GM 28275

SUMMARY OF GEOLOGICAL AND GEOPHYSICAL FIELD WORK ON EXPLORATION LICENCE NO. 404, BONAVENTURE COUNTY

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SUMMARY OF GEOLOGICAL AND GEOPHYSICAL FIELD WORK ON EXPLORATION LICENCE NO. 404, BONAVENTURE COUNTY, PROVINCE OF QUEBEC

LOCATION

Exploration Permit No. 404 was issued to Shawnee Petroleums Limited on May 21, 1970 for a period of five years. The permit contains approximately 21,600 acres and is situated in the electoral district of Bonaventure adjacent to the Bay of Chaleurs in the Gaspe Peninsula of Quebec.

RENTALS AND WORK COMMITMENTS

Annual rentals of $0.03 per acre have been paid on or by May 21, 1970 and May 21, 1971 thus rendering the permit in good standing until May 21, 1972.

Exploration work commitments of $0.20 per acre are required in the first year of the permit escalating at the rate of $0.20 per acre, per year, reaching a maximum of $1.00 per acre in the fifth year of the permit. To date the company has spent a total of $23,551.10 on direct geological and geophysical studies within the area.

NATURE OF WORK

Geological investigation and field work were preceded by the study and compilation of all available geological information; maps and reports pertinent to the area. A general regional study of the Gaspe Peninsula was undertaken in order to more fully understand the position of the permit area within the entire geological framework of the region. Little recent published geological work is available on the specific area, the last map and report being published by S. A. Northrop in 1939

on the Paleontology and Stratigraphy of the Silurian rocks of the Port Daniel - Black Cape Region in the Geological Society of America Special Paper 21. C. F. Burk Jr.'s paper of the Silurian Stratigraphy of the Gaspe Peninsula, published in the Bulletin of the American Association of Petroleum Geologists (Volume 48, No. 4, 1964) dealt in some detail on the stratigraphy of the Black Cape area but only in the context of the regional study. Quebec Department of Natural Resources, Geological Reports 70 (P. G. Badgley, 1956) and 107 (W. B. Skidmore, 1965) are adjacent to the area of interest and provided considerable help in the understanding of the geology.

Field work commenced in early June 1970 with a reconnaissance study by Cameron Berry, P.Geol., and Charles Church, P.Eng., of Shawnee in the permit area, particular attention being directed to the exposures at Cape Noir and Pointe Ouest. A detailed field study was conducted in the month of July 1970 employing the geological consulting services of C. J. Hadley, P.Geol., of Metals, Petroleum and Hydraulic Resources Consulting Limited of Toronto. Mr. Hadley employed a Mr. Charles Allard of nearby Carleton as a Field Assistant and worked in close association with Cameron Berry. Further field work was conducted on the Bonaventure River in September 1970 by Mr. Hadley and Mr. Berry. A report of this study is enclosed entitled "Geological Surface Mapping, Gaspe Peninsula".

In November of 1970, Overland Exploration Services Limited of Calgary, Alberta were contracted to perform a detailed gravity survey of the area. A series of residual gravity maps and profiles were computed from the Bouger values resulting in the disclosure of eight anomalies of varying magnitude. A copy of the report and maps entitled

"Gravity Survey of the Bonaventure Area, Gaspe Peninsula, Quebec" is enclosed with this summary. An attempt was made to conduct a ground magnetic survey in conjunction with the gravity survey, however the obtained values proved unreliable due to the proximity and abundance of electrical wires and cables adjacent to the roads in the southern portion of the permit area. This phase of the project was scrapped and the Federal aero-magnetic maps were used for regional magnetic analysis instead.

Mr. J. D. M. Phillips, P.Eng. of Cartographic Services, Unionville, Ontario was contracted in February 1971 to construct a series of topographic profiles across the area in order to further extend the geological interpretation in areas of little or no outcrop exposure. Further to this study a full scale air photo and drainage project was undertaken resulting in the development of a series of interpretive geology and tectonic maps. Recent work has been involved with the integration of the field geology and geophysical results with the photo interpretation. In this regard Mr. Donald Wilson, Geologist of Shawnee Petroleums Limited, assisted by Mr. Michael Hudson spent several weeks on the permit area in July 1971 obtaining further outcrop information. A report entitled "Photo Interpretation Gaspe Peninsula" is enclosed including the preliminary geological interpretation.

GENERAL GEOLOGICAL OBSERVATIONS

It is the intention of the company to present a comprehensive geological interpretation and evaluation of the permit area within the next year, after all information has been fully integrated. Although this stage has not yet been reached certain pertinent observations on the

geology and petroleum and natural gas potential of the area can be made.

A large portion of the permit area is covered by the essentially flat-lying Carboniferous Bonaventure formation of non-marine origin. The Bonaventure rests disconformably on the Chaleurs Group of sediments of Silurian age; this section consisting of some 10,000 feet of marine carbonates, sandstones and shales. The Silurian constitutes the primary exploration target and may be expected to contain hydrocarbons in both structural and stratigraphic trapping mechanisms. The Chaleurs Group has been divided into seven formations on the basis of the Cape Noir and Port Daniel sections and the definitions and nomenclature proposed by Burk (A.A.P.G. Volume 48, No. 4) has been utilized throughout the study. Northeast and east of the area of interest where the formations are exposed at the surface they are folded into a series of long northeast-southwest trending anticlines and synclines. The synclines appear symetrical from previous mapping however exhibit deep dips along the flanks. The flanks are frequently faulted by normal faults trending parallel to the anticlinal axis. Although the structures are significantly breached in that area, it is anticipated that in the deeper portion of the basin underlying the Bonaventure, erosional breaching may be considerably reduced. The West Point formation is exposed at Cape Noir and may also be overlain by a thin Devonian conglomerate underlying the Bonaventure. The regional gravity map clearly indicates the increase in section to the south thus corroborating this point of view. The Black Cape extrusive volcanics are also shown by the aero-magnetic surveys to have limited distribution particularly on land. The Black Cape exposure represents the northern extremity of the lava flows with the source or

center of the flow some four to five miles south within the Bay of Chaleurs.

The West Pointe formation exhibits massive reefing of both biohermal and biostromal nature. The type section exposure at Pointe Ouest appears to be entirely a large biostrome with massive coral heads and debris held in a stromatopora and algal mat network. This massive reef is in the order of 900 feet thick and may be two to three miles in length. Excellent reef and back reef facies can be readily observed in the Pointe Ouest - Port Daniel area and it is my belief that this would prove to be the most outstanding area in eastern Canada for students of carbonate geology to examine these relationships. The high energy carbonate reef environment is also clearly seen at Cape Noir in the West Point formation suggesting wide distribution of this facies. The nearby presence of extrusive volcanic activity comptemporaneous with West Point time might further enhance reef growth by the development of atoll type features. The residual gravity survey has delineated several broad low density relief anomalies around the 1,500 - 3,000 foot depth horizons which may be porous reefs in the West Point. Further evidence of reefing is indicated in the deeper Bouleaux, Anse Cascon and La Veille formations with the latter exhibiting intermittent reefing over a 400 foot section at the Cape Noir exposure. Considerable environmental evidence was also found on the Bonaventure River.

The Clemville and Anse Cascon formations were also found to contain significant thicknesses of medium grained sandstones exhibiting porosity in field examination. These zones may be considered as potential reservoirs if they can be located in the subsurface in

favourable structural positions. No evidence of hydrocarbon odor or staining was observed in the sandstones however they are associated with fossoliferous carbonates and shales capable of hydrocarbon generation. A karst topographic surface was observed in the La Veille limestones where they are overlain directly by the Bonaventure formation. The sink holes are partially or completely filled with Bonaventure sandstones and with large calcite crystals indicating void spaces. Consequently these sinks may be considered as potential reservoirs where filled by porous material in the La Veille subcrop belt and where overlain by tight Bonaventure shales or siltstones.