor amounts of poorly consolidated, argillaceous, green to white sandstone; worm trails on top bed	7'
<u>Sandstone</u> , quartzose, well sorted, very fine grained, well rounded, yellowish white, unconsolidated to poorly consolidated, containing thin interbeds of light green unconsolidated clay; grades downward into sandy green clay..	6 1/2'
<u>Sandstone</u> , quartzose, light yellowish gray, very fine grained, friable	2'
<u>Sandstone and clay</u>	2'
<u>Unexposed</u> ; upper part is slumped <u>green shale</u>	about 40'
<u>Sandstone</u> , friable, yellowish green, with argillaceous interbeds	5'
<u>Unexposed</u>	7'
<u>Sandstone</u> , firm, coarse grained, quartzose, ...	1'
<u>Unexposed</u>	5'
<u>Sandstone</u> , semi-firm, yellowish white to greenish white, coarse grained, quartzose, noncalcareous, well sorted and well rounded, ...	3'
Bottom of outcrop	
Total thickness	89 1/2'

Red Bed Sequence

Low cliffs of red dolomite occur along the west shore of the north arm from Red Rock Point to beyond Whitebeach Point. Fossils collected from this dolomite indicate an Ordovician age and this dolomite probably correlates with the fossiliferous dolomite described by C.S. Lord on the La Martre River to the north. This unit appears to be at least 150 feet thick.

Silurian

Silurian rocks have been described near Fitzgerald and on the north shore of Great Slave Lake near the entrance to the north arm. Both these localities were studied and no evidence was found to definitely establish the presence of Silurian rocks in the Great Slave Lake area.

Devonian

The oldest Devonian rocks which are exposed on Great Slave Lake consist of interbedded dolomite and evaporites.

At Locality E35 the section is as follows:

<u>Description</u>	<u>Thickness, feet</u>
<u>Gypsum</u> , white, thin bedded	1.5'
<u>Unexposed</u>	about 20'
<u>Dolomite</u> , brown, thin bedded	5'
<u>Gypsum</u> , white	5'
<u>Unexposed</u>	about 30'
<u>Dolomite</u> light grayish brown, ...	0.5'
<u>Dolomite</u> , reddish gray, cryptocrystalline, thin evenly bedded, poor porosity	2'
<u>Dolomite</u> , reddish brown, sandy, cryptocrystalline, thin bedded	1'
<u>Unexposed</u>	about 15'
<u>Dolomite</u> , sandy, fragmental, red, medium bedded	2.5'
<u>Unexposed</u>	100'
<u>Dolomite</u> , red, containing Ordovician fossils	
Total thickness	182.5 feet

On Long Island at Locality K79 four and a half feet of light brown thin bedded anhydrite is exposed. The evaporite represented by this and other occurrences is probably equivalent to the thick anhydrite found in the subsurface at Pine Point (DD.H. G - 1)

Middle Devonian

Pine Point formation

The Pine Point formation consists of dark limestone which is underlain by the evaporites referred to above and is overlain by the Presquile formation. At Pine Point on the south shore of Great Slave Lake the limestone is dark brown, bituminous and contains abundant fossils of the genus Martinia. North shore equivalents of the Pine Point formation consist of a western sequence of medium to thin bedded, medium gray, sparsely fossiliferous limestone (Localities K66, K69, K71) and an eastern, presumably older sequence of thicker bedded, medium brown, fossiliferous limestone (Localities K77, K78, K93).

Presquile formation

The Presquile formation at the type locality on Presquile Point on the south shore differs from the Presquile of other areas in consisting of brown fragmental, fossiliferous limestone, only slightly dolomitic. This is considered to be a very poor type locality since there is even some doubt as to whether any bedrock actually occurs on this rubbly point. Dolomite correlated with the Presquile forms a broad highland several miles south of Pine Point. The dolomite in the diamond drill holes on the Pine Point mines property consists of an upper coarsely crystalline member and a lower finely granular member.

The coarsely crystalline member is white and brown mottled. Similar coarsely crystalline dolomite is present in the Sulphur Bay area and in the Frobisher Test wells on lower Hay River. Unusually intense alteration has obscured sedimentary features which were undoubtedly present in the rock. Thickness of the coarse crystalline dolomite member is at least 200 feet in the Pine Point area.

The lower sandy-textured dolomite member is extensively developed in the Pine Point - Little Buffalo River area with a thickness of about 475 feet at the Pine Point mines property. The dolomite here is light brown and finely granular. Surface outcrops in the Resolution Bay area are less granular and consist of thick to massive beds of dolomite with a few colonial corals and large Atrypas.

Outcrops in the Windy Point - Sulphur bay area on the north shore consist of two types of dolomite, as follows:

Upper Member: Dolomite - medium brown, massive-bedded, microcrystalline, coralline in part, 200 feet more or less.

Lower Member: Dolomite - brown and white mottled, massive, no visible bedding, coarsely crystalline, with white dolomite veinlets, 50 to 100 feet (?).

Slave Point formation

The type locality of this formation is at Slave Point where a small thickness of fossiliferous, calcitic brown dolomite is exposed. Elsewhere in the Great Slave Lake area the Slave Point formation is typically medium to light colored fossiliferous limestone, with in some places (eg. Localities K4 and K5) small amounts of dolomite. Thickness of the Slave Point is between 250 and 350 feet.

Surface exposures of the Slave Point formation are few and widely separated. Outcrop sections on the north shore from Burnt to Windy Point consist of thickly interbedded grayish brown sparsely fossiliferous limestone and brown very fossiliferous coralline and stromatoporoidal limestone. On the south shore at Sulphur Point outcropping Slave Point equivalents are generally similar to those in the Burnt Point area but are less fossiliferous.

Upper Devonian

Frobisher formation

The Frobisher formation was named by A.W. Farmilo in 1949 (then of California Standard Company) and was defined so as to include the Simpson and Hay River shales. The Frobisher formation is composed of greenish gray shaly limestone, noncalcareous shale and dolomitic shale. Cores of Frobisher Test Hole #5B revealed the presence of Lingula in the basal 100 feet of the Frobisher, Eleutherokomma 160 feet above the Slave Point and Buchiola 475 feet above the Slave Point contact.

Hay River formation

The Hay River formation is applied to the beds of the type locality on Hay River. The Hay River formation here consists of bedded light colored fossiliferous limestone which were not examined in detail during the 1952 field season.

Exposures on lower Kakisa River are small and discontinuous except at Lady Evelyn Falls where about 100 feet of section is exposed.

The section is as follows:

<u>Description</u>	<u>Thickness, feet</u>
Top of Outcrop	
Limestone, with thin greenish gray limy shale partings near top, medium light gray, medium to thin nodular bedded, finely fragmental, very slightly silty in part; contains argillaceous patches, Scattered <u>Atrypa</u> , trace of <u>Stropheodonta</u> , bryozoan, pelecypods solitary corals	13'
Limestone, medium light gray, medium bedded; crinoid columnals and brachiopods abundant	1.5'

<u>Limestone</u> , with thin partings of limy, silty <u>shale</u> ; medium gray, thin nodular-bedded, fine textured	5.0'
<u>Limestone</u> , medium gray, medium nodular-bedded, fine textured, containing fine fossil fragments, solitary corals	1.0'
<u>Unexposed</u>	15' +
<u>Limestone</u> , brownish gray, medium nodular-bedded, fine textured, containing fine fossil fragments	6'
<u>Shale</u> , limy, grayish green, thin bedded, with a few nodular interbeds of gray limestone	3'
<u>Unexposed</u> ; appears <u>shaly</u>	1.5'
<u>Limestone</u> , medium light brown, medium nodular-bedded, finely fragmental	3'
<u>Limestone</u> , argillaceous, greenish gray, thin nodular- bedded, with thin partings of limy shale	2'
<u>Shale</u> , limy, grayish green, thin bedded, with a few thin, nodular beds of argillaceous limestone	1.5'
<u>Unexposed</u> ; appears <u>shaly</u>	5'
<u>Limestone</u> , finely sandy, argillaceous, medium bedded, finely fragmental, containing scattered dolomite rhombs and fine fossil detritus, with thin partings of greenish gray limy <u>shale</u> in lower half	22'
<u>Limestone</u> , argillaceous, gray, fine textured, medium bedded, with thick partings of greenish gray limy <u>shale</u>	10.5'
<u>Limestone</u> , argillaceous, medium gray to slightly greenish, thick bedded, fine textured, with scattered fossil fragments; grades up into overlying beds	3.5'
<u>Shale</u> , limy, greenish gray, slightly silty, medium bedded, blocky	2.5'
<u>Shale</u> , limy greenish gray only partly exposed	2'
<u>Limestone</u> , medium light gray, fine textured, medium irregular-bedded, with scattered fossil fragments, scattered <u>Stropheodonta</u>	2'
<u>Shale</u> , limy, greenish gray, medium bedded, blocky	2.5'
Bottom of outcrop	
Total	102.5'

Kakisa River Limestone

On upper Kakisa River the Hay River formation is overlain by a sequence of algal limestone and sandy limestone which so far has not been named. This sequence was designated as Kakisa River Limestone by A.E. Kliske. Upper and lower contacts are not well outlined at present. The limestones are exposed along the river between Kakisa and Kathleena Lakes. The outcrops are small, scattered, and have a very gentle dip preventing accurate determination of total thickness.

In descending order the outcrop section consists of:

1. Sandy limestone
2. Fragmental limestone
3. Very sandy limestone

4. Algal limestone
5. Sandy limestone

All members are light brown or gray. Fossils are scattered to abundant consisting chiefly of Hypothyndina, Athyris, spiriferoid brachiopods, foraminifera, cup corals, crinoid remains, algae, stromatoporoids and colonial corals. Kakisa River limestones are typically fragmental and sandy, containing to 60 per cent fine quartz sand.



