

The Cheticamp Prospect: A large salt-cored anticline offset from the East Point Gas Discovery, Gulf of St. Lawrence

Paul Durling and Tom Martel, Corridor Resources Inc

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Introduction

A large sedimentary basin containing over 12 km of Carboniferous and Permian strata underlies the southern Gulf of St. Lawrence in eastern Canada. The rocks in the basin consist mainly of red and grey, non-marine, clastic rocks with abundant coal. A thick marine evaporite interval was deposited near the bottom of the sedimentary basin fill, but has since been remobilized to form numerous salt structures. The Carboniferous “Coal Measures” comprise a world class natural gas source. Grant and Moir (1992) estimated a methane resource in the Gulf of St. Lawrence of 76 trillion cubic feet from a single 3 m coal seam.

An extensive grid of seismic reflection data was acquired in the southern Gulf of St. Lawrence from the late 1960's through to the early 1980's. These data were commonly low fold (6-12), not migrated, and by today's standards, had very basic processing. Such data were satisfactory for flat-lying strata, but are grossly inadequate for areas of complex structure such as the area offshore from western Cape Breton Island. A modern seismic program was conducted in the aforementioned area in December, 2003. The survey was acquired with a low-powered source and a 6000 m streamer, resulting in high quality 120 fold data. The data were processed to pre-stack time migration and provide much improved images of the area. Whereas the older seismic data in the area portrayed salt structures as near vertical columns of salt, the new data shows detached salts and vertical salt welds, analogous to some Gulf of Mexico structures.

East Point Discovery

A number of petroleum exploration wells drilled in the Maritimes Basin show strong indications of natural gas, including the East Point E-49 well that tested natural gas at a flow rate of 5.5 million cubic feet per day. The East Point well was drilled on a salt pillow and the structure is listed as a “Significant Discovery”. The natural gas reservoir is located within the Cable Head Formation, a regionally deposited sandstone unit of Late Carboniferous age. The reservoir comprises medium to coarse grained quartzose sandstone with 14% porosity and permeability of 2.3 md.

Another exploration well, the Brion Island well, shows that thickening of the Cable Head Formation can lead to dramatically improved reservoir thickness and quality compared to the E-49 well.

Cheticamp Prospect

Seismic mapping on the new seismic data shows that the prospective interval thickens dramatically off the East Point structure into several mini-basins. The thickened Cable Head Formation is expected to have improved reservoir characteristics. Thick Cable Head rocks were mapped within a closed area called the Cheticamp Prospect, located about 20 km southeast of the East Point discovery. It consists of an anticline between two salt structures and encloses an area of roughly 20 km². The prospect has the potential of one trillion cubic feet of gas in place. Possible direct hydrocarbon indicators have been identified and are presently being evaluated.

Reference

Grant, A.C. and Moir, P.N., 1995, Observations on coalbed methane potential, Prince Edward Island: in *Current Research*, Part E, Geological Survey of Canada, Paper 92-1E, 269-278.