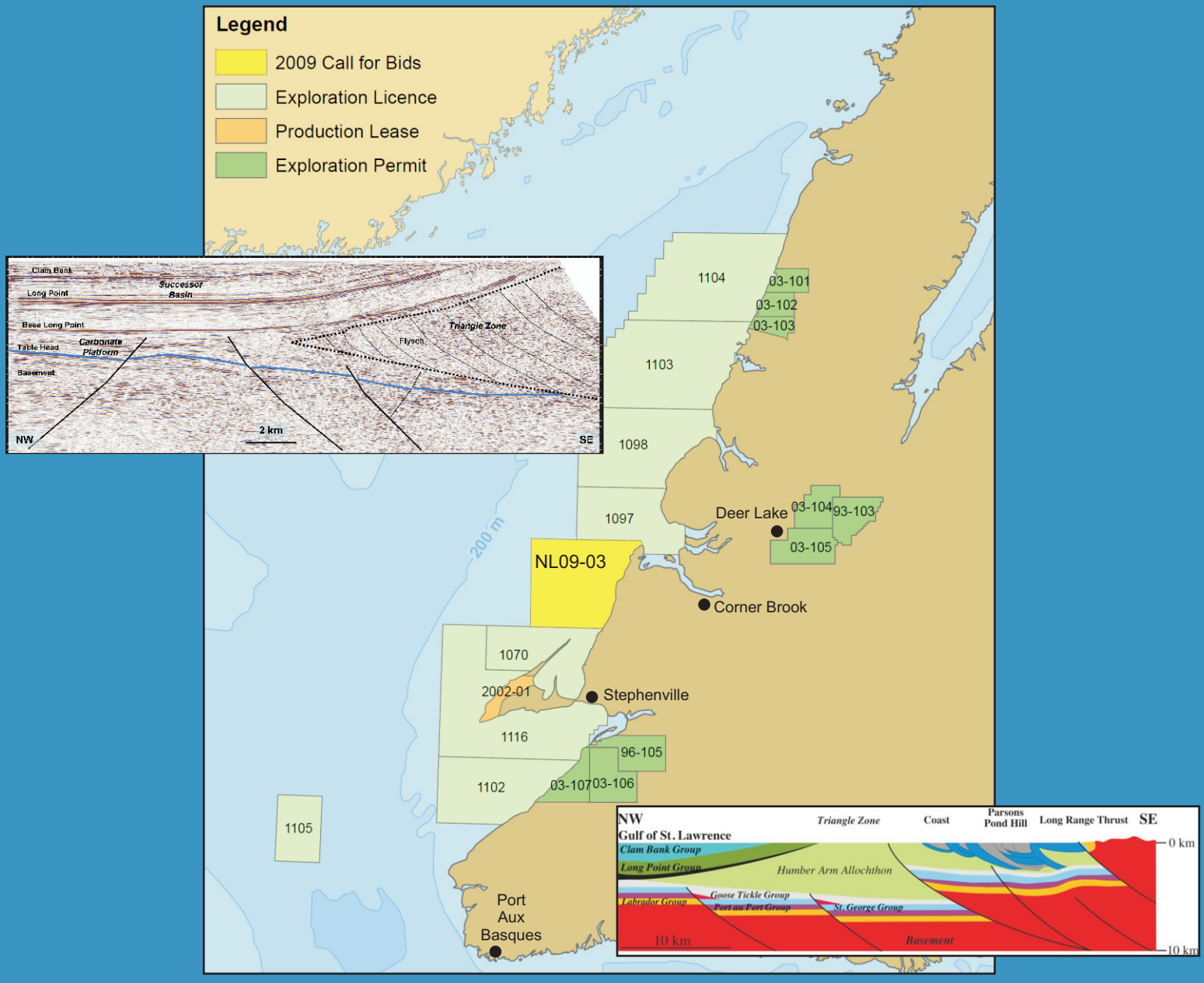
Call for Bids NL09-03, Parcel 1
Western Newfoundland
Regional Setting and Petroleum Geology Evaluation



Newfoundland Labrador

Natural Resources

www.gov.nl.ca/nr

Foreword

This report has been prepared on behalf of the Government of Newfoundland and Labrador Department of Natural Resources (NL DNR) to provide information on land parcels being offered in the Canada-Newfoundland and Labrador Offshore Petroleum Board's (C-NLOPB) 2009 Call for Bids NL09-03. This year the Board has issued three separate Calls for Bids, including:

1. **Call for Bids NL09-01** (Jeanne d'Arc Basin) consisting of one parcel;
2. **Call for Bids NL09-02** (Laurentian Subbasin) consisting of two parcels, and
3. **Call for Bids NL09-03** (Western Newfoundland and Labrador) consisting of one parcel.

These four parcels comprise a total of 513,769 hectares (1,269,546 acres). All four parcels are situated on the shelf and deep water off Newfoundland in an area administered by the Canada-Newfoundland and Labrador Offshore Petroleum Board on behalf of the Province of Newfoundland and Labrador (NL) and the Federal Government. Newfoundland and Labrador (NL) is Canada's easternmost Province that in the past decade has become an important petroleum producing region. The area also holds large gas discoveries in the Jeanne d'Arc and Hopedale basins.

Call for Bids NL09-01

Call for Bids NL09-01 consists of a single parcel of 9,558 hectares (23,618 acres), located in 100 m water depth within the Jeanne d'Arc Basin on the Northern Grand Banks. This Mesozoic-Tertiary basin produced 294,730 bopd from the Hibernia, Terra Nova and White Rose giant oil fields during the first 6 months of 2009. There are 16 active Exploration Licenses and 45 SDLs (some covering the same field) in the Jeanne d'Arc Basin and environs. The parcel offered for bid is located immediately southwest of the White Rose field Production Licence (PL 1007) and just west of the recent North Amethyst K-15 discovery and Production License (PL 1008). The Board has previously conducted a Strategic Environmental Assessment in the area covered by the Call for Bids NL09-01. The bid for this will be concluded on November 19, 2009 at 4 p.m. NL time. Additional information on this Call for Bids can be found at http://www.cnlopb.nl.ca/news/pdfs/cfb09_1.pdf

Call for Bids NL09-02

Call for Bids NL09-02 consists of two parcels totaling 364,001 hectares (899,463 acres), located in the deep water of Laurentian Subbasin, south of the island of Newfoundland. This expansive Mesozoic-Tertiary basinal area has four large active Exploration Licenses and is on geological trend with sizable oil and gas discoveries on the Scotian Shelf and Grand Banks of Newfoundland. With only one exploration well drilled during 2001 in its shelfal part, the subbasin is practically unexplored. Parcel 1 offered for bid has 290,070 hectares (716,776 acres) and is located in 500 – 2500 m of water in the south-eastern part of the basin. Parcel 2 offered for bid has 73,931 hectares (182,687 acres) and is located in 2000– 2600 m of water in the south-western part of the basin. The Board will conduct a Southern Newfoundland Strategic Environmental Assessment (2009) prior to the close of Call for Bids NL09-02. The bid for these parcels will be concluded on November 19, 2009 at 4 p.m. NL time. Additional information on this Call for Bids can be found at http://www.cnlopb.nl.ca/news/pdfs/cfb09_2.pdf

Call for Bids NL09-03

This report focuses on Call for Bids NL09-03 that includes one parcel with an area of 140,210 hectares (346,465 acres) situated within the shallow waters offshore Western Newfoundland offshore. The Call for Bids NL09-03 parcel is located within a very active Paleozoic exploration area where a proven petroleum system exists. A large oil flow test was obtained from the Port au Port #1 well in 1995, while historic oil production, well shows and present day seeps are reported from the onshore side of the Anticosti Basin. As detailed in this report and earlier publications, significant oil and gas potential exists in the Parcel offered for bids. The Board has previously conducted a Strategic Environmental Assessment in the area covered by the Call for Bids NL09-03. **The closing date for Call for Bids NL09-03 (Western Newfoundland and Labrador) is at 4:00 p.m. Newfoundland Standard Time, on November 19, 2009.** Additional information on this Call for Bids can be found at http://www.cnlopb.nl.ca/news/pdfs/cfb09_3.pdf

This report should be referenced as ***Enachescu, M.E and W. Foote., 2009. Call for Bids NL09-03, Parcel 1, Regional Setting and Petroleum Geology Evaluation, Government of Newfoundland and Labrador, Department of Natural Resource*** and can be downloaded from: http://www.nr.gov.nl.ca/mines&en/oil/.

We acknowledge the contribution to the writing of this report from Phonse Fagan, Larry Hicks and Ian Atkinson who earlier summarized the regional geology of the area in reports available from Newfoundland and Labrador Department of Natural Resources website. Thanks are due to MUN, PPSC and PR-AC as well as to Landmark-Halliburton, Canstrat and IHS. We also acknowledge the contribution to the writing of this report of earlier researchers and explorers in the area such as, H. Williams, T. Calon, I. Knight, M. Cooper, D. Lavoie, I. Sinclair, G. Stockmal, J. Waldron, P. Cawood, N. James, P. Giles, M. Gibling, G. Langdon, J. Wright and E. Burden. Also, we acknowledge the professionals of the group of companies who have investigated, mapped and drilled in the Western Newfoundland basins during an earlier exploration phase (1985-1995) when much of the seismic and geological data base for the offshore area was acquired. We thank the many researchers of the GSC Atlantic and NL Geological Survey, the geoscience specialists of the NL DNR and C-NLOPB who provided information used for the completion of this report. A number of illustrations were kindly provided by Craig Rowe, Darrell Spurrell, Dianne Noseworthy, Brad Kendell and Jillian Owens. We thank David McCallum, Larry Hicks and Anne Lake for edits and report organizing.

Two separate power point presentations and a Laurentian Basin report providing information on the other two 2009 Calls for Bids will be available on http://www.nr.gov.nl.ca/mines&en/oil/ during the fall of 2009. For information on how to submit a bid to C-NLOPB in this Call for Bids go to: http://www.cnlopb.nl.ca/ and view the May 28, 2009 News Release (http://www.cnlopb.nl.ca/news/nr20090528eng.shtml).

Acronyms used in this report:

NL = Newfoundland and Labrador (the legal name of the Province)
C-NLOPB = Canada-Newfoundland and Labrador Offshore Petroleum Board
NL DNR = Government of Newfoundland and Labrador-Department of Natural Resources
NL09-01, 02 and 03 = identifiers for the three 2009 NL Calls for Bids
FPSO = Floating Production Storage and Offloading
CSEM = Offshore Electromagnetic Survey
CFB = Call for Bids
GSC = Geological Survey of Canada
GSNL = Geological Survey of NL
PL = Production Licence
EL = Exploration Licence
EP = Exploration Permit (onshore only)
SDL = Significant Discovery Licence
DPA = Development Plan Application
HDT = Hydrothermal Dolomite
TD = Total Depth
PAP = Port au Port
md = millidarcy
bopd = barrels of oil per day
mmcfd = million cubic feet per day
tcf = trillion cubic feet
bcf = billion cubic feet
mmbbls = million barrels
Bbbls = Billion barrels
mmboe = million barrels equivalent

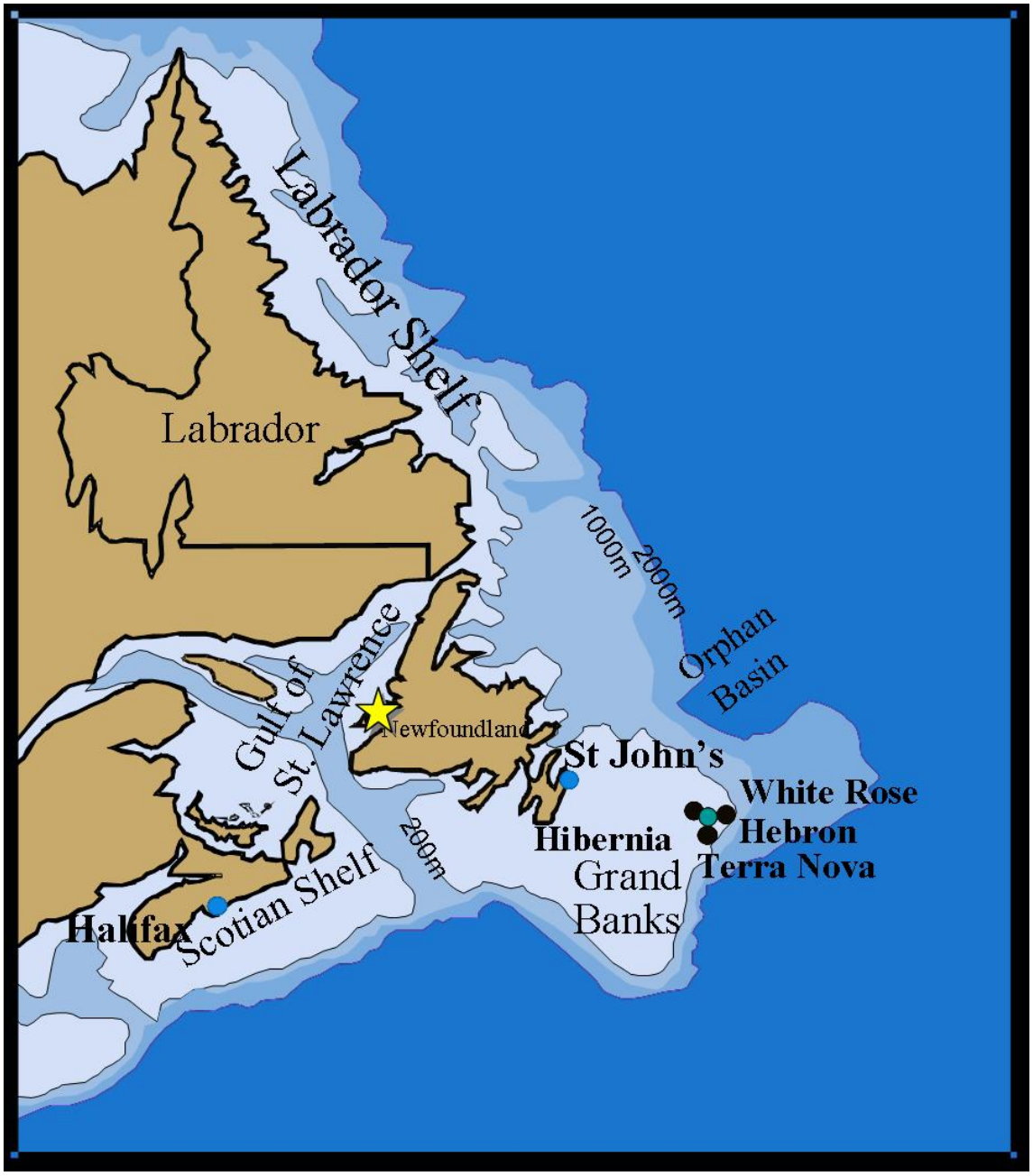


Figure 1. Location of Newfoundland and Labrador's a) major offshore producing oil fields (black dots), b) future field development at Hebron (green dot) and c) the Western Newfoundland CFB NL09-03 Parcel 1 (yellow star).

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1. Introduction

This report focuses on Parcel 1 of the C-NLOPB Call for Bids NL09-03 which is situated off the West Coast of the island of Newfoundland, in water depths ranging from the low water tide mark on the coast to approximately 125 m offshore. The single parcel of this CFB is located within the open coastline on the eastern margin of the Gulf of St. Lawrence, south of the Bay of Islands and geologically encompasses the Paleozoic Foredeep and the Appalachian Overthrust Belt (Figures 2 and 3). The parcel on offer is one of the few remaining unlicensed offshore blocks along the western coast of Newfoundland and is situated north of and on trend with the Port au Port Peninsula, where light oil and gas were tested at significant flow rates from the Port au Port #1 (PAP #1) well in 1995. The parcel lies adjacent to several active Exploration Licenses (offshore) and Exploration Permits (onshore) where there is ongoing petroleum exploration consisting of acquisition of seismic data and drilling (Figures 3 and 4).

This report provides general background on petroleum exploration on Newfoundland's West Coast area and general geological information on the hydrocarbon prospectivity of the West Newfoundland basins, emphasizing the potential of the offshore Anticosti Basin. It also discusses the specific geology and petroleum potential of the Parcel in Call for Bids NL09-03.

More information on the geology and petroleum potential of the Western Newfoundland and Labrador region, including evaluations of earlier Call for Bids parcels which became active Exploration Licences 1097, 1098, 1102, 1103, 1104, 1105, 1070 and 1116 (Figures 3 and 4) can be accessed at:

1. http://www.nr.gov.nl.ca/mines&en/oil/call_for_bids_nf04_01.stm
2. http://www.nr.gov.nl.ca/mines&en/call_for_bids/NL05.pdf
3. http://www.nr.gov.nl.ca/mines&en/call_for_bids/cfb_nl06-3_%20enachescu_report.pdf
4. http://www.nr.gov.nl.ca/mines&en/call_for_bids/CFBNL06-3_presentation.pdf
5. http://www.nr.gov.nl.ca/mines&en/oil/NatResPetDevWestCoastSydney.pdf

The accompanying Call for Bids NL 09-01 power point presentation that describes in detail the geology of Parcel 1, located in the Jeanne d'Arc Basin, southwest of the White Rose oil and gas field, will be available at http://www.nr.gov.nl.ca/mines&en/oil/ in the fall of 2009. The Call for Bids Report NL 09-2 and companion power point presentation that discusses the petroleum geology of the Laurentian Basin and the exploration potential of Parcels 1 and 2 included in the 2009 landsale will also be available from the same website during the fall of 2009.

Additional petroleum related reports from the Department of Natural Resources are available at: http://www.nr.gov.nl.ca/mines&en/oil/ and http://www.nr.gov.nl.ca/mines&en/publications/.

Selected references on the geological setting and petroleum potential of the West Newfoundland region are also provided at the end of this report.

2. Exploration and Development Background

Exploration for oil and gas onshore and offshore Western Newfoundland is less known than the much larger scale exploration efforts that took place since the 1960s and continues today in the Mesozoic basins of the Atlantic margin: on the Grand Banks to the east, on the Labrador Shelf to the north and on the Scotian Shelf to the south. This report will focus on the general setting and history of petroleum exploration in the West Coast Newfoundland region within a provincial, regional and international context (Figures 1, 2 and 3).

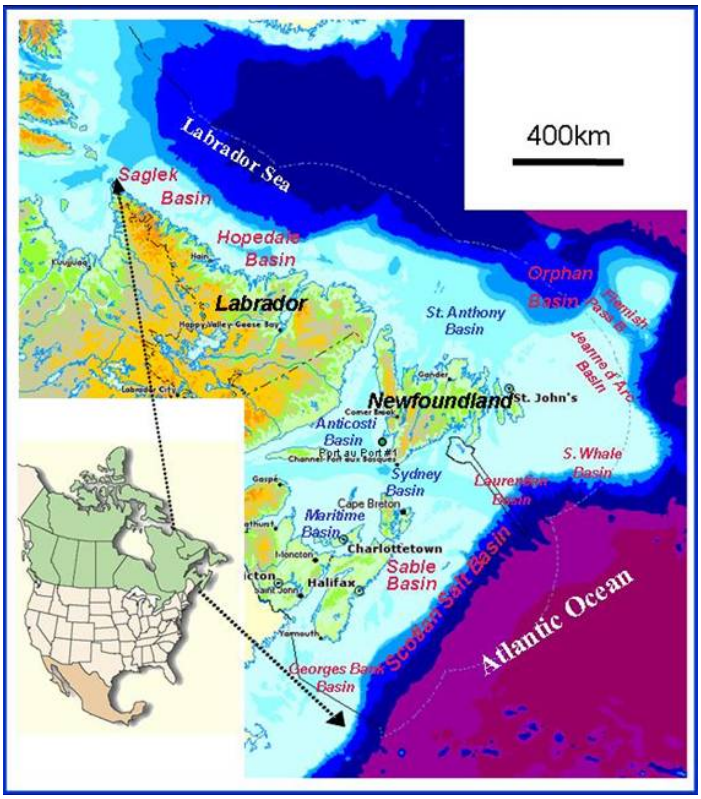

Figure 2. Atlantic Canada offshore basins map. Mesozoic basins are labelled in red and Paleozoic basins are indicated in blue (bathymetry map from NRCan). Located within the Gulf of St. Laurence the Anticosti Basin is predominantly situated in shallow water.

The Canadian provinces of Newfoundland and Labrador (NL), Nova Scotia (NS) and the Nunavut Territory (NU) are the only jurisdictions north of the state of Florida allowing offshore petroleum exploration on the Atlantic side of the North American continent. While the pace of discoveries have occurred over large time intervals and the exploration costs are significant, the large size of the hydrocarbon fields discovered on the East Coast justify that this region be in the E&P portfolio of many multinationals and independent oil companies.

Traditionally, exploration offshore Newfoundland has targeted mainly oil accumulations in a) extensional structures located within the eastern Mesozoic rift basins, and b) compressional and salt induced structures in the western Paleozoic basins. Gas exploration *per se* is a new development in the NL offshore basins and it is triggered by a need for a cleaner source of energy and increased demands from Europe, Central Canada and Northeast USA markets. It is fair to say that presently both oil and gas resources are targeted in the offshore basins of NL as well as in the Province's interior Paleozoic basins.

The Mesozoic extensional and Paleozoic compressional basins distributed around the Province of Newfoundland and Labrador constitute approximately a 600,000 km^2 area with oil and gas potential. Continental margin fundamental research and offshore oil and gas exploration have been carried out on the Atlantic region of the Province of NL for almost 5 decades. Accumulated knowledge is available to the public, including any interested petroleum exploration company, from many sources including the Geological Survey of Canada, C-NLOPB, NL Department of Natural Resources and published geoscience literature.

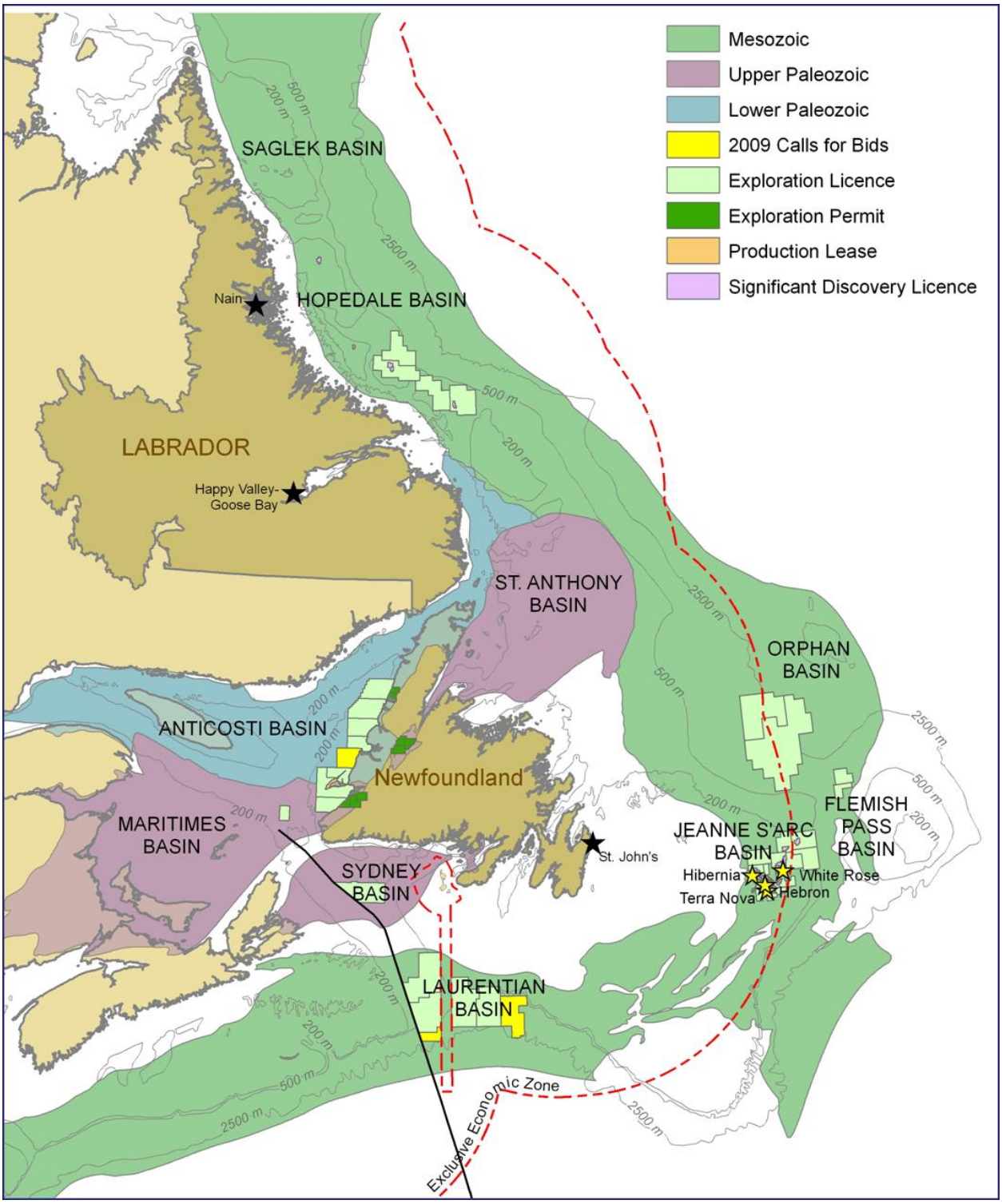

Figure 3. Atlantic Canada offshore basin setting, oil and gas discoveries, land situation as of fall 2009 and NL CFB-09-01, -02 and -03 parcels (in yellow). Mesozoic basins are indicated in green, Lower Paleozoic basins are labelled in blue and Upper Paleozoic basins are in purple. Parcel NL09-03-01 west of Corner Brook, is situated in shallow water within the Anticosti Basin (map modified after the GSC, C-NLOPB and Enachescu, 2005).

NL's largest oil and gas discoveries occurred between 1979 and 1985 and field developments started in the late 1990s and continue today (Figures 1, 2 and 3). Several new discoveries and additions to older fields have recently been announced increasing the size of total proven reserves offshore Newfoundland and Labrador. A "first ever" discovery in the deeper water of the poorly explored Flemish Pass Basin was announced in April 2009 by StatoilHydro. There is no doubt that Mizzen O-16 discovery in Exploration License 1049 will open the way for further discoveries in the wide deep water area (200-2000 m) surrounding the Province. Significant exploration activity is also taking place in the ultra-deep waters of the Laurentian and Orphan basins (2000-3000 m), as well as in the shallow waters of the Labrador's Hopedale Basin.

The past oil and gas exploration activity in the Western part of the NL Province was intermittent and less intensive. However, several extant offshore West Newfoundland ELs are now close to their Period I conclusion when parcels have to be drilled or released. In the ELs 1096-97 older 2D seismic grids were reprocessed and a first ever exploration 3D (dense 2D) survey was acquired in 2008 and interpreted in 2009. It is expected that at least one exploration well will be drilled in the shallow waters of the Anticosti Basin within these ELs during the 2010-2011. Other wells in the remaining offshore ELs may follow, once a shallow water rig is brought to West Newfoundland.

2.1. NL Petroleum Production

Offshore Developments. Three large fields - Hibernia, Terra Nova and White Rose - have been developed in the Jeanne d'Arc Basin which lies to the east of the island of Newfoundland in 80 to 150 m of water (Figures 1 and 3). These fields have produced in each of the past five years in the range of 300,000 to 360,000 barrels per day of light crude (30 to 35º API) from Mesozoic sandstones. During 2008 the three fields produced 125.3 million barrels of oil.

Presently NL delivers about 37% of the conventional light oil produced in Canada from these three producing fields and more than 80% of Atlantic Canada's offshore hydrocarbon production comes from NL, which is now the second largest hydrocarbon producing province in Canada. Over 1 billion barrels has been produced to date from the Jeanne d'Arc Basin where more than 1.8 billion barrels proven remaining recoverable reserves/resources exists and many active exploration licenses await further drilling. The total estimated Recoverable Reserves of the NL Province stands at 6 Bbbls oil and 60 tcf natural gas. Up to now four offshore basins have yielded significant petroleum discoveries and many other basins remain under-explored.

The Jeanne d'Arc Basin developments are the only producing offshore oilfields on the Atlantic coast of North America. A fourth large field, Hebron-Ben Nevis, estimated to contain 731 million barrels recoverable reserves/resources will be developed starting in 2012 using a concrete platform to be built in the Province. Hebron's "first oil" production is scheduled for 2017.

During the past 5 years several large and medium size satellite fields have been discovered and delineated in the vicinity of production facilities. Hibernia South is an extension of the Hibernia field and is estimated to contain about 230 million barrels of recoverable oil to be developed using a combination of existing infrastructure as well as a subsea tieback to the Hibernia platform. North Amethyst satellite field is located southwest of the White Rose field and is estimated to contain about 70 million barrels of proven and probable reserves. The field is being developed using subsea tie-backs to the existent SeaRose FPSO. In the future, a number of smaller fields including several located in the vicinity of larger fields may also be brought on as satellite developments using the current infrastructure and subsea installations. One such example is the 24 million barrel South White Rose Extension development which received approval in September 2007. Present estimates for discovered reserves and resources in the Jeanne d'Arc Basin are 2.8 Bbbls and about 6.6 tcf (NL DNR, 2009; C-NLOPB, 2009), with the greatest majority being contained in the Late Jurassic-Early Cretaceous sandstone reservoirs of the central Jeanne d'Arc Basin.

The Jeanne d'Arc Basin is only one of many Mesozoic basins and sub-basins located in Atlantic Canada (Enachescu, 1987; Tankard and Welsink, 1989; Grant and McAlpine, 1990; Enachescu and Fagan, 2004, 2005a and 2005b; Enachescu and Hogg, 2005; Enachescu, 2005 and 2006c, NL DNR, 2008; Hawkins et al., 2008; Enachescu, 2008 and Figures 1 to 3). On the Atlantic Mesozoic trend, exploration for large oil and gas fields continues today with seismic and CSEM data acquisition, exploration drilling or plans for future drilling in the:

1) Laurentian Basin, south of Newfoundland;
2) Orphan Basin, northeast of Newfoundland, and
3) Hopedale Basin, offshore Labrador (Figure 3).

More than 10 tcf of technically recoverable gas has been discovered in the Jeanne d'Arc and Hopedale basins, but to date only oil developments have occurred in the Province. The oil is delivered by tanker to markets in eastern North America and the solution gas produced with the oil (about 450 mmcfd) is mainly being used as fuel or re-injected. However, given the future demand in the North American and European gas markets, the stakeholders in NL gas are continuously investigating the commercial and technical aspects of natural gas development from Newfoundland and Labrador waters. Except for the rapidly declining Sable Project and the future production from Deep Panuke field on the Scotian Shelf, there are no other offshore proven sources of gas on the East Coast of North America. Deep Panuke project is estimated to contain 0.7-0.8 tcf of sales gas and is scheduled to start producing first gas in 2010. In the near future, the Grand Banks, Labrador and other offshore NL basins will become a very important North American gas producing area.

No new offshore drilling was performed in West Newfoundland waters to test existing Paleozoic Exploration Licenses since our last report and power point presentation available from the DNR website: http://www.nr.gov.nl.ca/mines&en/call_for_bids/cfb_nl06-3_%20enachescu_report.pdf and respectively http://www.nr.gov.nl.ca/mines&en/oil/NatResPetDevWestCoastSydney.pdf (Enachescu, 2006a and 2008). One well, Shoal Point 2K-39 was drilled in 2008 by Shoal Point Energy on behalf of CIVC et al from onshore to offshore to test a possible northern extension of the Garden Hill field. Results of this well are still being evaluated.

Since 2006, several new offshore NL blocks targeting large Lower Paleozoic structures were licensed (Figures 4 and 5):

1) EL 1105 by Corridor Resources in the Magdalen Basin (Enachescu, 2007);
2) EL 1115 by Husky Oil in Sydney Basin, both with Carboniferous reservoir potential (Enachescu, 2006b and 2008), and
3) ELs 1106 to 1109 in the Labrador Sea, with primary reservoir potential in Cretaceous sandstones and probable secondary reservoir potential in the Ordovician carbonate forming the area's basement (Enachescu et al., 2006a, b, c and d; Enachescu, 2008) by Husky Oil (EL 1006), Vulcan/Investcan (EL 1107) Husky/Suncor (EL 1108) and Chevron Canada (EL 1009).

2.2. The Emergence of Nalcor Energy

In May 2007, the Government of Newfoundland and Labrador enacted legislation to create the province's energy corporation, Nalcor Energy, which is wholly owned by the Province. Prior to the release of the Energy Plan, government through Nalcor, negotiated equity positions in the Hebron Project (4.9%) at a cost of $110 million and White Rose Growth Projects (5%) at a cost of $30 million pending final reserve determinations associated with Western White Rose.

On September 11, 2007, the Newfoundland and Labrador Government released the provincial Energy Plan "Focusing our Energy" a comprehensive document that established new policies for oil and gas exploration and production in the Province's onshore and offshore regions. The Plan outlines the four levers available to governments as resource owners to ensure sound and effective management and to maximize benefits over the long term. One such lever was the acquisition of equity ownership to ensure first-hand knowledge of how the resources are managed and to share in that management, and to foster closer government industry alignment of interests. The Plan also contained several oil and gas policy actions aimed at increasing exploration and development of oil and gas resources including the implementation of an Offshore Natural Gas Royalty Regime and introduced the concept of a "pioneer project" (http://www.nr.gov.nl.ca/energyplan/EnergyReport.pdf).

The NL Government has established a policy to obtain a 10% equity position in oil and gas projects requiring a Development Plan approval, where it fits government's strategic long-term objectives. Nalcor Energy Oil and Gas Inc. (NEOGI) on behalf of government negotiates payment of its share of the historic exploration costs incurred by the licence co-venturers, as well as contributes its share of subsequent development and operating costs.

In December of 2008, government successfully launched Nalcor's brand and corporate identity. Nalcor Energy has five lines of business: Newfoundland and Labrador Hydro, Churchill Falls, Lower Churchill Project, Oil and Gas and Bull Arm Fabrication. While continuing to manage the performance of its operating units, the company has acquired equity interests in offshore oil projects, facilitated wind development in the province and continues to pursue growth opportunities in the energy sector.

Another policy initiative contained in the Energy Plan is government's intent to invest in onshore and offshore geoscience activities. Thus, $5 million was announced to fund the Petroleum Exploration Enhancement Program (PEEP) in onshore Western Newfoundland and an additional $20 million was provided to fund the Offshore Geoscience Data Project. Under PEEP, DNR in collaboration with the Geological Survey of Newfoundland and Labrador (GSNL) and Nalcor, completed a high resolution aeromagnetic survey covering 7150 km^2 (~36,000 line km) of land in Western Newfoundland (Foote, 2009; Kilfoil 2009 and Figure 4). The flight portion of the aeromagnetic survey has been completed and the data has been compiled and is being now interpreted. A fall 2009 release is anticipated. This work is in addition to an aeromagnetic program conducted by GSNL with results released in July.

Under the PEEP program, Nalcor has the flexibility to commission seismic work independently and/or partner with private companies. A modern regional grid of seismic data processed to pre-stack time migration is necessary to decipher the complex regional structural architecture of the onshore Paleozoic autochthonous and allochthonous beds. Properly imaging the Triangle Zone

and the blind thrust sheets of the Appalachian Foldbelt is essential for choosing further drilling locations. According to the NL Minister of Natural Resources, Kathy Dunderdale, "Acquiring seismic data is an expensive undertaking but essential for making crucial exploration decisions. This program will hopefully result in greater exploration activity" (NL DNR, 2007; Dunderdale, 2007). While an older regional 2D seismic coverage already exists, there is no doubt that new data acquisition and modern processing is necessary to advance our knowledge of the petroleum geology of Western Newfoundland. The Offshore Geoscience Data Program is a potential funding source for future offshore geoscience data collection in Western NL.

In August 2009, Nalcor announced that it had acquired an average of 67 per cent gross working interest in three exploration permits (EPs 03-101, 03-102 and 03-103) being held by Leprechaun Resources and co-venturers in the Parsons Pond area of the Great Northern Peninsula in Western Newfoundland. This represents the company's first direct involvement with operating exploration acreage and drilling exploration wells.

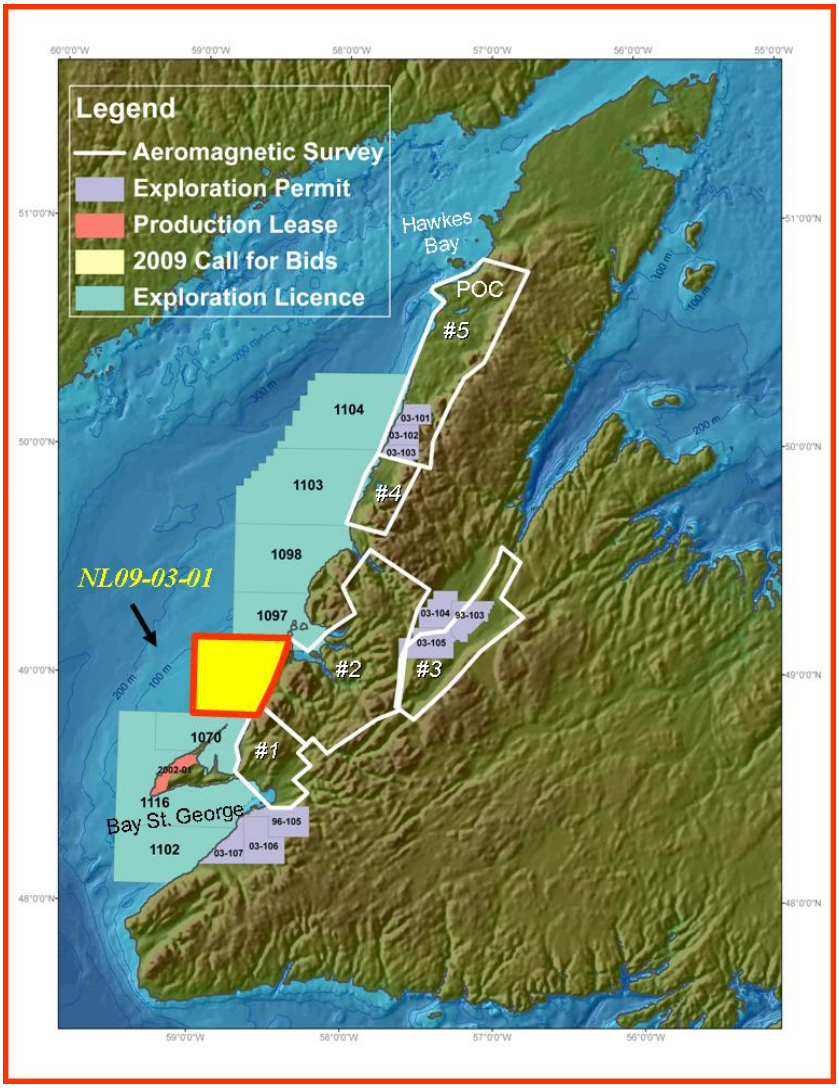

Figure 4 Western Newfoundland aeromagnetic coverage financed through PEEP and GSC and completed during 2008-9. Location of CFB parcel NL09-03-01 is also shown. Map sectors are #1 = Stephenville (Indian Head); 2 = Corner Brook; #3 = Deer Lake Basin; #4 = Port au Choix extension; #5 = Port au Choix; POC = Port au Choix area.

2.3. Large Paleozoic Under Explored Basins

Newfoundland and Labrador's area of petroleum potential extends outside of the confines of the Jeanne d'Arc Basin where the Hibernia, Terra Nova and White Rose fields are located. The continental margin of Newfoundland and Labrador stretches on for more than 1500 kilometres from west of the Laurentian Channel to the northern tip of Labrador (Figures 1 to 3). Mesozoic sedimentary basins are found all along the East Coast of the province trending from the Laurentian Basin in the south, across the Grand Banks basins, through the deeper waters of the Flemish Pass and Orphan basins and extending north-westward to include several basins along the Labrador shelf and slope (Figures 1 to 3). Some of these Mesozoic rift basins are incised on a Paleozoic pre-rift basement that in places contains secondary reservoirs. True Paleozoic basins and platforms surround the waters of the island of Newfoundland and at least the southern part of the Labrador margin (Figures 2 and 3).

A total of 150 exploration wells have been drilled in 1.6 million km^2 offshore NL area. Only 6 wells were drilled for Paleozoic plays in the Western Newfoundland offshore basins and about a dozen have penetrated Paleozoic strata, including good quality reservoirs while drilling for Mesozoic synrift targets on the Grand Banks, Orphan and Labrador basins. The Paleozoic offshore basins are located in the Gulf of St. Lawrence area, surround the island of Newfoundland (Sydney Basin to the south, St. Anthony Basin to the north and Bonavista Platform to the east) and form the upper part of the pre-rift basement of the Grand Banks and Labrador Sea (Figures 2 and 3).

The western region of NL is part of continental wide Appalachian Structural Front (ASF). This front stretches from Texas through the eastern US seaboard, the New England states and through Quebec, and the Atlantic provinces and into Western Newfoundland and contains more than 20 proven petroleum basins. Excellent source rocks and reservoirs yielded numerous discoveries along the Appalachian foredeep and fold belt. Some of the largest and most productive USA oil and gas fields are located along the ancient Paleozoic continental margin and the Appalachian foldbelt within basins such as the Permian, Val Verde, Fort Worth, Anadarko, Arkoma, Black Warrior, Illinois, Michigan and Appalachian (Figure 5).

On the west coast of Newfoundland, under-explored areas of petroleum potential are found in the large Paleozoic sedimentary basins within the Gulf of St. Lawrence. The Gulf, excluding all contained islands and the St. Lawrence estuary, has a water area of approximately 220,000 km^2, or approximately one fourth the size of the Western Canadian Sedimentary Basin. Water depths on average are less than 100 m except within the Laurentian Channel and associated feeder tributaries where depths range from 200 to 535 m.

Geologic mapping and past drilling for hydrocarbons indicate that the Gulf of St. Lawrence is underlain by a thin veneer of glacial sediment covering two adjacent, relatively thick, Paleozoic aged sedimentary basins known as the Maritime (Magdalen) Basin and the Anticosti Basin. These basins are large and virtually unexplored.

The Anticosti Basin (named after Anticosti Island) of Cambro-Ordovician to Silurian age (approximately 510-415 million years old), underlies the northern part of the gulf. The Magdalen Basin (named after the Magdalen Islands) of Pennsylvanian (Late Carboniferous) to Permian age (approximately 350-250 million years old), underlies the south. The Bay St. George Basin is an arm of the predominantly Carboniferous Magdalen Basin (Figure 3). Together, the Anticosti and

Magdalen basins cover an area approximately the size of the state New Mexico or half of the Canadian Province of Alberta. These Paleozoic basins also extend eastward into the Province's onshore area and to the northeast into the St. Anthony Basin and beneath the Mesozoic sediments of the Labrador Sea (NL DNR, 2008; Foote, 2008). It is worth mentioning that Canada has a significant part of its light oil and gas production from Paleozoic sedimentary rocks and over 20% of world oil reserves originate in Paleozoic strata (Enachescu, 2006a and 2008).

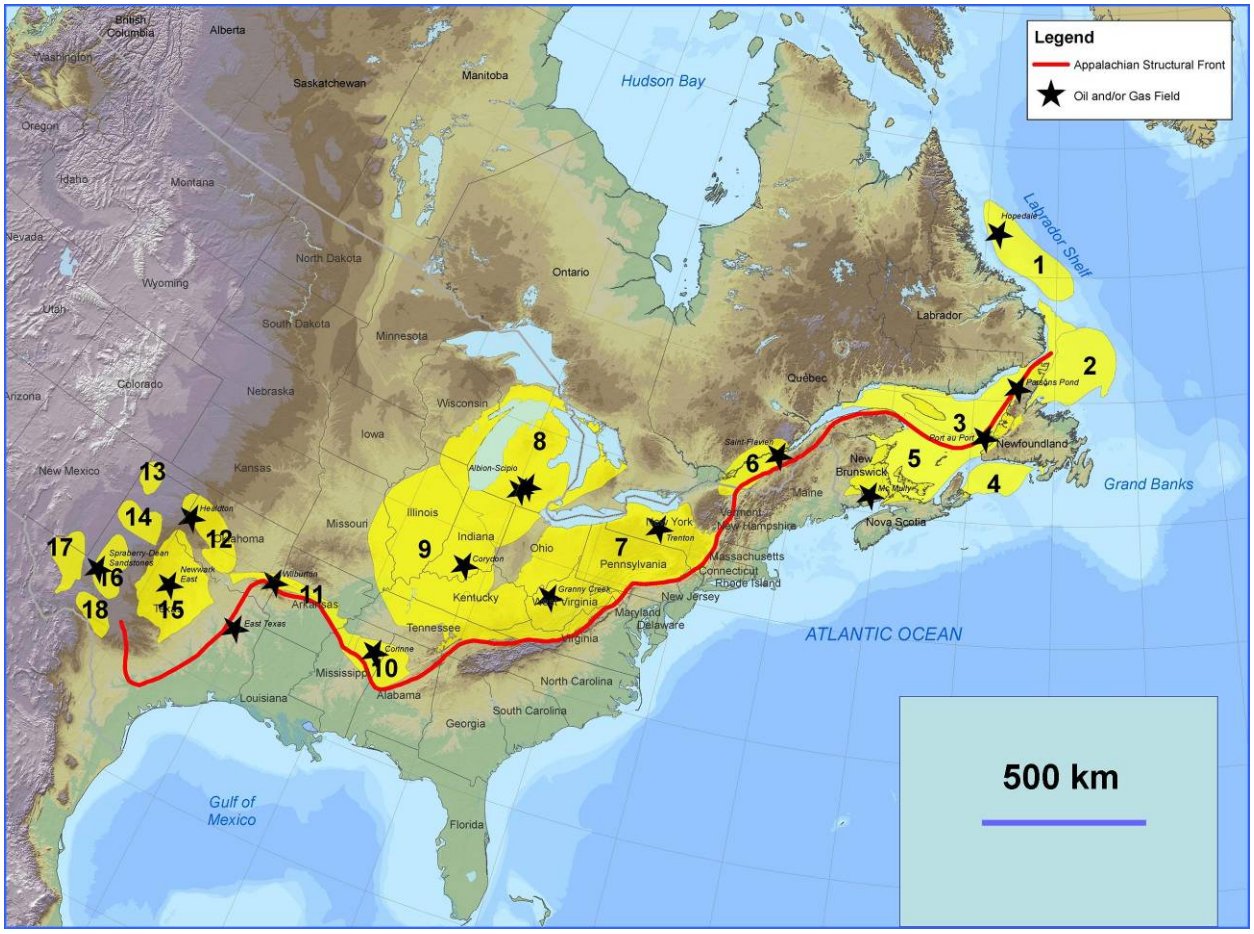

Figure 5. North America Appalachian Structural Front and associated foredeep and foldbelt basins with oil and gas production. Paleozoic basins are: 1. Hopedale (Labrador); 2. St. Anthony; 3. Anticosti; 4. Sydney; 5. Maritime; 6. St Lawrence Lowlands; 7. Appalachian; 8. Michigan; 9. Illinois; 10. Black Warrior; 11. Arkoma; 12. Anadarko; 13. Dalhart; 14. Palo Duro; 15. Forth Worth; 16. Midland; 17. Delaware; 18. Val Verde (after NL DNR).

A comprehensive discussion of the Paleozoic basins of Atlantic Canada is contained in several reports and power points available from the Government of Newfoundland and Labrador Department of Natural Resources website (Atkinson and Fagan, 2000; Fagan and Hicks, 2005; Enachescu and Fagan, 2005; Enachescu, 2006a and b; 2008). Additional information on these basins and their petroleum potential was recently gathered and compiled by the Geological Survey of Canada (Lavoie et al., 2009).

2.4. E&P Activity in Atlantic Paleozoic Basins

A. Onshore Developments. Onshore, several recent development and exploration wells tested the Paleozoic basins of the Atlantic Canada. While there is a large potential for non-conventional petroleum resources in the area, this review is focussed on conventional oil and gas and generally ignores the areas potential for coal bed methane or shale oil and gas exploration.

New Brunswick. The McCully (Figure 6) gas development onshore New Brunswick (Enachescu, 2006a and 2008) presently produces about 23 mmcfd (17 mmcfd net to Corridor Resources) from a 400 hectares (approximate 12,000 acre) fractured anticline estimated to contain about 1 Tcf proven and probable gas resource (Corridor AGM presentation, 2009). McCully field production is from the Carboniferous Hiram Brook Member of the Albert Formation. Reservoirs are lacustrine sandstone inter-bedded into a mainly shaly succession. A 50 km pipeline connects the McCully field to the Maritimes and Northeast Pipeline (M&NP) which distributes to the Canadian Maritime and Boston natural gas markets. Production from this low permeability, low saturation reservoir is aided now by hydraulically fracturing the reservoir using propane.

In 2008, Corridor while drilling for gas, discovered crude oil at the South Branch G-36 well situated three kilometers southeast of the McCully natural gas field. Further testing is currently underway to determine the significance of this 45º API oil discovery that may extend on the southern fringe of the McCully anticline.

The Stoney Creek Field (Figure 6) discovered south of Moncton, New Brunswick in 1909 produced approximately 804,000 barrels of oil and 28.7 billion cubic feet of natural gas up to the time of field depletion in 1991. Recently Contact Exploration announced their intention to drill a horizontal well in this field, re-start production and acquire 2D seismic over a large area south of the field (Fyffe and St. Peter, 2006).

Prince Edward Island. The only Carboniferous offshore discovery in Eastern Canada, the East Point E-49 (Figure 6) has tested 5.5 mmcfd from poor permeability Pictou Group sandstone, probably sourced from same age coal beds. The E-49 SDL, estimated to contain approximately 60-70 Bcf of gas and now belonging to BP Canada is located north-east of PEI in the Magdalen Basin. Presently, there are five active Exploration Licenses on the island's onshore. In 2007 Corridor drilled Green Gable #3 and found gas in the Bradelle sandstones, but encountered problems during stimulation operations and the well is suspended. An earlier Green Gable #2 well produced non-commercial quantities of gas. Another Carboniferous play was drilled by a partnership including PetroWorth at New Harmony #1 well that had only gas shows. PetroWorth has acquired 304 km of 2D and 108 km^2 of 3D seismic onshore PEI and has partnered with companies such as Corridor and Ardent to further explore PEI's Carboniferous potential.

Quebec. Proven petroleum systems have been identified in the St Lawrence and Gaspé basins. Three gas accumulations were discovered within Paleozoic reservoirs, two of which are located in the St Lawrence Lowlands Basin and are now depleted and used as gas storage reservoirs: Pointe-du-Lac on North Shore of St-Pierre Lake producing from coarse well-sorted Quaternary sands (produced of 2.5 Bcf) and Saint-Flavien (produced 5.7 Bcf). Exploration in this basin has mainly focused on the Trenton Black-River sedimentary zone (Séjourné, 2009). Ordovician reservoir and shale gas are also promising exploration plays in the St. Lawrence Lowlands.

In the Gaspé Basin, since 2002, Junex developed the Galt gas field (Figure 6) discovered in the early eighties. Production is stimulated by fracturing and commercialized by trucking of CNG. The field is estimated to contain about 1 Bcf gas within oil and gas bearing Devonian dolomite/carbonate formation (HDT) situated at about 2000 m subsurface.

Just east-southeast of Galt, the Haldimand field (Figure 6) operated by Pétrolia tested 34 bopd of light crude (50º API) from Devonian sandstones at depths of approximate 1000 m. This "first Quebec" - oil discovery is being delineated using 3D seismic, geochemical studies and further drilling to 1000 + m.

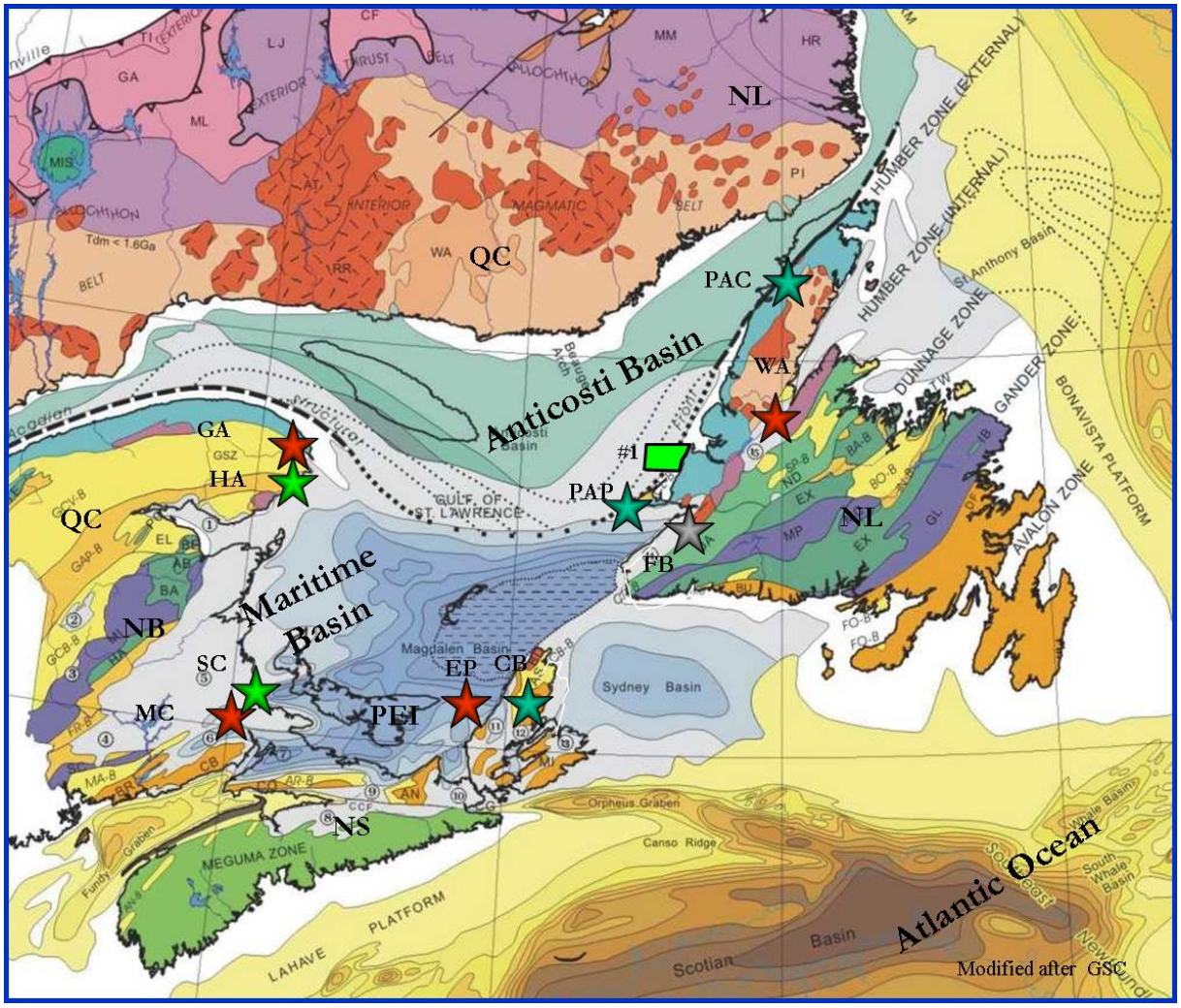

Figure 6. Regional map of the Mesozoic and Paleozoic basins of Atlantic Canada including location of Call for Bids NL 09-03-01 parcel (modified after GSC). The Carboniferous hydrocarbon fields MC = McCully, SC = Stoney Creek; GA = Galt gas field ; discoveries EP = East Point E-49, HA = Haldimand, CP = Cape Breton seeps/shows and coal bed methane; FB = Flat Bay wells that intersected tight oil zone, WA=West Adventure #1 gas flow, PAC = Port au Choix exhumed oil field and PAP=Port au Port #1 oil discovery. QC = Quebec; NS = Nova Scotia; NB = New Brunswick; PEI = Prince Edward Island, NL = Newfoundland and Labrador and #1 = Parcel CFB NL09-03-01.

Quebec is today a hot spot for nonconventional gas exploration: more than 90 per cent of the known exploration zone in the St. Lawrence basin is already claimed by petroleum companies

such as Gastem, Questerre, Junex, Talisman and Forest Oil. Large gas resources are seen in Quebec's Utica shale. A Houston consultant company estimated a prospective resource of 4.28 tcf of natural gas in place in the Ordovician Utica shale in the deep fairway of Quebec's St. Lawrence Lowlands. Other published numbers are in the tens of tcf of gas resources that remain to be proven.

Nova Scotia. All of the large oil and gas discoveries and production from Nova Scotia is from offshore Late Jurassic-Cretaceous sandstones. The onshore extensions to offshore Paleozoic basins are part of the Appalachian Orogeny or the Carboniferous successor basin stage. These areas have seen only modest exploration for conventional hydrocarbons. Only about 30 wells were drilled deeper than 1000 m. No significant discoveries have been made, but oil and gas shows are recorded from the Sydney, Cape Breton (Figure 6), Antigonish, Cumberland and Minas basins.

Drilling for unconventional resources is currently taking place in some of these basins. There are currently four conventional exploration agreements, one Production License and 3 coal bed methane agreements held by oil and gas companies. Just recently, Triangle Petroleum of Calgary had success exploring for shale gas at its site in the Kennetcook area, about 70 km north of Halifax. In April 2009, the provincial government approved Triangle's 10-year production lease, which requires the company to drill seven wells at the site by 2014. At least two of those wells must be drilled by 2010 and the company has to complete three wells drilled last year. Finding partners and collecting more seismic data are essential for the success of this PL.

B. Offshore Developments. Several large Gulf of St. Lawrence seismic programs in the 1970s and early 1980s operated by companies such as Mobil, Chevron, Shell, Petro-Canada, etc., culminated with the drilling of ten offshore wells, one of which - the East Point E-49 - drilled in 1970 - flow tested at 5 million cubic feet of natural gas per day (Figure 6). This well was drilled midway between Cape Breton Island and Prince Edward Island and is estimated to contain in-place gas reserves of 60-70 bcf in Carboniferous sandstone. This early exploration cycle ended with the oil price collapse of 1982.

During the 1990s, a number of large companies (Mobil, Norcen, BHP, Hunt, Talisman and PanCanadian) along with several local junior companies explored for petroleum in the onshore and offshore Paleozoic basins of Western Newfoundland. This exploration cycle resulted in the acquisition of several nearshore and shallow water marine seismic programs extending from the southern portion of Bay St. George to Hawke's Bay in the north (Enachescu, 2006a).

A number of large leads and prospects have been defined in the wide maritime area between Nova Scotia, PEI, NL and Quebec using the two sets of marine seismic data. One of these prospects is the Old Harry mapped by Corridor Resources in the Gulf of St. Lawrence. This project was delineated using densely spaced 2D data collected in 1998 and a 500 km^2 3D survey collected in 2002. The prospect which straddles the boundary between NL and Quebec, has simple four-way closure covering an area of more than 20,000 hectares, and is one of the largest undrilled prospects in Eastern Canada. This large size, Windsor salt cored, anticline hosts a number of potential Carboniferous sandstone reservoirs. The closure is covered by a Quebec license in the southwest and a NL licence in the northeast (Enachescu, 2008 and http://www.corridor.ca/oil-gas-exploration/gulf-of-saint-lawrence.html). A hazard-site survey at a proposed Old Harry drilling location planned for 2009 was recently postponed due to late start

of the implementation of the strategic environmental assessment program in the Gulf of St. Lawrence by the Quebec Government.

In Nova Scotia, new offshore Cape Breton seismic data was acquired by Hunt Oil in 2005 over the North Sydney structure. Hunt had two large offshore Exploration Licences that were abandoned in 2007 without drilling due to lack of partners (Enachescu, 2008).

Currently there is no seismic acquisition work or offshore drilling in any of the Paleozoic basins of the Atlantic Provinces outside of NL. Several Exploration Licences were awarded in the Anticosti and Maritime basins in Quebec's jurisdictional waters. In the early 2000s Hydro-Quebec had large sums ($300 MM) committed to exploring the Gulf of St Lawrence. Exploration plans were cancelled after the government raised environmental concerns about blue whales. Offshore exploration is now under a moratorium.

Several Exploration Licences are active in the Anticosti and Magdalen basins in Quebec's jurisdictional waters. While substantial geoscience research has been carried out by GSC-Quebec in the offshore part of the Laurentian Estuary and St. Lawrence Bay, offshore Quebec, and especially the Anticosti Basin, the sector is poorly understood and has seen very little exploration by oil companies in the past decade. According to the GSC, petroleum targets representing the greatest potential in the region are the Silurian and Devonian sandstones, the hydrothermal dolomites and breccias, and Devonian and Silurian reefs.

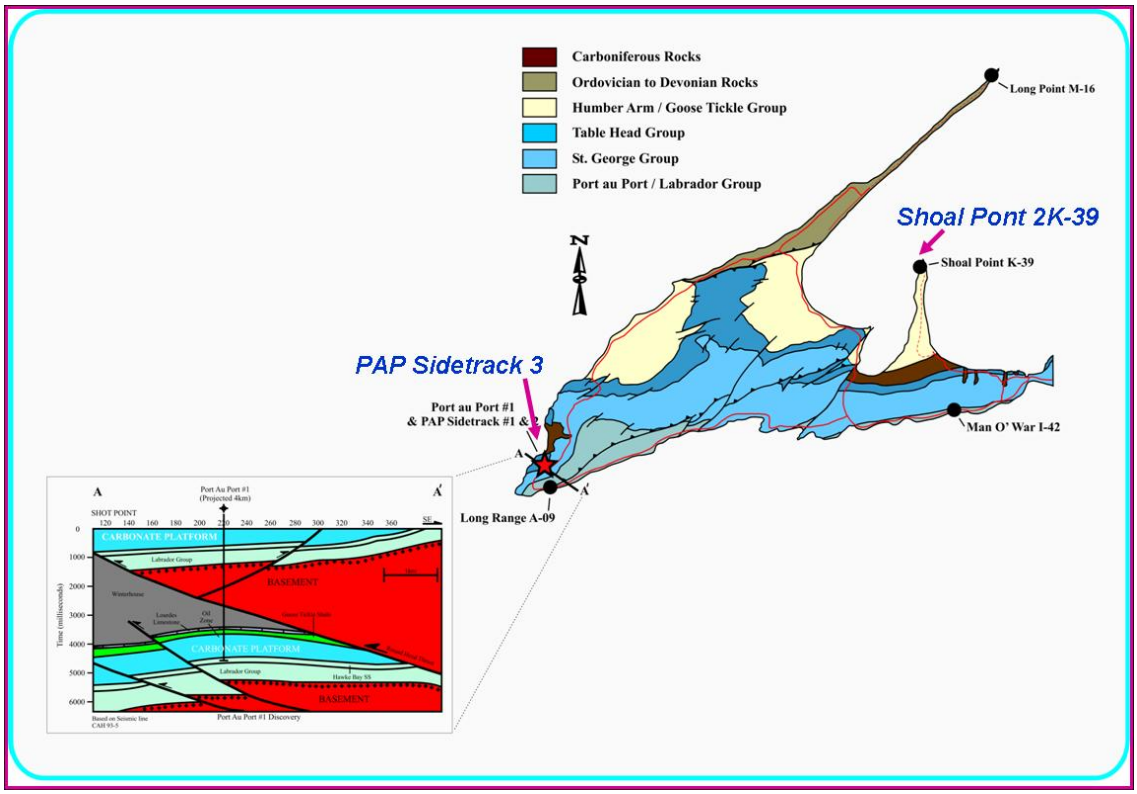

Figure 7. Regional geology map and cross-section of the Port au Port #1 discovery, now the Garden Hill oil field operated by PDI (after NL DNR). Insert shows the geological interpretation of the seismic line through the well (modified after Stockmal and Waldron, 1993; Cooper et al., 2001 and Government of Newfoundland and Labrador Department of Natural Resources). Magenta arrows show location of the most recent wells on the Port au Port Peninsula.

2.5. West Coast Newfoundland Exploration History

Numerous hydrocarbon seeps, oil shows in historical wells and some early light oil production are reported in the Paleozoic sedimentary area covering Western Newfoundland. Sporadic episodes of petroleum exploration in the Appalachian fold belt and Paleozoic foreland of Western Newfoundland have been ongoing since 1867. Up to now these efforts have been rewarded only by excellent hydrocarbon shows or hard to evaluate finds, and there has been only minor commercial production (from the Parsons Pond area) during the early part of the twentieth century. More recently (1995 to present) production tests and tracking of oil was done from the Port au Port #1 well and its sidetracks (Figure 8 and Atkinson and Fagan, 2000; Fagan and Hicks, 2005; Enachescu and Fagan, 2005a and b; Enachescu 2006a and 2008; Hicks, 2008 and 2009).

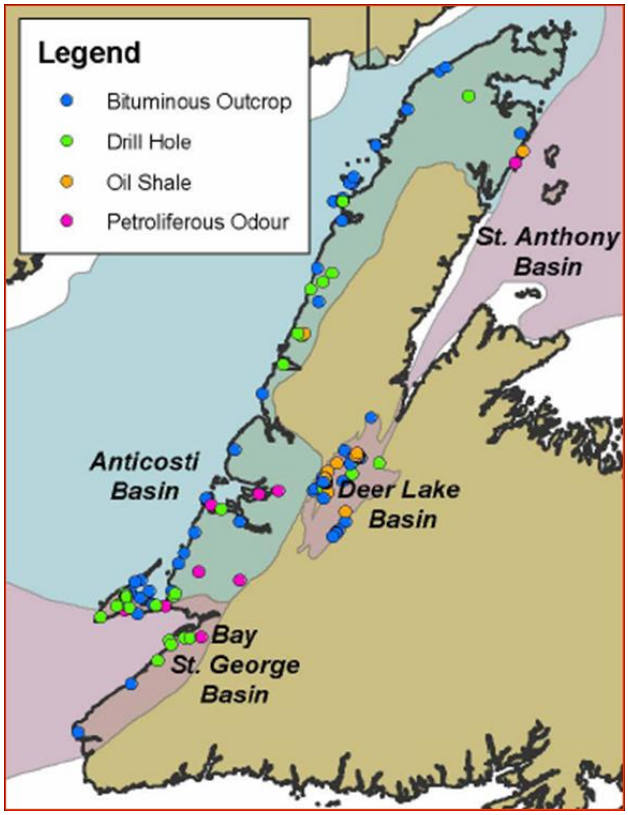

Figure 8. Hydrocarbon shows and historical drilling in the Paleozoic sedimentary area onshore West Newfoundland (after Hicks, 2008)

During the late eighties-early nineties Western Newfoundland offshore was the scene of exploration by multinationals and majors (e.g. Hunt, Talisman, BHP, PanCanadian) who drilled several deep wells from the Port au Port Peninsula, one of which being the Port au Port Garden Hill onshore discovery. This exploration phase ended with the majors leaving the area and being replaced by several home grown companies such as Vulcan Minerals, CIVC, Deer Lake Oil and Gas, NWest and Ptarmigan, led by geoscientists with expertise in the area and who were encouraged by the significance of the Port-au-Port discovery.

Junior companies continue to hold lands and explore both Ordovician and Carboniferous targets in Western Newfoundland. Interest in a regional hydrothermal dolomite play has more recently been given a boost by success in similar rocks in New York State (Eaton, 2004; Atkinson, 2005a and b; Wright, 2007; Maher, 2008 and 2009) and exploration of the trend is ongoing elsewhere in Atlantic Canada - on the Gaspé Peninsula (Galt), New Brunswick (away from the McCully field) and on Anticosti Island.

Successful exploration of the hydrothermal dolomite play in New York and in the Rocky Mountain Foothills has been aided by use of 3D seismic, which can under the right circumstances allow the direct detection of porosity. Porosity can also be inferred by association with basement faulting, karstification and platform collapse zones. Unfortunately, only 2D data has been recorded up to now, both onshore and offshore Western Newfoundland; one small exploration 3D survey was collected in 2008 by GSI for NWest. The early nineties marine seismic data is good to fair quality, but the older data acquired prior to 1989 is of poor to fair quality and largely un-interpretable at depth. Modern offshore data (about 5,000 km) acquired by

several major and intermediary companies during the 1990s provides good imaging of the subsurface along most of the coastline and is available from C-NLOPB in hardcopy for the cost of reproduction and for sale in digital form from the data owners. Further offshore and to the north, the seismic coverage is sparse, and older data is available only on microfiche.

Only six offshore wells have been drilled in the Western Newfoundland jurisdiction, of which five were directionally drilled from land and one of these had to be abandoned before reaching its target depth due to operational problems. The five offshore wells drilled from land are all located on the Port au Port Peninsula and the only one "true" offshore well drilled by a jack-up (St. Georges Bay A-36) lies to the SE of the Port au Port Peninsula. All of these mid 1990s wells were located in the vicinity of the Hunt PanCanadian Port au Port #1 (PAP #1) discovery (Figures 7 and 9). Subsequent drilling of four wells, Hunt PanCanadian Long Point M-16 (drilled in 1995-6, TD at 3810 m in Port au Port Group), Talisman et al. Long Range A-09 (drilled in 1996, TD at 3685 m in Watts Bight Formation), PanCanadian et al. Shoal Point K-39 (drilled in 1999, TD at 3035 m in Hawke Bay Formation), to test the same target zone in the immediate area, encountered only shows and based on these results the major operators departed the province. The shallow Inglewood Man O' War I-42 (drilled in 1998, TD at 667 m in Forteau Formation) was terminated due to mechanical problems before reaching the target.

The offshore Hunt PanCanadian St. George' s Bay A-36 well located in shallow water, approximately 6 km south-west of the Port au Port Peninsula (drilled in 1996, TD at 3240 m in Forteau Formation), contained several zones of good to excellent vuggy and cavernous porosity as well as bitumen and minor live oil shows within known reservoir horizons.

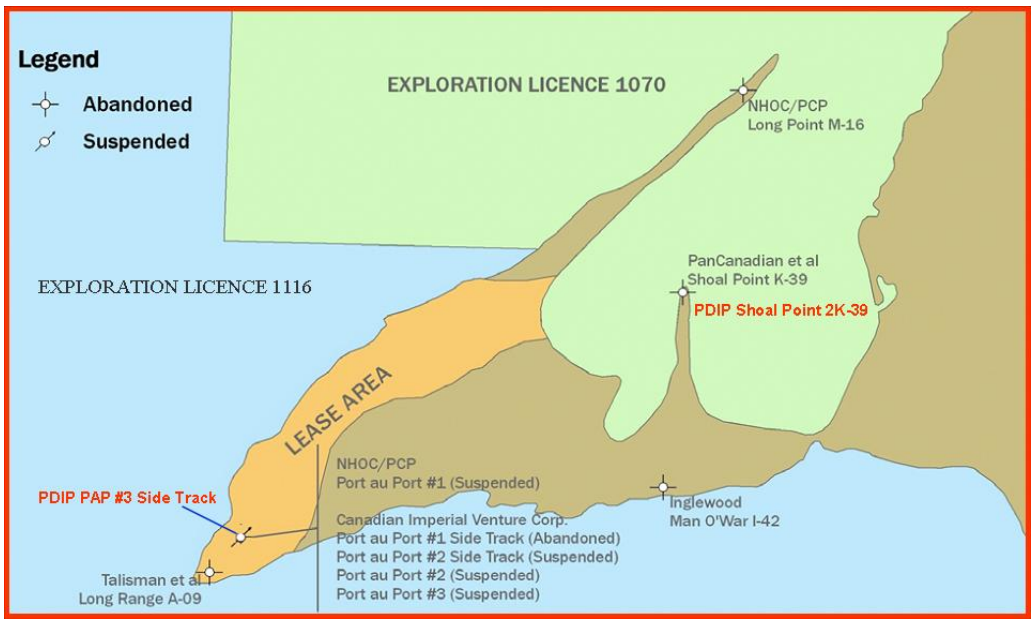

Figure 9. Port au Port #1 discovery, now Garden Hill oil field operated by PDI Production Inc. The map also contains other exploration wells, Port au Port Side Track wells, wells drilled in 2008 (in red) and the limits of Lease 2002-01 (PDI et al.) on Port au Port Peninsula (modified after NL DNR).

The key challenge in terms of hydrocarbon prospectivity in the Paleozoic has been in finding good quality continuous reservoir that contains hydrocarbons. Quality reservoirs have been often encountered (e.g., Catoche and Watts Bight in the PAP #1 well) but thus far have tested water.

Onshore Activity. Onshore exploration is administered and regulated by the Government of Newfoundland and Labrador Department of Natural Resources, Energy Branch.

Production Lease in Bay St. George Basin. Port au Port #1 was the first well ever drilled in Western Newfoundland with the benefit of good seismic data coverage in selecting the location. Two zones, which are believed to be in communication, tested at rates of about 1500 bopd of light oil, with gas rates of about 2.5 mmcfd. Extended testing showed the pressure to be dropping, and subsequent sidetrack drilling by a farmin operator (Canadian Imperial Venture Corp. - CIVC) indicated a complex reservoir near the wellbore. The well encountered several reservoirs, one of which was hydrocarbon bearing. Two intervals within the autochthonous, platformal Aguathuna Formation (Figures 7 and 9) (at approximately 3,400 m KB) flowed at 1,528 and 1,742 bopd of high quality oil (51º API) and 2.6 and 2.3 mmcfd of natural gas, respectively, with associated water. An extended test over one of the zones flowed a total of 5,012 barrels of oil and 9.2 million cubic feet of gas over a nine day period, but the flow diminished with time. There are a number of possible explanations why flow rates dropped off at the time of these initial tests.

CIVC who farmed into the project in October 1999, completed an additional 26 km of 2-D seismic over the area during the summer of 2000 and followed in 2001, by submitting a development plan for the newly mapped and renamed “Garden Hill field”. Port au Port sidetrack #1 drilled in mid to late 2001 failed to encounter commercial hydrocarbons in the upper Aguathuna Formation. The sidetrack demonstrated that the reservoir around the original PAP #1 well bore was probably an isolated, hydrothermally dolomitized porous zone within a larger trend.

A Production Lease for developing the field was granted to CIVC in 2002 (Figures 9 and 10). The field is divided into a South (closure confirmed by discovery well), Central (further lead) and North (further lead) sector. Since then, CIVC and various partners have conducted delineation work (2D and 3D seismic planning, deviated and horizontal drilling, and various tests). A second sidetrack well, Port au Port sidetrack #2 drilled in 2002 towards the northeast reached in close proximity to the original PAP #1 well and test- flowed 195 bopd and 1.2 mmcfd of natural gas with no produced water reported.

After several years of financial difficulties CIVC has considerably divested itself from the Garden Hill Field. A group of companies led by PDI Production Inc. (a subsidiary of Enegi Oil Plc) now controls ownership of the Production Lease and they have requested a lease extension from Government. This extension was granted in June 2006 and allows the company and its partners time to achieve first production and formulate future exploration plans. PDI Production Inc. (PDIP) took operatorship of the project and re-entered the Port au Port #1 Sidetrack #2 well in late 2006/early 2007, in order to conduct an extended well test. The test produced excellent initial results, but was terminated due to problems related to borehole constrictions within open-hole shaly intervals.

A further production lease extension was granted in August 2007, conditioned by commitment to drill a well with a minimum expenditure of $10 million no later than August, 2008. PAP#1-ST#3 well produced 460 barrels of oil and was later shut-in. PDIP has subsequently acquired 100% interest in the Lease and continue to fulfill the conditions of the extension agreement. There is oil

contained in the Garden Hill structure but questions remain as to the size of the accumulation and how to commercially produce the oil contained in the HTD zones.

Presently, beside the discussed onshore production lease, there are nine onshore exploration permits issued in three general areas for Western Newfoundland: Flat Bay, Deer Lake and Parsons Pond, for a total of 228,500 hectares under permit (Figure10).

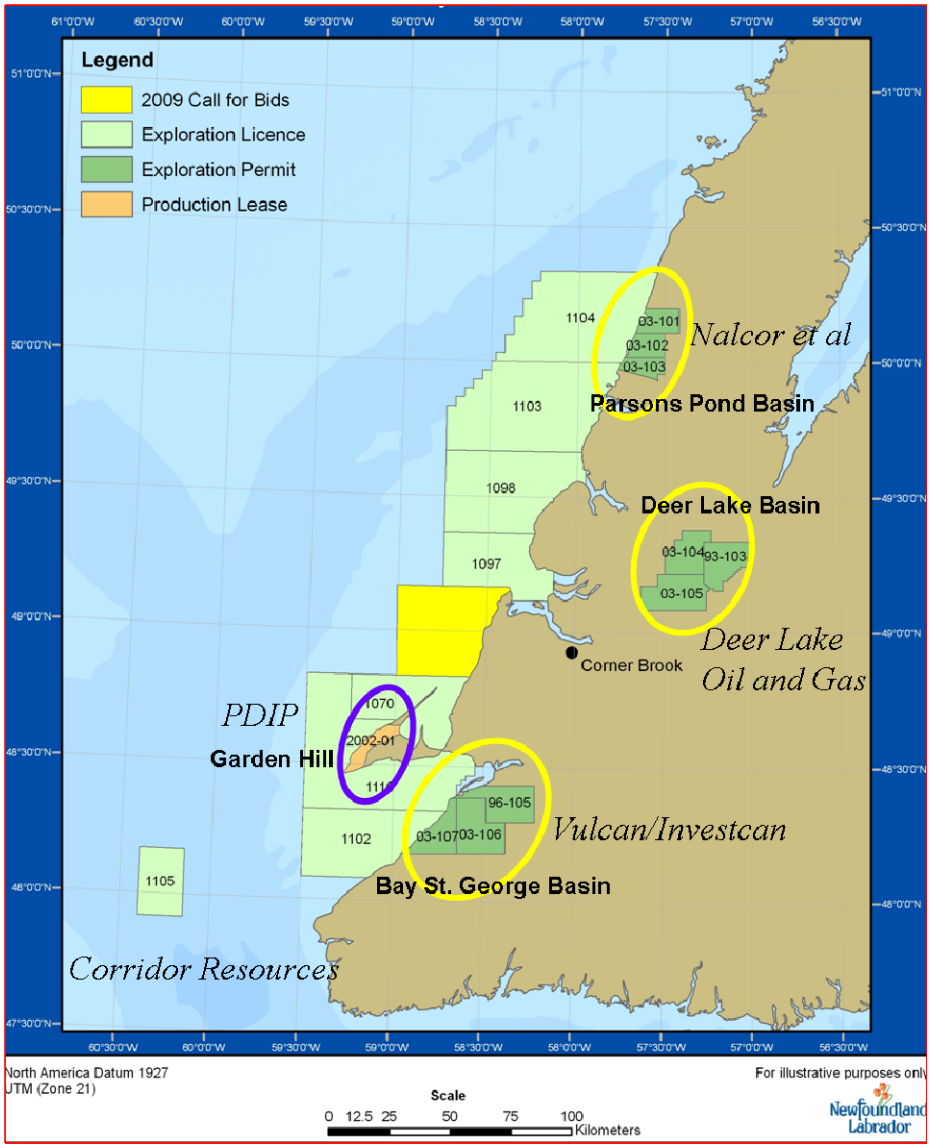

Figure 10. Onshore Western Newfoundland landholdings and operators of a) the Garden Hill Production Lease (blue ellipse), and b) Exploration Permits in the Bay St George, Deer Lake and Parsons Pond basins (yellow ellipses).

Exploration in Bay St. George Basin. The Bay St. George Basin is a Carboniferous strike-slip successor basin overlying the Western Margin of the Appalachian Orogen (Figures 3, 4 and 6). Vulcan Minerals of St. John's, the operator of Exploration Permits 96-05, 03-106 and 03-107 (Figure 10) has drilled seven shallow land wells (less than 1,000 m) in the Bay St. George Basin in order to test large, structural features that were seismically mapped and confirmed by potential field data (http://www.vulcanminerals.ca/projects/onshore-petroleum-bay-st-george-nl/).

The Bay St. George Basin is part of the larger Carboniferous aged Magdalen Basin. The basin was formed as a pull-apart depression and contains more than 10 km of Late Devonian to Late Carboniferous, mostly terrigenous clastic succession with some marine intervals. Basin fill from oldest to youngest has been divided into the Anguille, Codroy and Barachois Groups (Knight, 2008; Fagan and Hicks, 2005; Enachescu 2006a and 2008; Hicks, 2009a and b; Laracy, 2008 and 2009).

Historically, most of the activity has been in the north end of the onshore basin where crude oil was encountered at shallow depths beneath a gypsum quarry in the Flat Bay area, and natural gas was discovered and flared as part of the same mining operation approximately 50 years ago. In the past decade, Vulcan drilled 8 shallow wells, acquired 4 seismic surveys and compiled all existent geologic, seismic and potential field data in the basin. In the Flat Bay area, Vulcan has encountered a thick oil zone in a shallow, low permeability reservoir (Anguille conglomeratic sandstone) in several wells. The oil zone is up to 150 m thick, with the top as shallow as 50 m. The oil is light (34^{o} API) and sweet and appears to be derived from a lacustrine source rock. No commercial production was obtained from this reservoir, however it continues to be studied.

New seismic lines and high resolution aeromagnetic data collected during 2005-2006 in the Bay St. George Basin, has allowed the identification of several large structural closures located away from the Flat Bay anticline (Enachescu, 2006a and 2008; Laracy, 2008 and 2009). In 2006, the Red Brook #1 well targeted an area 20 km to the southwest of the Flat Bay structure and was suspended before reaching the target due to mechanical problems. To further delineate prospects and leads in the northern Bay St. George area, Vulcan collected approximately 57 km of off road 2D seismic data during the later half of 2007. A deep prospect was identified as "Robinson's" with a target depth at about 3500 m. Additionally, several other shallow and intermediate depth leads were mapped.

In early 2008 Vulcan farmed out 50% of their interest in the onshore Bay St. George Basin, covering approximately 236,000 acres to Investcan Energy Inc., a French company. In the spring of 2009, these companies drilled two wells in the shallow Flat Bay deposit, both of which showed oil. In the summer of 2009 the Robinson's #1 well was spudded with plans to drill a 3600 m hole into a fault-bounded anticline. This will be the first deep well in the underexplored Bay St. George Basin. At the time of posting this report on the web the drilling reached a depth of 3440 m and was drilling ahead. A second well Red Brook #1, situated 12 km from Robinson's #1 is already being planned and the partners have an option on the rig.

Exploration in Deer Lake Basin. The Deer Lake Basin (Figures 3, 6 and 8) is an inverted Paleozoic rift basin where the plays involve rotated and inverted blocks containing porous and permeable North Brook sandstone (Carboniferous) and the deeper dolomitized Ordovician carbonates. The source rocks are Mississippian lacustrine shales and dolostones of the Forty-five Brook and Rocky Brook formations (Martin, 2009).

Deer Lake Basin Exploration Permits 93-103 (29,000 ha), 03-104 (25,818 ha) and 03-105 (35,221 ha) were issued in 1993 to St. John's based Deer Lake Oil and Gas (DLOG). Permit 93-103 remains valid (Figure 10). While intensive surface geology studies were undertaken, the licenses have very limited seismic coverage. The recent aeromagnetic data acquisition sponsored by the Government through PEEP program should advance the knowledge of subsurface structure and allow preplanning of new seismic acquisition (Figure 4).

Two modern wells (Western Adventure #1 and #2) were drilled by DLOG in this basin. The Western Adventure #1 well located in EP 93-103 was drilled in 2000 and tested 100,000 cu ft of gas per day at 1600 m, with some condensate from sandstone units within the North Brook Formation at 850 m (Figure 6 and http://www.deerlakeoilandgas.com/box5link.pdf). Pending available capital, DLOG has indicated that it plans to do further testing on this well.

Based on drillstem results from Western Adventure #1, DLOG submitted a Development Plan Application to the NL DNR in 2003. However, in 2005 it re-entered the Western Adventure #1 well and perforated and tested two upper zones with no hydrocarbons flow to surface. The well is currently suspended as DLOG evaluates the results of the previous two testing programs. In September 2006 DLOG submitted an updated Development Plan Application for the Western Adventure Field outlining additional work needed to prove commerciality of the discovery. No lease has been issued to date.

In the past few years DLOG has concentrated in finding partners for drilling both conventional and unconventional resources in the Deer Lake Basin (e.g. Martin, 2009). DLOG is planning 2 shallow wells identified as Nicholson #1 and Fisher Creek #1 to test Carboniferous reservoirs in the 03-104 and 03-105 blocks that without drilling are to expire in 2010. A shallow hole, shale gas program is also planned for the Deer Lake Basin Exploration Permits.

Exploration in Parsons Pond Basin. Three Exploration Permits 03-101, 03-102 and 03-104 are active in the Parsons Pond area, a Paleozoic basinal area within the Anticosti Basin (Figure 10). Approximately 27 historical holes have been drilled in this basin located on the Great Northern Peninsula of Western Newfoundland with a small commercial production during the 1920s. All these wells were shallow and were located based on surface geology and light oil seeps (Figure 8). Light (42º API) oil was obtained from several of the seeps.

The Parsons Pond Basin contains four main play types: 1) structural traps within HTD of the St. George Group Platform (the reservoir at Port au Port #1); 2) stratigraphic traps in HTD along sub-vertical fault trends (Trenton-Black River type); 3) dolomitized deep-water carbonates overlying the platform, and 4) low perm, fractured deep water sandstones.

During the early 1990s, approximately 300 km of high fold seismic data was collected in the basin. In 2004 Contact Exploration and partners including DLOG and Vulcan drilled the Parsons Pond #1 well to test a Middle Ordovician dolomite play. The well reached TD at 1062 m within the first thrust sheet of the Appalachian fold and thrust belt but was short about 150 m of its target. Parsons Pond #1 encountered oil and gas shows in fracture zones and was not tested.

Shallow wells such as Parsons Pond #1 can test potential reservoirs in the thrusted sequence including a possible resource play (shale gas) within Ordovician rocks; however they will leave the Lower Paleozoic structures untested. The deeper target in the basin - the Cambro-Ordovician Carbonate Platform - is located under the allochthonous stacked thrusts of the Appalachian Foldbelt. Based on seismic reprocessing and mapping several platform located anticlines and fault blocks have been identified. Exploration at Parsons Pond will require deep wells (3,000 m +) to adequately test several mapped closures within the Carbonate Platform (Atkinson and Wright, 2006; Enachescu, 2006a; Maher, 2009).

In 2008 Leprechaun Resources acquired Contact's interest in the Parsons Pond permits and did further seismic and geological studies, in preparation for a 2009 summer drilling (Foote, 2009). However, in the summer of 2009, Nalcor Energy, Oil and Gas acquired an average interest of 67% in EPs 03-101, 03-102 and 03-103 and for the first time since its creation became an operator of exploration lands. A first deep test well in the basin is planned for late 2009 pending the Environmental Assessment approval. This well plus two others are part of an exploration program operated by Nalcor and financed by the partnership. This drilling program will validate all three permits and extend them for a secondary term of 2 years. Other partners in the permits are Leprechaun, Vulcan/Investcan and DLOG. They account for the remaining 37% interest in the 3 blocks. Drilling this first well will test simple and fault-bounded structural closures with up to 300 m of vertical closure. Hydrocarbons may be present at several levels in the Cambro-Ordovician sequence. The Catoche formation, a dolomitized reservoir is the main target. Information from these wells will also be used to advance knowledge on offshore Anticosti Basin structure, stratigraphy and petroleum systems.

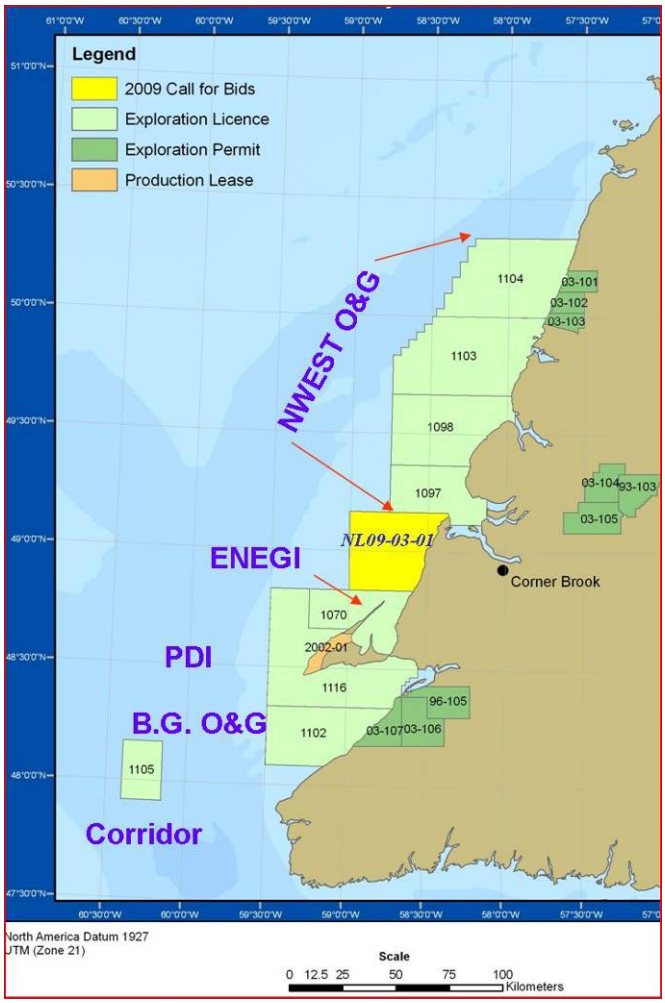

Figure 11. Offshore West Newfoundland landholdings and operators. In yellow is the CFB NL09-03-01 parcel.

Offshore Bay St. George and Anticosti basins. The most active phase of exploration in Gulf of St. Lawrence waters on the Newfoundland side took place in the early-mid nineties when several expansive ELs were operated by large companies such as Hunt, PanCanadian, Talisman, BHP and Mobil. During this period five wells were drilled and a 12,203 line km seismic grid was collected. As previously noted, the Garden Hill oil field (Port au Port #1) discovered at the time and drilled offshore from a land location, is covered now by a Production Lease (Enachescu 2006a; Foote, 2008 and 2009). No new offshore drilling or large 2D seismic programs have occurred in Western Newfoundland since the late 1990s. However, eight large ELs issued by C-NLOPB are active and exploration activity is picking up. This should be conducive to more shallow water (30 to 80 m) drilling in the next few years. The size of these parcels ranges up to 205,000 ha (or about 84 GOM tracts).

2.6. Recent offshore Western NL Landsales and Exploration Results.

Offshore Newfoundland and Labrador exploration areas are licensed by the C-NLOPB to the party submitting the highest bid in the form of work commitments, which are secured by a refundable deposit equal to 25% of the bid amount (http://www.cnlopb.nl.ca/). The minimum bid

for all parcels in the Western Newfoundland Offshore Region is $250,000 (approximately US $230,000-235,000 at September 2009 exchange rate) per parcel.

Except for the older, validated and extended EL 1070, all the active offshore ELs were issued in the past 3-4 years: 2 in 2006 (both in Anticosti Basin), 3 in 2007 (2 in Anticosti Basin and one in Bay St. George Basin), 1 in 2008 (in Magdalen Basin) and 1 in 2009 (straddling both the Anticosti and Bay St. George basins) (Figures 6 and 11; Table 1). The eight licences cover a total of 1,121,007 ha (Table 1). A new round of offshore drilling is anticipated in the near future in order to evaluate these licences.

Two exploration wells were drilled in Western Newfoundland in 2008 in order to validate offshore licenses. During the spring and summer of 2008, Shoal Point Energy drilled the onshore to offshore exploration well SPE et al. Shoal Point 2K-39 and its sidetrack 2K-39Z into Port au Port Bay from an onshore site at Shoal Point (Figures 7 and 9).The well was located to test a Middle Ordovician platform carbonate horizon and ended at a total measured depth (MD) of 3,629 m and a true vertical depth (TVD) of 2,548 m. This well validated the Exploration Licence 1070 until January 15, 2011. The 2K-39 well logs did not identify the presence of an active hydrocarbon system in the main hole section but there were significant gas shows while drilling through the Green Point shale hole section. While the well was plugged and abandoned, evaluation of the drilling results are still ongoing.

EL No.	Basin	Size (ha)	Date Issued	Operator	Other Partners
1097	Anticosti	96,100	2006	NWEST Oil and Gas Inc.	Vulcan (19%)
1098	Anticosti	159,872	2006	NWEST Oil and Gas Inc.	Vulcan (19%)
1103	Anticosti	216,164	2007	NWEST Oil and Gas Inc.	Vulcan (19%)
1104	Anticosti	187,744	2007	NWEST Oil and Gas Inc.	Vulcan (19%)
1070	Anticosti	103,040	2002	ENEGI Inc	Shoal Point Energy, CIVC, Gestion
1116	Bay St. George/Anticosti	211,987	2009	PDI Production Inc.	CIVC CC (10%)
1102	Bay St. George	124,320	2007	B.G. Oil & Gas Ltd.	
1105	Magdalen	51,780	2008	Corridor Resources Inc	

Table 1. Offshore Western Newfoundland Active Exploration Licences and Particulars.

Also in 2008 Tekoil & Gas Corporation, through a farm-in agreement with Ptarmigan Resources Ltd., received approval to commence drilling the Glori E-67 onshore to offshore well on Exploration Licence 1069. The conductor hole was drilled and casing set in January 2008. Due to financial difficulties and time constraints the remainder of the test hole was not drilled and the well was abandoned at 10.6 m depth. Consequently, the EL was not validated and subsequently relinquished. This expired block (previous EL 1069) is now the subject of CFB NL09-03-01.

In late December 2008, Geophysical Services Inc. (GSI) had completed an offshore nonexclusive exploration 3D program in the Anticosti Basin covering portions of the ELs 1096 and 1103. An

exploration 3D (or E3D) is a dense 2D seismic survey using single streamer layout. The survey totalled 2,555 line kilometres and covered an area of 598 km^2. The lines were recorded at 100 m spacing interval. Data was acquired as a speculative survey primarily on behalf of NWest Energy Inc. who holds about 659,880 ha (1.6 million acres) of prospective property over four blocks off the Newfoundland's west coast (ELs 1097, 1098, 1103 and 1104 in Figure 11).

By interpreting over 5,000 km of older seismic data collected by Mobil and BHP in the early 1990s, NWest and Sproule Associates have identified several large structural leads in the area. Three of them, first identified as "T" (or South) lead and "N" and "O" leads in the central area, were detailed using the 2008 GSI program. The E3D survey, now interpreted and mapped at several levels, has confirmed the T structure as a four-way closure with upside as a fault-dependent closure. Two locations were selected and the structure is now ready to drill. The prospect is situated in shallow water, about 25 km from shore and contains multiple reservoir targets in the Table Head, St. George and Labrador groups. The well located in approximately 80 m of water is planned to terminate at 3,400 m. This prospect will be drilled in 2010-2011 if more partners are found. Future 2D and 3D data acquisition is planned for the NWEST operated ELs to assist the partnership in defining further drill sites (Foote, 2009; Webb, 2009).

In EL 1102, B.G. Oil and Gas and DLOG, using older 2D seismic data have reconfirmed the presence of a salt induced anticline that forms a large closure for potential Carboniferous sandstone reservoirs. This structure nicknamed "Young Harry", has the drilling target at approximately 200 m, lies in the shallow waters of the Bay St. George Basin and can be drilled by a jack-up unit (Martin, 2009; Foote 2009). The partners in the EL 1102 have commenced the approval process for a seismic survey authorization; by filing a project description with the C-NLOPB as part of the environmental approval process.

The current offshore licence holders offshore Western Newfoundland are junior companies, based in the province of Newfoundland and Labrador, who generally have the Paleozoic basins acreage as their core assets. For the past few years these companies were reprocessing, collecting new seismic lines and re-interpreting the existing geological and geophysical database and seeking partnerships for eventual drilling. From a logistics point of view, Western Newfoundland offshore is less challenging than the Grand Banks and is closer to the main North American and European markets, with easy access to export venues. Any significant production offshore or onshore West Newfoundland will also have a rapid and significant impact on the Province's and region's economy and is supported by the government and local population.

There are 8 active ELs in the offshore Paleozoic basins (6 ELs located in the Anticosti Basin and 2 ELs in the Magdalen Basin) for a total area of 1,079,230 hectares (Figures 3 and 4). Detailed presentations of the general geology, seismic coverage and petroleum potential of the ELs located in Western Newfoundland offshore are given by Enachescu (2006a and b, 2008) and is available from http://www.nr.gov.nl.ca/mines&en/oil/

To date, over 12,000 line km of 2D and 598 km^2 of 3D seismic data has been collected and 6 wells drilled, with one light oil discovery recorded onshore at the Port au Port #1 well. All these wells were located close to the Port au Port Peninsula; five were drilled from onshore-to-offshore to minimize costs (Atkinson and Fagan, 2000; Fagan and Hicks, 2005; Enachescu, 2006a and b; NL DNR, 2008; Hicks, 2009; Foote, 2008 and 2009). The level of exploration activity during 2006-2008 was relatively low, but companies involved in Western Newfoundland offshore exploration have firmed up several large prospects that are now ready to be drilled.

3. Regional Geology of the Western Newfoundland Basins

Comprehensive accounts of NL Paleozoic regional geology, petroleum potential and seismic examples are given by Atkinson and Fagan (2000), Fagan and Hicks (2005) and Enachescu (2006a, b and 2008) and is available at: http://www.nr.gov.nl.ca/mines&en/oil/. The following regional geology discussion is reproduced with minor modifications from these documents.

The island of Newfoundland and the Hopedale Basin in Labrador forms the north-eastern North American end of an extensive, once continuous Texas to Northern Europe, Paleozoic aged mountain chain developed during the Appalachian Orogen. The Appalachian Orogen evolved through a Wilson cycle, starting 600 million years ago and closing with continental collision and the formation of Pangea approximately 300 Ma ago. The geologic subdivisions of Newfoundland record the development of the:

1. intra-continental rifts,
2. Lower Paleozoic continental margins,
3. Iapetus oceanic basement,
4. terrains resulting from the docking of several island chains and
5. final continent-continent collision (Laurentia and Gondwana).

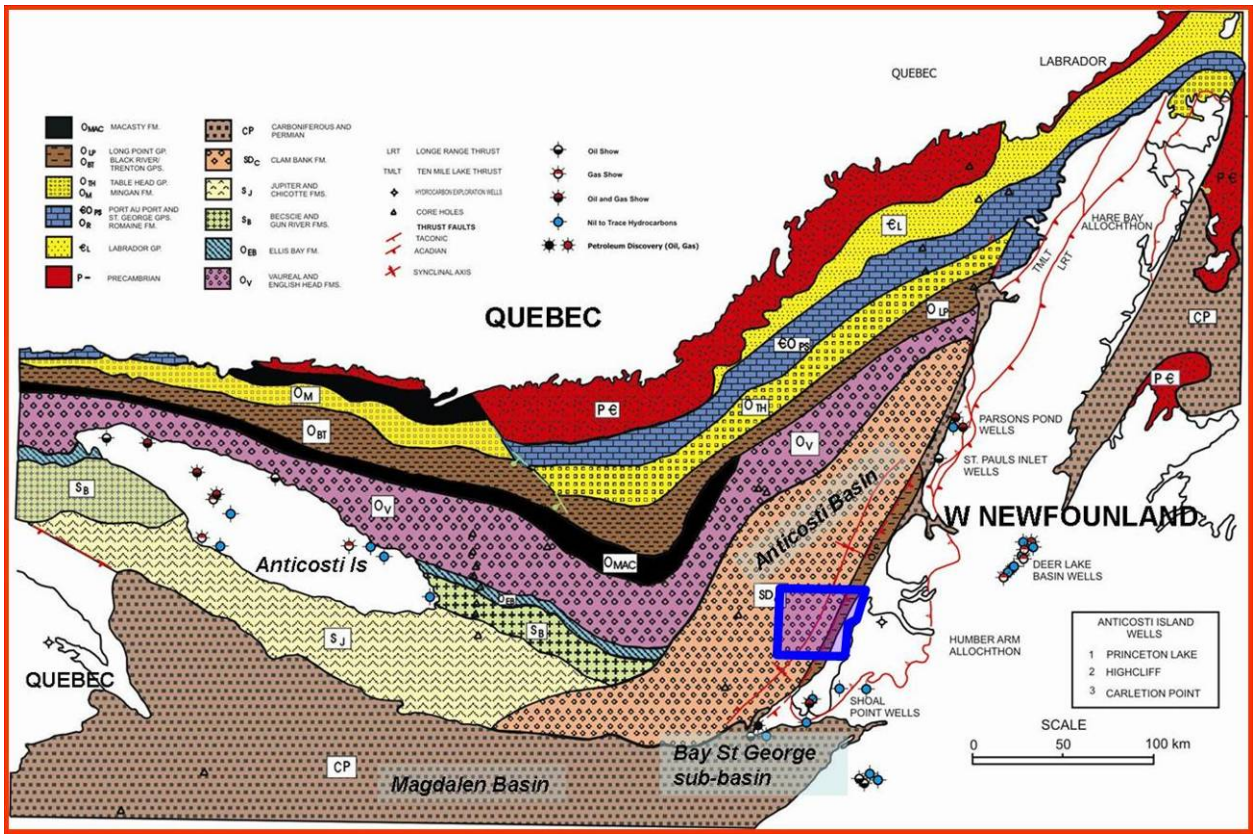

Figure 12. Bedrock geology of the offshore area between Quebec and Western Newfoundland; diagram includes the Anticosti Basin where NL09-03-01 landsale parcel is located (the blue block). Several historical wells and hydrocarbons shows are indicated (modified after Sinclair, 1990).

Following break-up of Rhodinia from the late Precambrian to early Cambrian, Western Newfoundland was molded and shaped during three distinct orogenic phases: 1.) Taconic (late

Middle Ordovician), 2.) Salinic (Late Silurian), and 3.) Acadian (Devonian). These phases were associated with docking and thrusting of several microplates to the Laurentia continental margin (Lavoie et al., 2003; Figures 13 and 14).

The Acadian orogeny resulted in the raising of the Appalachian Mountains along the eastern North America continent (http://gsc.nrcan.gc.ca/mindep/synth_prov/appalachian/index_e.php). A final Alleghenian orogenic phase during the Carboniferous completed the formation of the supercontinent of Pangea which included the island of Newfoundland. Erosion through Late Paleozoic to Tertiary almost peneplained the Appalachians before renewed regional uplift during the Tertiary and selective erosion (including glaciations) shaped the mountain chains and hills now forming the Newfoundland landscape. Regional uplift may have been related to plate movement readjustments during opening of the Atlantic Ocean and the Islandic magmatic uplift.

The westernmost geological unit of the island of Newfoundland is the Humber Zone (Figures 13 and 14). The rocks and structures of this unit illustrate the break-up history of an ancient North American continent, formation of the Laurentia continental margin and spreading of the Iapetus Ocean. The area's evolution began with rifting of existing continental crust, dated at around 600 to 550 million years. The rifting is evidenced by magmatic injections that filled fractures in the older crust and fed volcanic eruptions at surface. It also led to deposition of coarse grained sedimentary rocks (Figure 18). This was followed by the development of a passive continental shelf with mainly thick limestone deposition, like that of the present Bahamas, and also with synchronous continental slope and rise deposits. This stage lasted for about 100 million years. It ended with deposition of clastic rocks of easterly derivation, which are the first suggestion of offshore disturbance and an indication of forthcoming orogenic events (after Williams, 2003).

The destruction of the margin is marked by the transport of rocks from the compressed, uplifted continental slope and rise prism, landward above the former continental shelf. These transported rocks are, in turn, structurally overlain by slabs of oceanic crust and mantle, such as the Tablelands in the Bonne Bay/Trout River area. After closure of Iapetus, Appalachian sedimentation consisted mainly of subaerial red and grey sedimentary rocks that include fluvial and lacustrine strata, coal measures, shallow marine limestone, and evaporites. These rocks are present in Western Newfoundland and extend offshore underlying much of the Gulf of St. Lawrence, the southern Grand Banks (Sydney Basin), and the northeast Newfoundland shelf (St. Anthony Basin) (Figures 2, 3, 6 and 12 to 16). Some of the sub-basins seen now on land and offshore started as extensional rifts, others evolved as strike-slip structural basins (geological evolution modified from Williams, 2003).

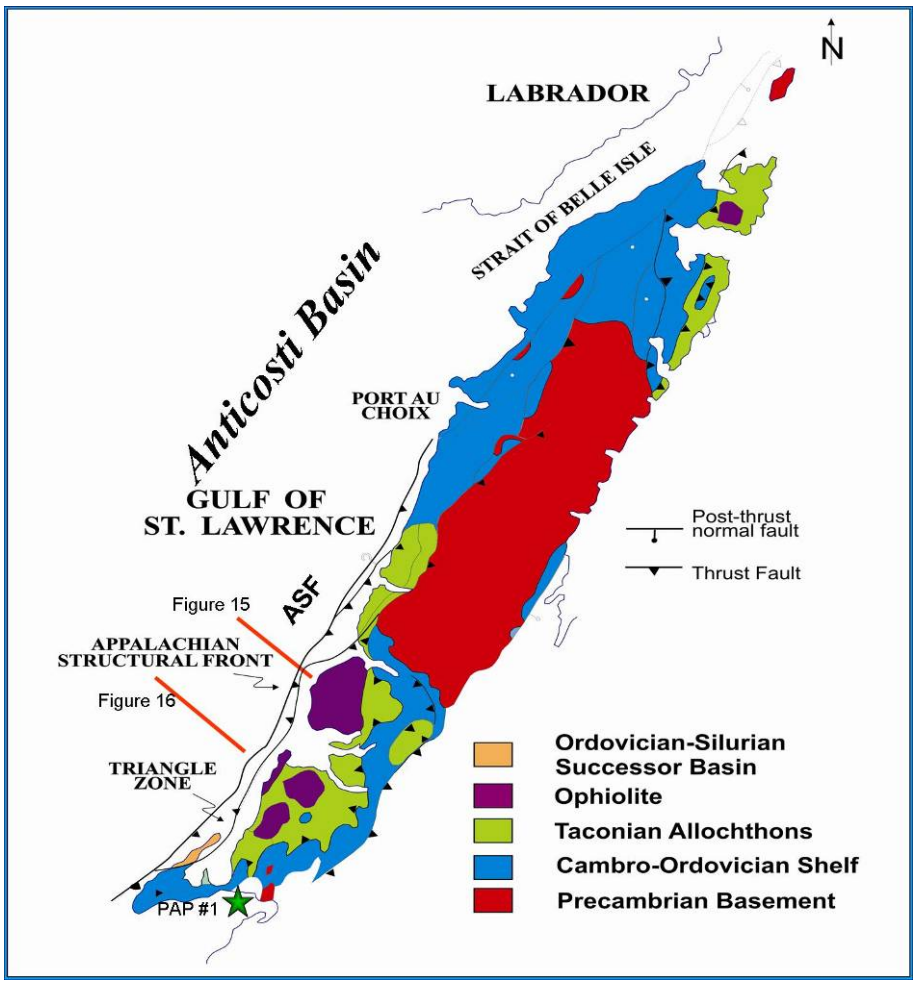

Figure 13. Geology map of the onshore Anticosti Basin (Humber Zone). Similar geologic successions continue offshore all the way to the Appalachian structural deformation front (ASF). A Carbonate Platform with a veneer of Carboniferous rocks forms the Appalachian foreland (modified after NL DNR). Also indicated are the locations of the seismic line 91-1491 (Figure 15) and the seismic line BHP 91-2 (Figure 16).

Upon synthesizing results of the mid-late 1990s round of exploration in the Western Newfoundland basins, Cooper et al. (2001) divided the Paleozoic strata of the Humber zone into six tectono-stratigraphic megasequences. The following sequence classification from oldest to youngest sequences is reproduced in this report with minor modification from their work (Cooper et al., 2001):

1. *Siliciclastic synrift sediments* (Late Proterozoic-Early Cambrian) deposited as the Iapetus Ocean opened up;
2. *Passive margin strata* (latest Early Cambrian-Early Ordovician) that consists of shallow water carbonates passing eastward into basinal shales;
3. *Flexural forebulge sediments* of the Taconic foreland basin that migrated westward through the region (during latest Early Ordovician to earliest Middle Ordovician), creating the regional St. George unconformity (Knight et al., 1991). A Middle Ordovician sequence of subtidal carbonates and shales was deposited in this early Taconic foreland basin;

4. *Culmination of the Taconic orogeny sequence*. This episode resulted in the westward overthrusting of basinal sediments (Humber Arm allochthon) and ophiolites. During this period, siliciclastic shallow marine sediments were deposited in the quiescent Taconic foreland basin (Late Ordovician to Salinic) and onlapped the Taconic allochthons;
5. *Emplacement of the Taconic allochthon sequence*. The Silurian Salinic orogeny caused additional displacement of the orogenic belt toward the west (Cawood et al., 1994) and exposure and erosion of the metamorphosed hinterland. Sedimentation in the Salinic foreland basin and deformation of the eastern Cambrian-Ordovician carbonate platform took place during this period;
6. *Successor basin fill*. Transtensional dextral reactivation of preexisting major basement faults (Bradley, 1982) followed the compressional deformation of the Late Devonian Acadian orogeny, creating successor basins with thick Carboniferous clastic fill (e.g., Deer Lake and Bay St. George's basins) (Knight, 1983).

Lavoie et al. (2003) have also summarized the main extensional and compressional stages of the Lower to Middle Paleozoic evolution of the Western Newfoundland basins (Figure 14).

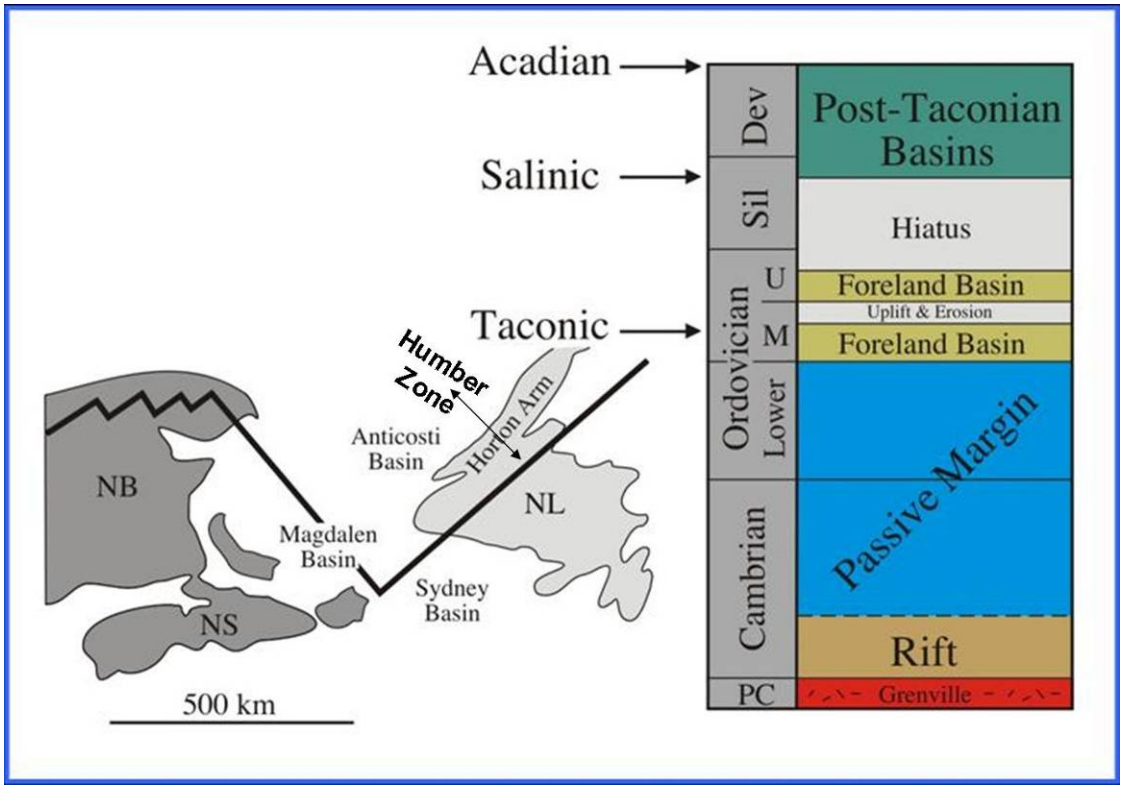

Figure 14. Schematic Paleozoic evolution of Western Newfoundland and environs (modified after Lavoie et al., 2003).

As illustrated by seismic sections recorded in the Anticosti Basin, most of the rocks of the passive margin stage usually identified as the "Paleozoic Platform" are only slightly deformed, mostly along major fault lines where block rotation, down dip failure, minor inversion and transtension may occur (Figures 15 and 16).

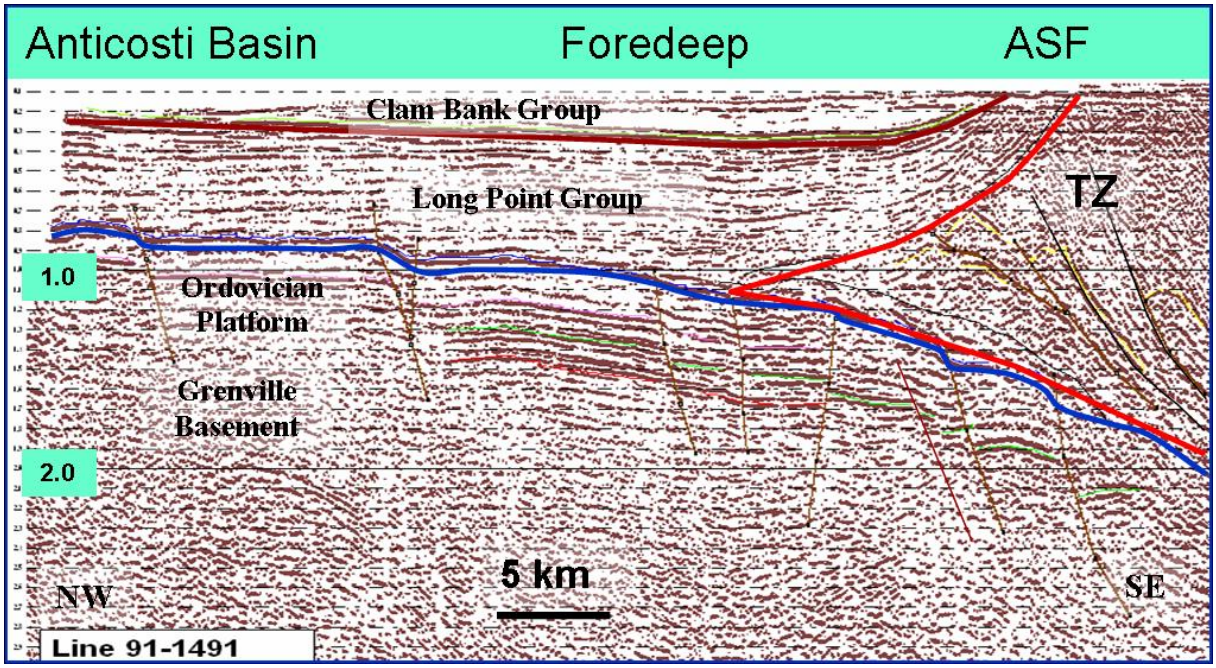

Figure 15. Representative marine seismic line from offshore Western Newfoundland. Line crosses the axial part of the Anticosti Basin, the faulted Cambro-Ordovician Carbonate Platform, the Permo-Carboniferous almost flat laying layers, the Foredeep, the Appalachian Structural Front (ASF) and the Triangle Zone (TZ) including several thrust sheets (modified after Fagan and Hicks, 2005).

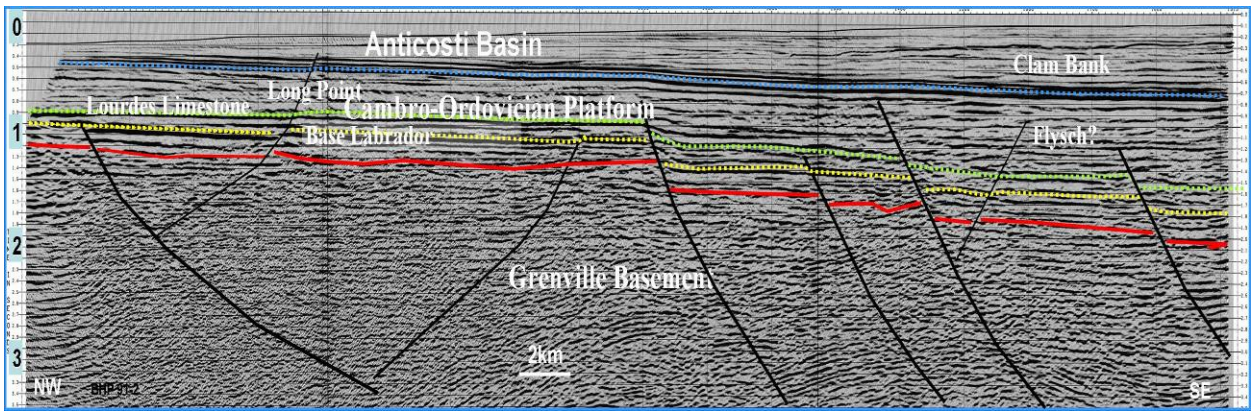

Figure 16. Marine seismic line from offshore Western Newfoundland located in the northern part of Parcel CFB NL09-03. Line crosses the axial part of the Anticosti Basin, the faulted Cambro-Ordovician Carbonate Platform, the Permo-Carboniferous almost flat laying layers and the Appalachian Foredeep without reaching the ASF, (modified after Enachescu, 2006a). Several rotated blocks and a horst are potential plays. Late Ordovician and Silurian groups (Long Point and Clam Bank) overlay the Carbonate Platform.

The western limit of the Humber Zone is located where deformed rocks of the Appalachians belt pass into flat-lying rocks of the Anticosti Basin. This is called Logans Line or the Appalachian Structural Front (ASF) (Figures 5, 6, 12, 13 and 15). The eastern boundary of the Humber Zone is a steep belt marked by discontinuous occurrences of Dunnage Zone oceanic crust and mantle rocks along the Baie Verte or Cabot Fault Line (Figures 13, 14 and 17). All oil and gas activity in Western Newfoundland occurs west of the Baie Verte Line within the onshore Paleozoic sub-basins and the offshore Anticosti and Magdalen basins.

3.1. Anticosti Basin Overview

The Early Paleozoic Anticosti Basin is one of several basins that preserve Cambrian to Ordovician shelf and foreland basin rocks along the Appalachian trend of eastern North America (Figures 2, 3, 6, 12 to 20). Except for the wells drilled from Anticosti Island, the Port au Port Peninsula and shallow wells drilled on land in the Parsons Pond area, no other wells have been drilled in this basin (Figures 7 to 9).

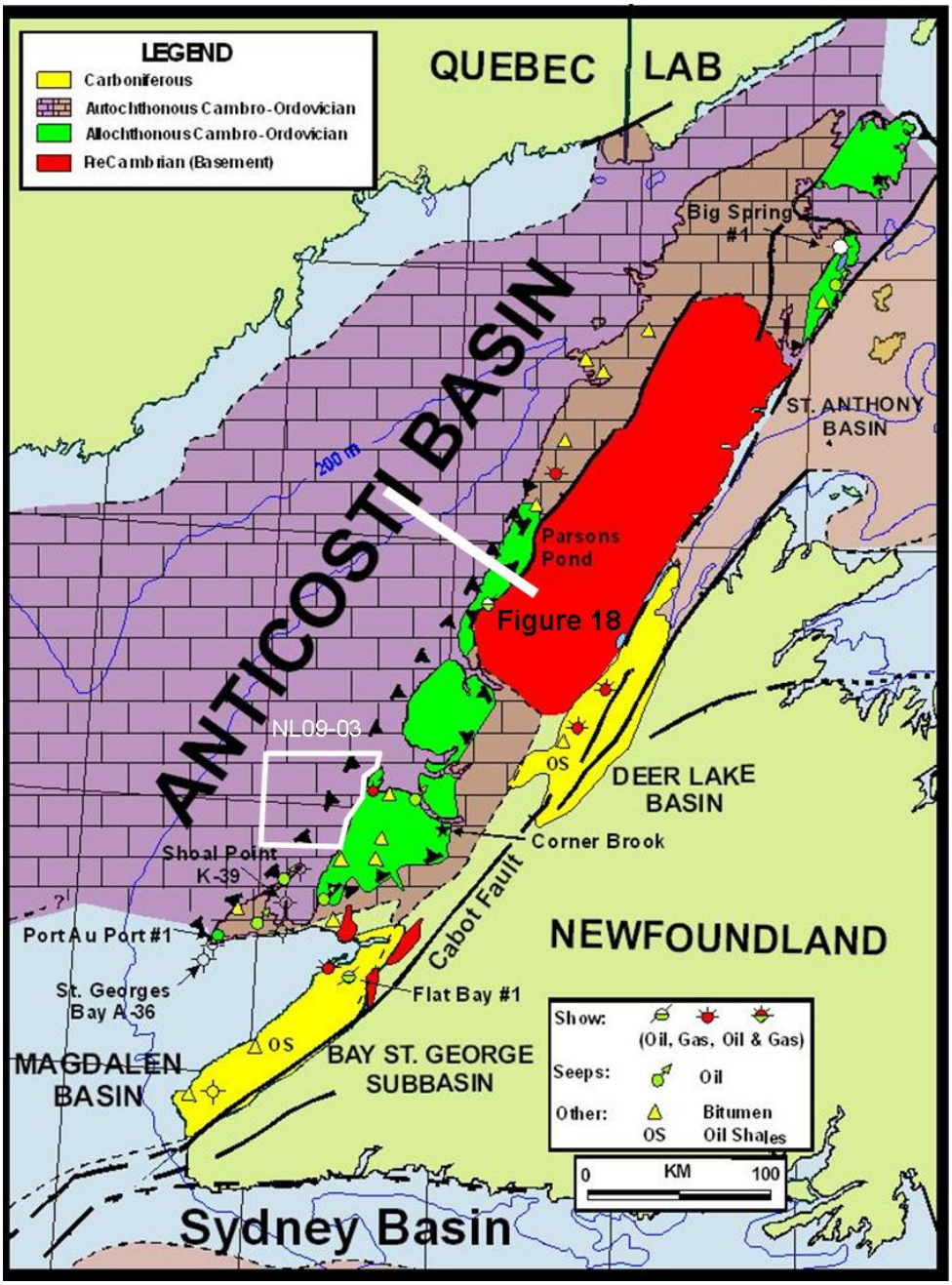

Figure 17. Geological map of the offshore Lower Paleozoic Anticosti and Magdalen basins and the onshore Appalachian belt including sedimentary sub-basins and oil and gas shows and seeps. Locations of geological cross-section in Figure 18 and Parcel NL09-03 are also shown (modified after Cooper et al., 2001).

Cambrian and Ordovician rocks of the Anticosti Basin include sandstones and carbonates that were deposited along the continental shelf and slope that bordered the ancient continent of Laurentia (Figures 12 and 17 to 20). The warm and vast Early Paleozoic Iapetus Ocean stretched to the south of the Laurentia margin. The closing of Iapetus and associated continental collision deformed the continental margin into a sinuous mountain belt that is preserved today as the Appalachian Mountains.

Today the Early Paleozoic shelf is preserved in Western Newfoundland as a lightly deformed, mainly carbonate, autochthonous platform sequence that is locally overlain (onshore and nearshore Western Newfoundland) by transported slope to basin sediments and ophiolites that were thrust westward during continental collision (Figures 12 to 20). Major reserves have been produced from similar age rocks (Ellenburger and Arbuckle groups in the Midland, Val Verde, Anadarko, Forth Worth and Arkoma basins) along this trend in the United States (Figure 5; Atkinson and Fagan, 2000; Fagan and Hicks, 2005; Enachescu 2006a; Maher, 2009). The Ordovician petroleum potential in carbonate rocks extends to the Hopedale Basin and Labrador Sea where two wells, Hopedale and Gudrid tested gas from porous limestone and dolomites (Figure 5; Enachescu and Fagan, 2005a; Enachescu 2006a, c and d).

The Appalachian Structural Front (ASF) is a major thrust zone separating moderate to intensely deformed, transported rock (on the south-eastern side of the fault in the Anticosti Basin) from their non-deformed to weakly deformed, non-transported equivalents (to the north-western side of the fault) (Figures 5, 6, 12, 13, 15, 17 and 18).

Based on field work, 2D seismic interpretation and well results, Stockmal et al. (1993 and 1995) and Cooper et al. (2001) have described in detail the structural complexity and geological evolution of Western Newfoundland (Figures 17, 18 and 20). Likewise, Atkinson and Fagan (2000) and Fagan and Hicks (2005) have shown more examples of seismic sections through the deformation front, which can be seen as a true Triangle Zone in the area north of the Port au Port Peninsula (e.g., Figures 15). Several other examples of interpreted 2D seismic sections in a similar structural setting and located north and south of Parcel NL09-03, were described in section 5 of the Enachescu 2006a report (e.g. Figure 16) (http://www.nr.gov.nl.ca/mines&en/call_for_bids/cfb_nl06-3_%20enachescu_report.pdf). All exploration blocks north of Port au Port Peninsula, including CFB NL09-03 parcel straddle the thrust front and present many hydrocarbon play possibilities within the Triangle Zone and the foreland basin (Enachescu, 2006a and Figures 12 to 20).

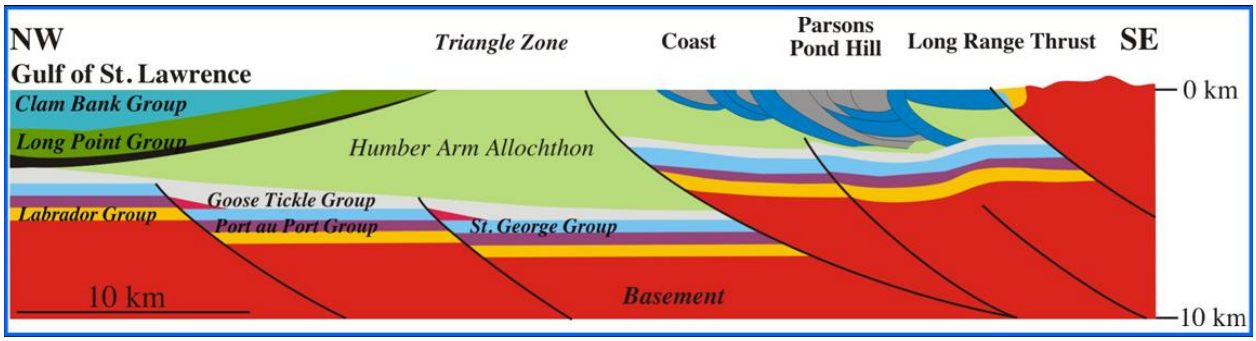

Figure 18. Geological Cross-section of the Anticosti Basin and Appalachian Triangle Zone within the Humber Arm structural unit (modified after Cooper et al., 2001).

Cooper et al. (2003) has constructed several geological cross-sections synthesizing information from Western Newfoundland seismic lines and well results showing the geometry of the deformation front and foreland on the eastern margin of the Anticosti Basin at the approximate latitude of ELs 1097, 1098 and 1103 and Parcel NL09-03-01. The cross-section in Figure 18, modified after Cooper et al. (2001) also shows the many possible structural-stratigraphic trapping mechanisms within the extended and slightly inverted platform, and within the Appalachian structural front. A diagram showing the geological evolution and the present configuration of offshore Western Newfoundland at the latitude of Corner Brook, including the possibility of hydrocarbon trapping in platform and overthrust sequences was presented by Atkinson (2005a and b) and Atkinson and Wright (2006).

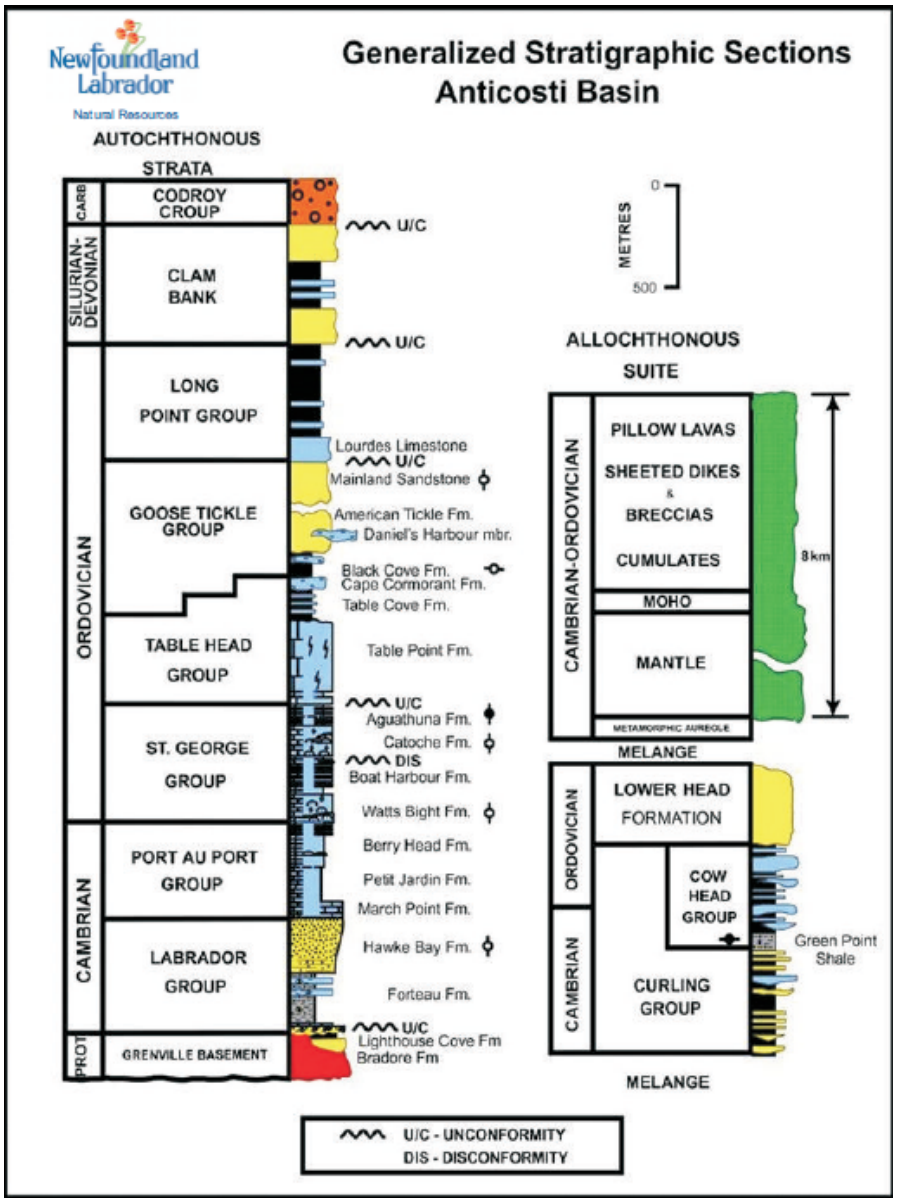

Figure 19. Generalized stratigraphy of the autochthonous and allochthonous sequences forming the Lower Paleozoic Anticosti Basin extending offshore and onshore Western Newfoundland (modified after James et al., 1988 and GNL DNR). Source and reservoirs rocks are highlighted.

4. Petroleum Geology of the Anticosti Basin

The Anticosti Basin is the largest of the Western Newfoundland Paleozoic basins, covering vast areas both offshore and onshore. The basin contains rock sequences ranging in age from Lower Cambrian to Devonian, with a sliver of overlying Carboniferous clastics. The Cambrian-Ordovician shallow marine platform and coeval deep water facies occupies the Gulf of St. Lawrence (Figures 17 to 20). The Appalachian Triangle Zone is located near the shoreline while the larger Cambro-Ordovician overthrust belt is located nearshore and on land in the relatively low lying coastal area.

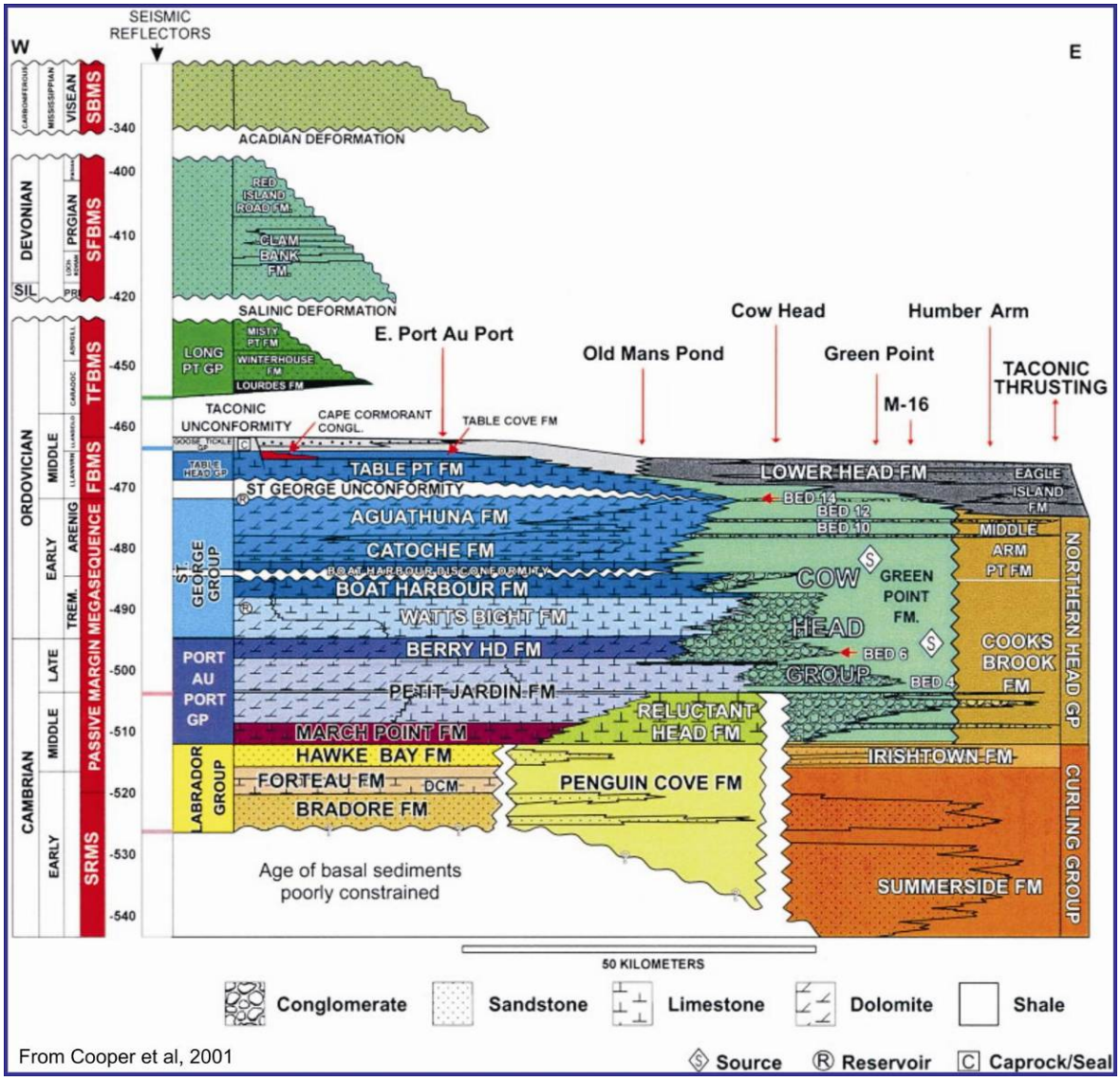

Figure 20. Generalized litho-stratigraphy of the autochthonous and allochthonous sequences forming the Lower Paleozoic Anticosti Basin of Western Newfoundland (after Cooper et al., 2001).

According to recent GSC studies, six valid conventional plays are recognized in Cambro-Ordovician strata offshore Western Newfoundland (Lavoie et al., 2009):

1) Cambrian rift sandstones,
2) Lower Ordovician hydrothermal dolomite (HTD),

3) carbonate thrust slices at the Appalachian structural front,
4) Middle-Upper Ordovician HTD,
5) passive margin slope clastics, and
6) foreland sandstones and carbonates

Among these plays: 1) the Lower Ordovician and Middle-Upper Ordovician HTD, 2) the carbonate thrust slice and 3) the Lower Devonian sandstone have either oil and gas production, significant shows or exploration data indicating possible hydrocarbon accumulations (Cooper et al., 2001; Fagan and Hicks, 2005; Enachescu 2006a and 2008; Hicks, 2009; Lavoie et al., 2009).

The Silurian-Devonian successor basin beds that overly the Ordovician formations in the Gulf of St. Lawrence, are usually shallow and relatively flat-lying. While good sandstone reservoirs are present in the Siluro-Devonian aged Clam Bank Formation these sandstones are not considered as viable targets.

It is evident that the 1995 Port au Port discovery in Lower Ordovician HDT has brought greater attention to the petroleum potential of the NL Paleozoic basins one of which, the Anticosti Basin is the subject of the CFB NL09-03-01 and this report. The PAP discovery proved a working petroleum system represented by the Green Point source rock and the Lower Ordovician Aguathuna HDT reservoir. Regrettably, little information is available to the public from the Garden Hill sidetrack wells in the form of final well reports. The latest well Shoal Point 2K-39 drilled by Shoal Point Energy has a two year data confidentiality period from rig release which occurred in July 2008. The following section is written following accounts by Sinclair (1990), Fowler et al. (1995), Knight et al., (1995), Atkinson and Fagan (2000), Weissenberger and Cooper (1999), Cooper et al., (2001), Fagan and Hicks (2005), Atkinson (2005a and b), Atkinson and Wright (2006), Enachescu (2006a and 2008), Knight (2008), Hicks (2008 and 2009a and b) and Lavoie et al. (2009), and reviewing the limited petroleum geology literature on the area.

4.1. Source Rocks

Several Paleozoic intervals with medium to rich source rocks have been recognized from drilling and outcrop sampling (Figures 19 and 20).

4.1.1. Green Point shale. The proven source rock for the Anticosti Basin onshore Western Newfoundland is a shale within the Late Cambrian aged Green Point Formation located within the Humber Arm allochthonous sedimentary suite (Figures 19 and 20). Analysis of Green Point samples by the C-NLOPB yielded a TOC of 1.74% to 3.04%, but values up to 10% were also reported by Fowler et al. (1995) and Cooper et al. (2001). Hydrogen Index (HI) of 367-451 and Oxygen Indices (OI) of 4-26 were reported in the literature (Sinclair, 1990). Physical and chemical analyses indicate that Green Point strata are significant type I/II source rocks (Fowler et al., 1995). Geochemical fingerprinting has identified the Green Point shale as the likely source rock for the oil shows at Parsons Pond and for the Port au Port #1 discovery. Average thickness for the Green Point shale is 50 m. East of the ASF, the Green Point source rock is widespread as evidenced by the sourcing of hydrocarbons encountered at both Parsons Pond area and on the Port au Port Peninsula. The source rock is marginally mature to mature when sampled in outcrop.

4.1.2. McCasty shale. Additional source rock potential to the west of the ASF is provided by the Late Ordovician McCasty Formation which is the recognized source rock on Anticosti Island (Enachescu 2006a; Hicks, 2009). The McCasty shale has not been encountered in Western

Newfoundland but may be present in the undrilled offshore foreland basin. Seismic data indicates that Parcel 1 being offered in this landsale, as well as all the other Anticosti Basin active ELs would contain the foreland basin sequences including the McCasty source rock.

4.1.3. Black Cove-Cape Cormorant shale. The Middle Ordovician Black Cove-Cape Cormorant formation, part of the autochthonous suite ((Figures 19 and 20) has also been sampled from outcrop in Western Newfoundland and should be present in the foreland basin to the west. Analysis of outcrop samples from these rocks by the C-NLOPB yielded an average TOC of 1.2% (but values up to 8% were reported by Atkinson and Wright, 2006). The shales have a HI of 246 and an OI of 18 (Sinclair, 1990).

An important distinction between the Green Point shales and the Black Cove/Cape Cormorant and McCasty sequences is that the latter are present in the autochthonous foreland basin, and should therefore be widespread throughout the Gulf of St. Lawrence (Sinclair, 1990).

4.2. Reservoir Rocks

Reservoirs rocks in the Anticosti Basin are predominantly dolomitized carbonate rocks and sandstone. Both primary and secondary porosity have been encountered in wells and outcrop (Figures 19 and 20).

4.2.1. Ordovician carbonates. Well and outcrop information indicates that all of the Ordovician carbonate reservoirs are within dolostones of the Early Ordovician *St. George Group* and Middle to Late Cambrian *Port au Port Group* (Figures 19 and 20). The factors controlling porosity within the *Aguathuna Formation* (the productive zone at Port au Port #1) are not well understood and the porosity appears to be highly variable. However, deeper reservoirs such as the *Watts Bight and Catoche formations* may provide more regional and predictable dolostone targets. At Port au Port #1 the *Watts Bight Formation* flow-tested water at 4,000 barrels per day and the *Catoche Formation* flow-tested water at 800 barrels per day. The *Catoche Formation* has been mapped in outcrop by Knight (2008) who indicates broad-based occurrence of Catoche porosity in Western Newfoundland. All these carbonates are included in the early Ordovician St. George Group.

Approximately 400 km north of the CFB NL09-03 block, in the Port au Choix area, the Ordovician carbonates (including the *Catoche, Aguathuana* and *Spring Inlet* dolomites) are inundated with bitumen and Cooper et al. (2001) concluded that the Port au Choix Peninsula contains a large exhumed oil field.

Dolomite porosity may be microcrystalline, inter-crystalline and vuggular. Secondary porosity creation in Ordovician carbonates depends on exposure and karstification of the platform carbonates during extension and rotation in Middle Ordovician as well as fracturing, solution injection and preferential dolomitization of previously karsted and high energy grainstone zones during the Devonian (Cooper et al., 2001).

4.2.2. Lower Paleozoic sandstones. In addition to the carbonate reservoirs the *Hawke Bay Sandstone* (Cambrian aged Labrador Group) was porous in the hanging wall at Port au Port #1 but was tight in the repeated section in the footwall. Additional reservoir potential is recognized within the autochthonous Late Ordovician Goose Tickle Formation, which contains *Mainland* and *American Tickle* sandstones (Figures 19 and 20).

4.2.3. Other reservoirs. Also contained in the Goose Tickle Group are dolomitized carbonate conglomerates of the *Daniels Harbour Member* and calcarenites carried in hanging wall thrusts (Knight – pers. comm.). Other reservoir intervals were encountered in the *Watts Bight Formation*.

The Late Ordovician Long Point Group and Silurian-Devonian Clam Bank groups are not widely outcropped in Western Newfoundland and may provide surprises when drilled offshore. Current knowledge would indicate the Long Point Group will be dominated by shales with minor limestones. The Clam Bank sequence offshore may also present unexplored porous clastic and carbonate zones. Other mentioned clastic reservoirs are *Eagle Island Sandstone, Blow-Me-Down Brook Sandstone* and the *Misty Point Formation* in the Long Point Group. The Misty Point Formation which outcrops along the western edge of the Port au Port Peninsula exhibits porosity values up to 16% in measured shoreline sections (Quinn et al., 1999).

Porosity is most extensive in the upper Catoche Formation, spottier in the peritidal Aguathuna and Spring Inlet Member, and extends as high as the lower Table Point Formation. The possibility of directly mapping hydrothermal dolomite porosity on high quality 3D seismic data and fluid indicator seismic attributes in this area remains to be explored.

Both source and reservoir rocks may be present in places within the synrift sequences present under the Carbonate Platform. These rocks have never been penetrated in the Anticosti Basin but similar Early Paleozoic synrift sequences are productive in other Paleozoic basins. An example is the Cambrian of the Mackenzie Corridor in NWT.

4.3. Seals

Numerous tight zones represented by shales, carbonates and various evaporite intervals are present in both allochthonous and autochthonous successions. Finding good seals should not be a problem in the offshore Paleozoic Anticosti Basin. The Middle Ordovician *Black Cove Shale* is a regional top seal for the foreland Carbonate Platform (Figures 19 and 20).

4.4. Hydrocarbon Traps

Plays in the Anticosti Basin are associated with deformation of the platform in front of and along the ASF. North of Port au Port area the deformation front is represented by a classic Triangle Zone with trapping possibilities in the overlying thrust sheets and underlying faulted and sometimes tightly folded autochthonous platform (Figures 5 to 7 12, 13 and 15 to 18). The deeper traps in the autochthonous or foreland Carbonate Platform are rotated fault blocks or inverted fault blocks including footwall shortcuts of the thick skinned thrusts (Cooper et al., 2001; Atkinson and Fagan, 2000; Atkinson and Wright, 2006; Enachescu, 2006a). This deformation zone should be present in the eastern, shallower water part of the Anticosti parcel NL09-03-01.

Northward of Port au Port Peninsula, the Cambro-Ordovician Platform and its cover deepens eastward through numerous steps, creating horsts and rotated blocks bounded by basement penetrating faults. While these faults are predominantly normal faults, minor inversion is observed in places (Figures 15 and 16).

Both thin and thick skinned structures are present in the Humber Arm Allochthon. Cooper et al., (2001) and Atkinson (2005a and b) summarized all possibilities of structural (horst blocks, tilted fault blocks, thrust sheet slices) and stratigraphic (sand lenses, pinchouts, fans, erosional edges, karstified and leached carbonates, dolomitized carbonates) in representative geological cross-sections (e.g. Figures 16 and 20) showing potential plays offshore and onshore Anticosti Basin. Enachescu (2006a and 2008) has shown possibilities of two- , three- and four - way fault bounded closures in the Anticosti Basin parcels north of the Port au Port Peninsula in numerous interpreted seismic sections (e.g. Figures 15 and 16; Enachescu 2006a).

4.5. Maturation and Migration

The Paleozoic source rocks should be all in the mature to overmature range. Port au Port #1 oil and gas tests and the presence of oil in seeps and drilled wells demonstrate that source rocks are mature and that oil and gas were generated and migrated into traps. After trap formation there were direct migration routes through porous beds or/and faults from the Green Point shale into allochthonous reservoirs.

With source rocks in the oil window or dry gas window, trap preservation and presence of adequate reservoir remains the main risk factors in the Anticosti Basin. One example of field destruction is the Port au Choix exhumed oilfield located on shore just north of EL 1104. This bitumen field with an area of 80 km^2 that has up to 300 m of good porosity in dolomitized Catoche Formation carbonates and 100 m “pay” was described by Cooper et al. (2001) and Knight (2008). Offshore, where prospective section is expected to be buried under thick Middle Ordovician beds, the risk of trap preservation should be lower.

4.6. Trenton-Black River Exploration Model

Trenton-Black River reservoir is a successful hydrocarbon exploration trend in the Appalachian Basin (http://www.osti.gov/bridge/servlets/purl/823787-muradR/native/823787.pdf). An exploration model including four prerequisites in the search for porosity development in carbonate rocks was recently presented by Dr. Taury Smith of New York State Museum. These four prerequisites are reproduced here as summarized at the PTTC Appalachian Region (2004) workshop (http://www.pttc.org/workshop_summaries/sol_2004/534.htm).

1. Appropriate tectonic settings such as basement-rooted intra-platform wrench faults and fault intersections, fault-controlled margins, and the first carbonates deposited on newly-rifted/heavily-faulted continental basement is needed for increasing the chance of finding porous carbonate;
2. Evidence of fault movement soon after deposition: much of the alteration takes place in the first kilometre of burial, so faults with minor vertical offset at the time of alteration may be in the best locations;
3. Indication for breccification; breccias may be either karst or hydraulic, so look for saddle dolomite-cemented breccias;
4. Petrographic evidence of hydrothermal alteration in cores and cuttings.

All these prerequisites have been identified and confirmed in the carbonates and dolomites encountered in drilling and in outcrops within the onshore portion of the Anticosti Basin, thereby providing strong arguments that a similar play is present offshore Western Newfoundland.

5. Petroleum Potential Call for Bids NL09-03 Parcels 1

The Call for Bids NF09-03 parcel covers a total area of 140,210 hectares (346,465 acres) situated within the eastern part of the Anticosti Basin. This shallow water parcel (0-150 m water depth), is located close to the Western Newfoundland coastline and in the vicinity of proven hydrocarbon occurrences on the Port au Port Peninsula, and in the Bay St. George, Parsons Pond, Deer Lake and Port of Choix areas (Figures 4 and 6).

5.1. CFB NL-09 Overview

Previously introduced maps for the Western Newfoundland offshore depicts the 2009 Call for Bids parcel within the framework of the Anticosti Basin and Appalachian structural front (Figures 3, 4, 6, 10, 11, 12, and 17). Some of the illustrations also show the existing Western Newfoundland Exploration Licences (Figures 3, 4, 10, 11 and Table 1). A detailed location map of CFB NL09-03 is contained in Figure 21.

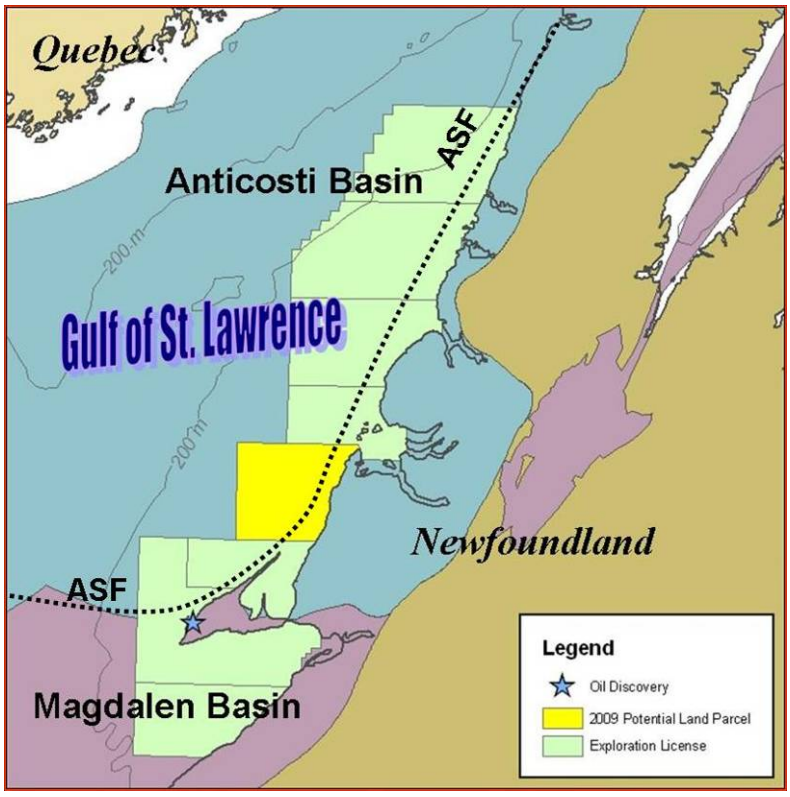

Figure 21. Location of CFB Parcel NL09-03-01 offshore Western Newfoundland. ASF = Appalachian Structural Front.

Structurally, Parcel NL09-03-01 encompasses the foreland, foredeep and deformation front of the Appalachian Foldbelt within the marine portion of the Anticosti Basin (Figures 3, 6, 12, 13, 17 and 21). As mentioned before, the immediate Western Newfoundland onshore-offshore area is characterized by thin-skinned deformation associated with Middle Ordovician to Silurian Taconic and Salinic orogenesis and Devonian Acadian orogenesis, overprinted by thick-skinned late Acadian deformations (Figures 12 to 20, and Waldron et al., 1998; Stockmal et al., 2000; Cooper et al., 2001). The upper detachment of the Triangle Zone, named the Tea Cove Thrust by

Stockmal et al. (2000) is mostly a submarine feature offshore Western Newfoundland, but outcrops at several locations north of EL 1104 and on the Port au Port Peninsula. Farther offshore, in the western part of the parcel, the Cambro-Ordovician Carbonate Platform is compartmentalized by many normal and a few reverse deep penetrating faults. Several compressional folds and pop-up blocks are also observed on the seismic data collected in the area.

The Paleozoic source rocks are mature throughout the area covered by the Call for Bid Parcel NL09-03-01 (see also Fagan and Hicks, 2005; Atkinson and Wright, 2006; Enachescu, 2006a Hicks, 2008 and 2009). No exploration wells have been drilled within this offshore parcel or in the northern ELs 1097, 1098, 1103, and 1104, but half a dozen exploration wells have been drilled in the adjacent southern area (Figures 6, 7 and 9). As mentioned in Section 4, these deep exploration wells were drilled on the Port au Port Peninsula in the deformation front and tested 4 different subsurface configurations within the Carbonate Platform. These wells have encountered porous zones and source rocks. The historic wells drilled onshore (about 60 in total) are mostly shallow wells which TD'ed in the Humber Allochthonous sequence (Anticosti Basin) or the deformed Carboniferous cover (Bay St. George Basin and Deer Lake Basin) (Figure 8).

The Port au Port deep exploration wells were discussed in more detail when describing the potential of the ELs listed in Table 1 (Cooper et al, 2001; Atkinson, 2005a and b; Fagan and Hicks, 2005; Atkinson and Wright, 2006; Enachescu, 2006a and 2008; Wright, 2007; Hicks, 2008 and 2009a) and more information on the onshore and offshore wells situated in the vicinity of the NL09-03-01 can be obtained from C-NLOPB Schedule of Wells (C-NLOPB, 2009 and http://www.cnlopb.nl.ca/well_alpha.shtml), Natural Resources Canada GSC Basin Database (http://basin.gsca.nrcan.gc.ca/index_e.php) or from the Government of Newfoundland and Labrador Department of Natural Resources (NL DNR). Complete well history reports and cores for offshore wells are available from the C-NLOPB and onshore well history reports for modern wells are available at NL DNR.

Seismic data quality is good to very good for the Parcel NL09-03-01. The marine data was acquired during the early 1990s using an intermediate length streamer (3-4.5 km) in a regional grid that is denser in the dip direction (NE-SW) (Figures 22 and 23). The water bottom is a very strong reflector/refractor. Energy penetration and water bottom multiples can be a challenge in this part of the Anticosti Basin due to this hard bottom. Several strong seismic impedance contrasts are created at major unconformities and this also creates peg leg multiples (Figures 15 and 16). However, the seismic data acquired with smaller length streamers can be reprocessed with modern multiple suppression algorithms with significant improvement of imaging.

Generally seismic lines have good quality and allows for adequate mapping of several foredeep formation tops and unconformities. Seismic imaging is more challenging in the more complexly deformed areas such as within the Appalachian Structural Front (eastern side of parcel), where the Humber Arm Allochthonous nappes and overlying flysch layers lie close to the surface (e.g. Figures 15, 16, 27 and 28). Seismic imaging of flysch and stacked thrusts is most challenging in many of the world's foldbelts, but longer streamer, 3D acquisition and pre-stack depth migration of data are employed to obtain better structural imaging and stratigraphic resolution of certain litho-stratigraphic units.

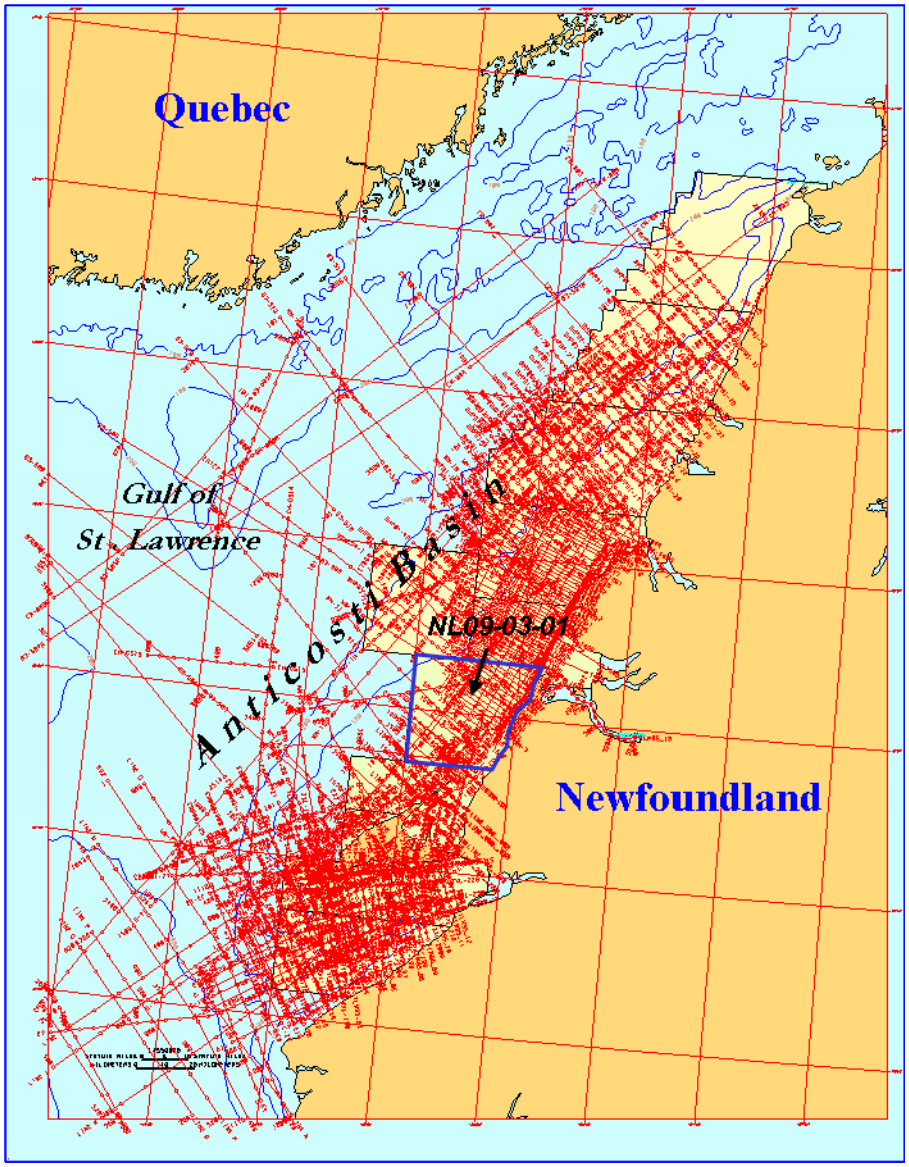

Figure 22. Regional and detailed 2D seismic coverage offshore Western Newfoundland including seismic grid over Call for Bids Parcel NL09-03-01 and neighbouring Exploration Licenses.

5.2. Parcel NL09-03-01 Description

This large size parcel is located approximately 30 km north of the PDIP Garden Hill Production Licence 2002-01 located on the Port au Port Peninsula and Exploration Permits further to the south operated by Vulcan Minerals. To the south, the parcel borders EL 1070 that was recently validated by the drilling of Shoal Point 2K-39 well operated by Shoal Pint Energy (Figure 21). To the north, the parcel borders EL 1097, the first of a series of four ELs operated by NWest (Figures 4, 10, 11 and 21). The parcel covers an area of 140,210 hectares, equivalent to 60 GOM offshore tracts, in water depths ranging from coast line to 150 m, with most of the parcel under the 100 m depth range.

The parcel is entirely located within the Anticosti Basin encompassing the Foreland and the Triangle Zone of the Appalachian Foldbelt. No wells have been drilled to date in the parcel.

5.3. Seismic coverage

The parcel is relatively well covered by a 2D seismic grid that has 1.5-2.5 km spacing in the dip direction and 3-5 km spacing in the strike direction. A total of 1500 km of 2D data is available for the petroleum evaluation of this parcel (Figure 23). The digital data is owned by companies such as Mobil (now ExxonMobil) and Hunt who collected the data covering the parcel and environs during the early to mid 1990s. Other regional data was collected by BHP and Norcen.

The Mobil grid represents the great majority of the seismic lines in the parcel and was collected during the largest seismic regional survey completed in 1991. A Western Geophysical vessel equipped with a sleeve gun array source with a 4500 cu in volume was used to conduct this survey. A fibre optic, 3,000 m long, 240 channel digital cable was towed. Seismic data processing was done by Halliburton Geophysical Services (HGS) and has designature applied in shot domain, F-K demultiple and gapped deconvolution after stack. Most of the Mobil lines are 80 fold, processed to finite difference migration and show fair to excellent quality in the foredeep area. Mobil simultaneously recorded shipborne gravity. This seismic coverage can be purchased as digital data from Exxon or data brokers in Calgary and as hard copies only for the cost of reproduction from C-NLOPB in St John's. Data grids older than 1980s are available from C-NLOPB only as individual seismic line hard copies or in microfiche.

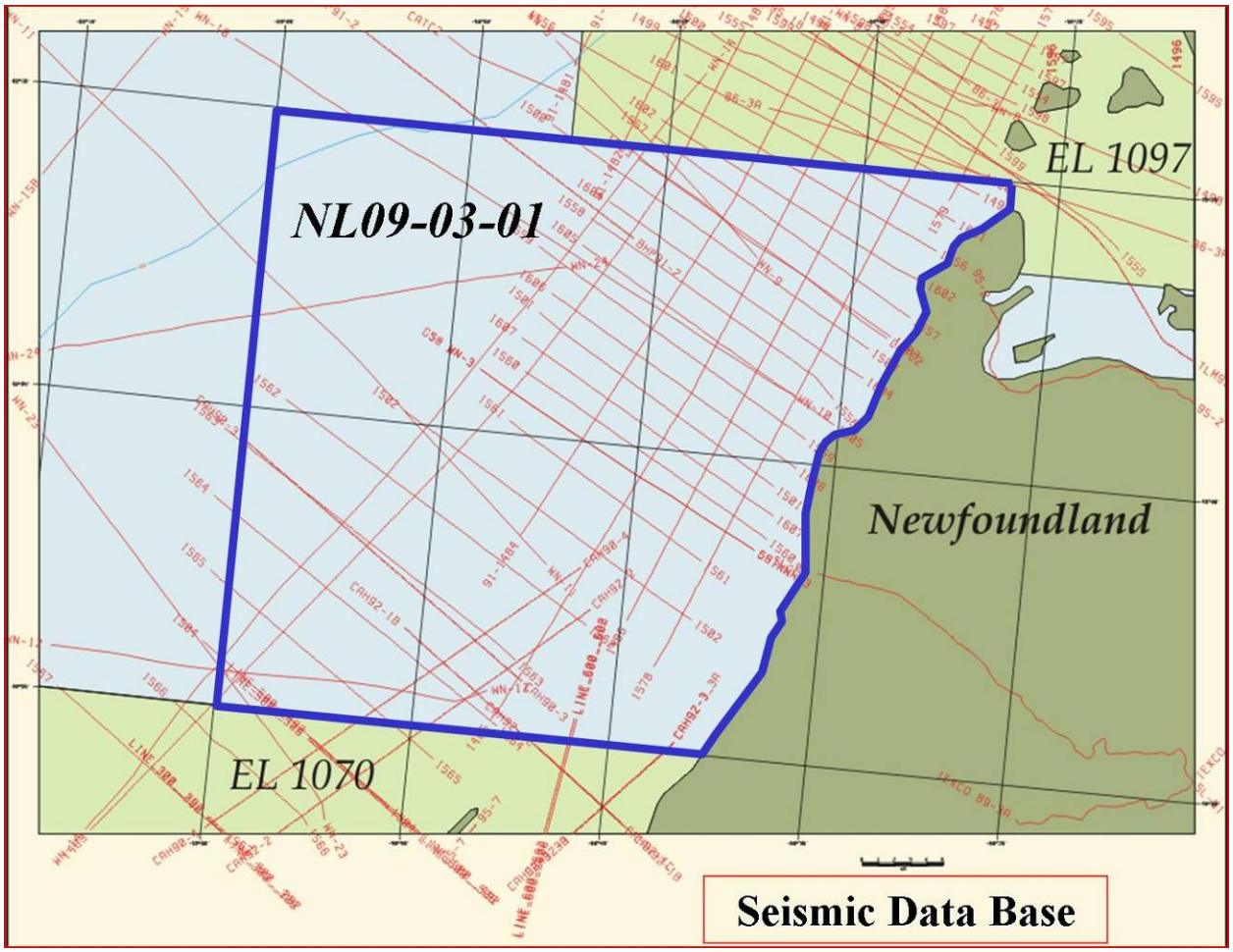

Figure 23. CFB NL09-03 Parcel 1, adjacent Exploration Licenses and current seismic coverage.

5.4. Significant Wells

The most significant well for the area, the Port au Port #1, was drilled approximately 40 km south of the Parcel 1 (Figures 6, 7, 9, 17 and 24). The well tested oil and gas from two Aguathuna Formation intervals at an initial rate of 1,700 bopd and 2.3 mmcfd, and was suspended as a potential oil well (Figures 7, 9 and 24). The well penetrated a higher imbricate block set by a footwall thrust, situated under the main Round Head Thrust (RHT) (Stockmal et al., 2000; Cooper et al., 2001; Atkinson and Fagan, 2000; Fagan and Hicks, 2005; Enachescu, 2006a). The RHT sets a large basement block above the platform carbonates (Figures 7 and 24). Both pressure and GOR declined during a 6 day extended test. No cores were taken. Subsequently, several PAP sidetrack holes were drilled by Canadian Imperial Venture Corp. who initially farmed into the project, and by PDIP, the present operator of the Petroleum Lease. Reservoir and oil flows have been recorded in some of the sidetracks and partners have plans for future delineation of this discovery estimated to contain mean unrisked reserves of 8.6 mmboe.

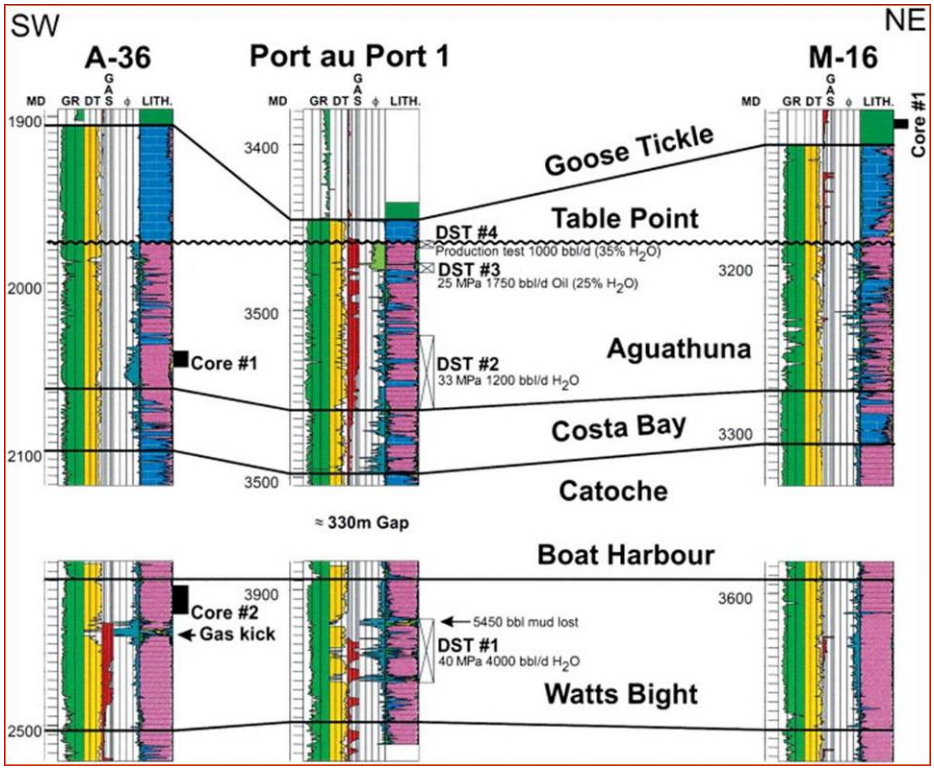

Figure 24. Log correlation of stratigraphic formations between the St. George's Bay A-36, Port au Port #1, and Long Point M-16 wells. Annotations are: MD = measured depth in meters; GR = gamma ray in API units; DT = sonic in microsecs/meter; GAS = total mud gas in units; Φ = porosity % (blue = water-filled; green = oil-filled); LITH = calculated lithology (green = shale; blue = limestone; pink = dolomite). Locations of cores and DST intervals are shown (reproduced from Cooper et al., 2001).

Further north on land, the Parson Pond #1 well drilled in 2004 by Contact Exploration et al. penetrated a thrust sheet of Cow Head Group, TD'ed above a major thrust fault, and encountered oil shows in fractures. Many of the earlier Parsons Pond wells, situated on land just northeast from the Parcel had either oil or gas or both (see sections 2 and 3 and Figures 8, 18 and 19).

5.5. Seismic Interpretation

The regional seismic data was tied with synthetic seismograms to several exploration wells in the Port au Port area and jump tied to the geologic units present on land. It is understood that for the offshore Anticosti Basin, the full Cambrian to Devonian sequence described in the past from outcrops and cores (Figure 25, courtesy of Elliott Burden) is present in all blocks north of Port au Port Peninsula including the Parcel NL09-03. For simplicity, on the illustrative seismic sections (Figures 26 to 28), only a few markers and formations as explained in Figure 25 are displayed.

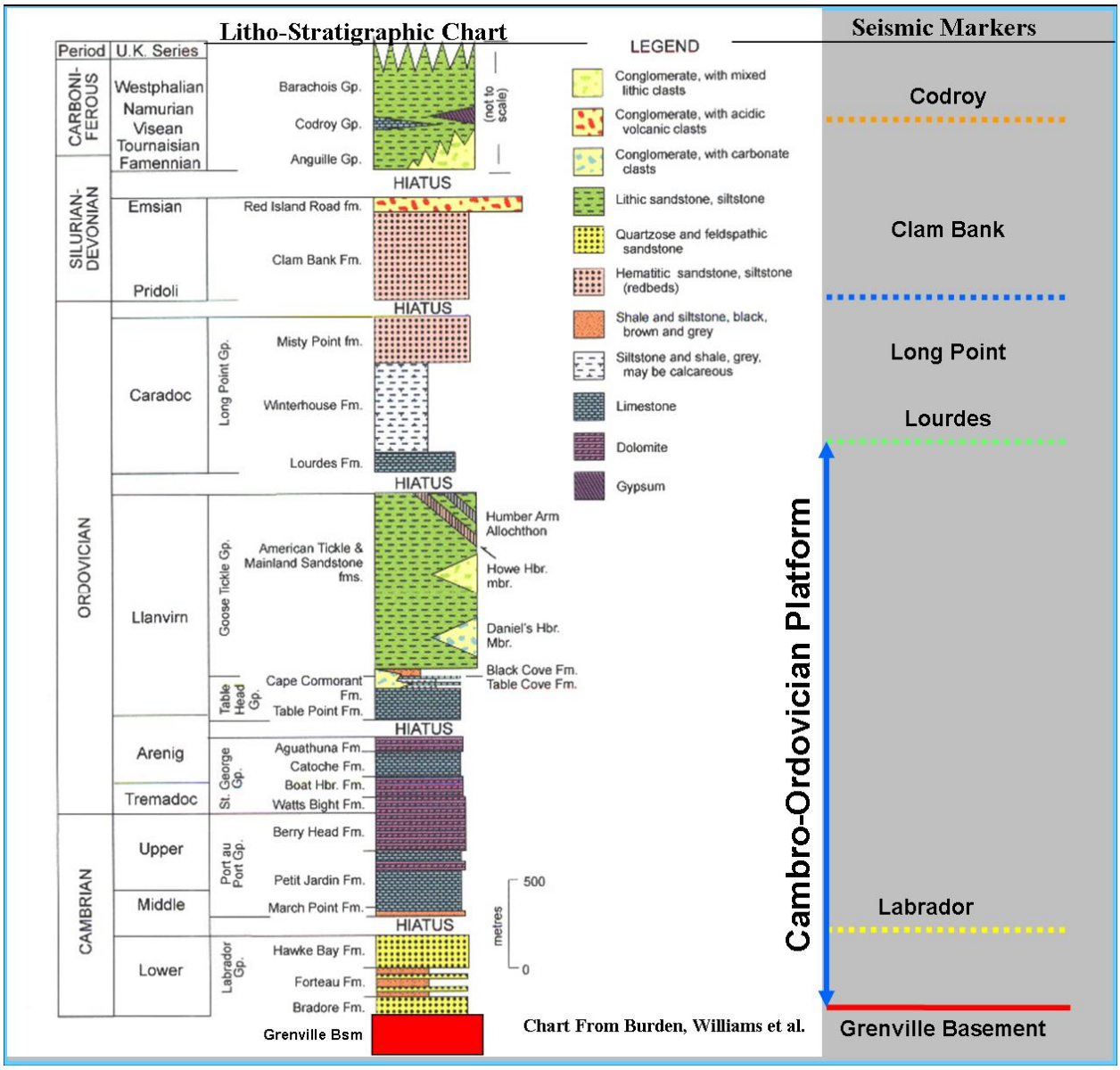

Figure 25. General stratigraphic/lithologic chart of the Anticosti Basin (after Burden and Williams et al.) including main seismic markers interpreted on the representative seismic sections 1502 and 1564.

The parcel is entirely located within the Anticosti Basin (foreland of the Appalachian Foldbelt). As shown by all seismic lines in the parcel, the basin has the general aspect of a monocline, dipping and thickening toward the southeast, being interrupted by thick-skinned normal faults

which affect the platform and the Grenville basement. Deformation of the overlying Silurian and Carboniferous layers in the upper basin fill is minimal; however several major faults may penetrate these sequences (Figures 15, 16, 27 and 28). Small strike-slip or reverse displacement is observed on some faults, but the main hydrocarbon play in the basin is set by rotation of blocks due to movement on deep penetrating normal faults.

Using the available seismic grid, two play fairways can be interpreted within the Cambro-Ordovician of Parcel 1:

1.) ***the Stacked Thrusts Play*** in the eastern third of the parcel, and
2.) ***the Horst/Rotated Block Play*** in the central and western part of the parcel.

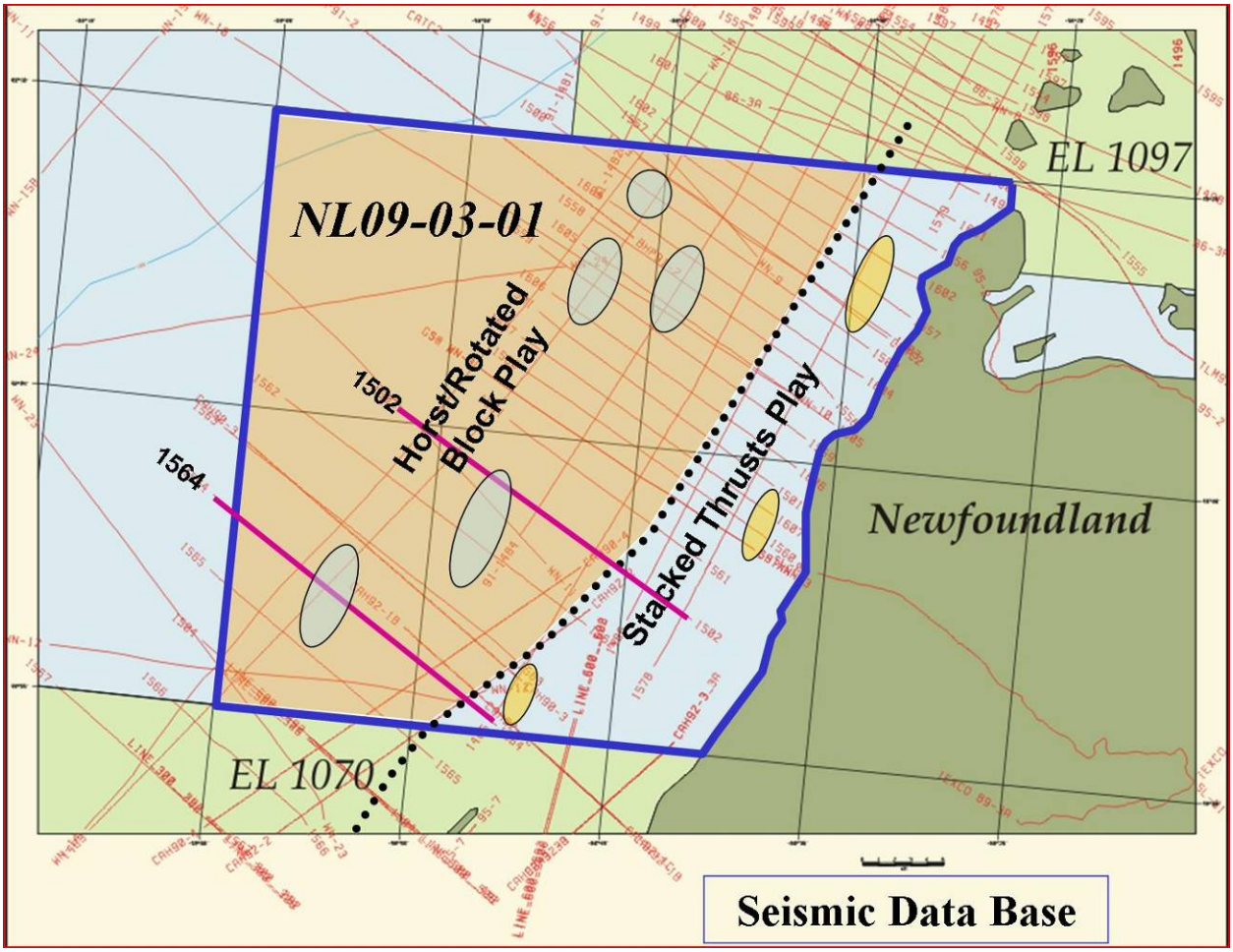

Figure 26. Hydrocarbon Play Fairways in Parcel NL-09-03. Two play trends are represented: the Stacked Thrusts Play trend and the Horst/Rotated Block Play trend. Blue and orange ellipses indicate the schematic locations of several leads identified on the available 2D seismic grid (leads not represented to actual size). Magenta lines indicate seismic lines 1502 (shown in Figure 27) and 1564 (shown in Figure 28).

The boundary between the two fairways approximately follows the coast line (Figure 26). The Horst/Rotated Block play, however, exists further westwards where data coverage is very poor and eastward under the Triangle Zone, under the Stacked Thrusts play. There are locations, where with deeper wells (4 to 5 km), both play trends can be tested.

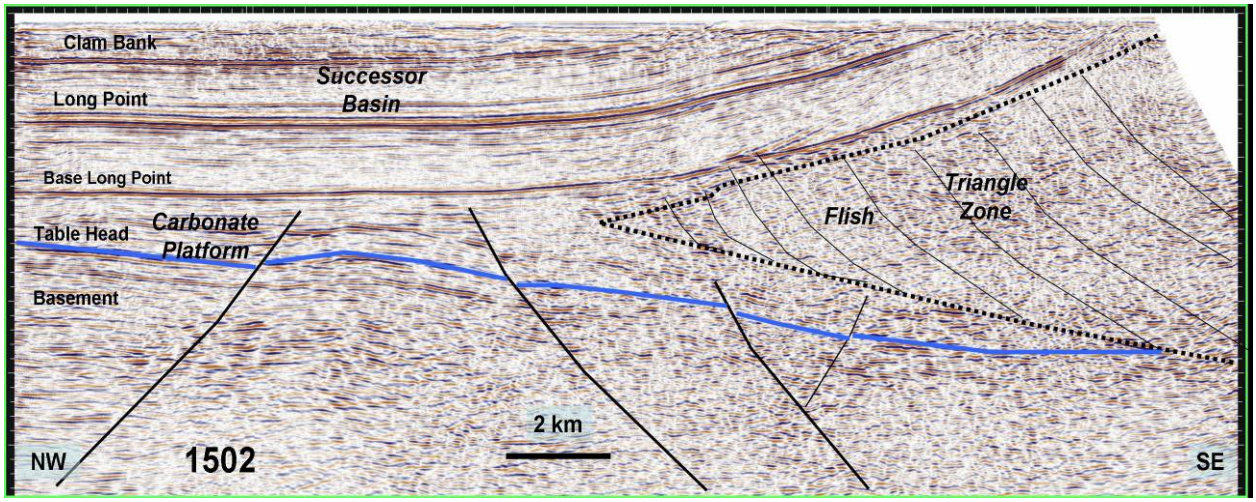

Figure 27. Interpreted dip seismic section 1502 within parcel NL09-03. Note the Carbonate Platform generally deepening toward south-east and affected by normal faults and the Triangle Zone formed by numerous stacked thrusts of Lower Paleozoic beds (seismic line courtesy of C-NLOPB).

Seismic Line 1502. This dip line oriented NW-SE is located over the foredeep and the Triangle Zone of the Appalachian Foldbelt (Figure 27; location shown in Figure 26). The prerift basement and the Carbonate Platform deepens southeastwards and is segmented by deep-penetrating normal faults. Two major faults with throws larger than 50 m and opposite dips delineate a large horst at the Basement and Carbonate Platform levels. This may constitute a viable, large structural trap if closure can be proven by intersecting strike lines. The potential reservoirs within the Cambro-Ordovician including the proven St George's Group can be tested with a 2500 to 3500 m deep well, depending on the location and selected target. Other Carbonate Platform targets on this line are rotated blocks closer and immediately under the Triangle Zone. The Long Point and Clam Banks sequences are unconformably overlying these targets. While parallel bedding characterize these units, stratigraphic trapping possibilities can be observed at some location on this and other dip and strike oriented seismic lines.

Other trapping possibilities are within the thrust sheets forming the large Triangle Zone, where HTD reservoir and source rocks are present, but where seismic data generally has poor quality. Data processing to pre-stack depth migration and new acquired data may be needed to better delineate this play which has the advantage of being reachable from land based drilling locations.

Seismic Line 1564. This is also a dip line oriented NW-SE located over the foredeep and the Triangle Zone of the Appalachian Foldbelt, in the southern portion of the parcel (Figure 28, location shown in Figure 26). While the prerift Basement and the Carbonate Platform generally deepen toward the southeast, several deep penetrating normal faults segment this sequence. Faults usually terminate at the pre-Long Point Group Unconformity that is a high quality reflector. The post-Long Point sequence of the Successor Late Ordovician-Silurian basin is formed by parallel, almost horizontal reflectors within the basin, generally following the Carbonate Platform structure. To the east, the Late Ordovician-Silurian groups are slightly curving upward, pushed by the stacked thrusts of the Triangle Zone, and outcrop at the water bottom (Figures 27 and 28). Certain litho-stratigraphic configurations, may allow the formation of stratigraphic traps in the Long Point and Clam Bank groups. These can be identified using the high quality seismic data over the interval.

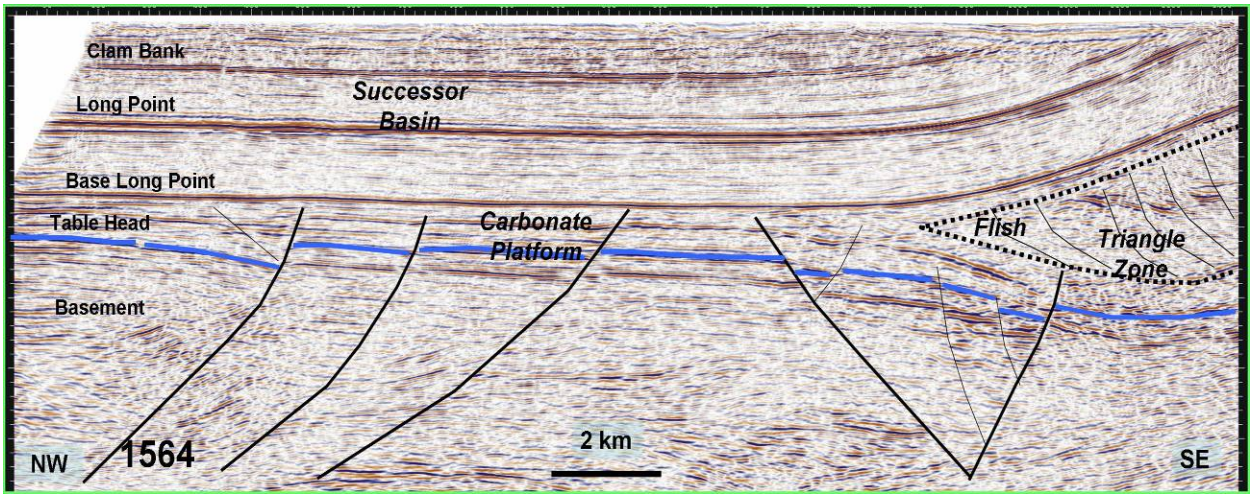

Figure 28. Interpreted dip seismic section 1564 within parcel NL09-03. The Carbonate Platform deepens toward south-east segmented by normal faults. The Triangle Zone formed by numerous stacked thrusts of Lower Paleozoic beds is wedged between the Carbonate Platform and the Successor Basin sequences (seismic line courtesy of C-NLOPB).

Yet again, two major faults with throws larger than 80 m and opposite dips delineate a large horst at the basement and Carbonate Platform levels. This may form a large fault bounded structural trap in the Cambro-Ordovician, sealed by Long Point shales that can be tested with a 2500 to 3500 m drillhole. Other Carbonate Platform targets are rotated blocks visible on both sides of the large horst or situated closer and immediately under the Triangle Zone overthrust wedge. Trapping possibilities also exist within the thrust sheets forming the Triangle Zone, where HTD reservoir and source rocks should be present. Seismic data quality on this line allows the mapping of individual thrusts sheets. However pre-stack depth migration and new acquired data is needed to better delineate Triangle Zone traps.

The depth to the top of the Carbonate Platform in the parcel varies from 2 km in the northwest to about 4 km in the southeast. The main hydrocarbon play is structural involving porous Lower Paleozoic carbonates, dolomites or sandstones (Goose Tickle Sandstones/Limestone, Aguathuna Formation, Watts Bight, Catoche Dolomite and various Lower Paleozoic clastics) within large fault bounded highs. A few fault dependent closures that can be mapped within Parcel are capable of holding several hundreds of million of barrels of oil or several tcf of natural gas.

The overlying Silurian-Devonian sandstones provide secondary targets. Mature source rocks can be found in the synrift sequence above the Grenville basement, in the shales and carbonates and within organic shales contained in the flysch and overthrusted sequences of the structural front. Numerous seismic amplitude variations are observed in the Lower – Middle Paleozoic sequences. The variation of seismic amplitude along the Carbonate Platform markers and amplitude anomalies around faults may indicate flow of hydrothermal solutions and dolomitization.

Good seals such as tight sandstones and carbonates, and shales are present in the parcel. The main geological risks on this parcel are the quality of the reservoir and access to sufficient source rock. These risks should be mitigated by the large size of the structural traps identified in this parcel.

5.6. Prospects and Leads

Several large petroleum leads within the Carbonate Platform were initially mapped by Mobil Oil when they held a large land position in the Western Newfoundland offshore, north of the Port au Port Peninsula. A seismic interpretation report and annexed time structural and isochron maps at several horizons of interest for the area including CFB NL09-03, is available from the C-NLOPB Archive and can be inspected and copied for bid evaluation. Mobil relinquished its offshore ELs which included the Parcel 1 in the mid nineties which included the Parcel 1 without developing the leads into prospects and without drilling any of them.

In recent years, Ptarmigan Resources Ltd. of St John's, NL was the representative of the now-expired EL 1069 (2002-2007, extended to 2008 after paying a refundable drilling deposit). According to a news release, Ptarmigan specialists mapped four prospects within the Ordovician Carbonate Platform in the Foreland Basin, and farmed out the drilling to Tekoil in January 2007. In addition to the Foreland Basin setting, Ptarmigan also mapped two prospects in the hanging wall of the regional NNE-SSW main thrust, comprised of the same Ordovician carbonate reservoir systems.

The reservoir engineering firm of Martin & Brusset Associates (MBA), based in Calgary provided Ptarmigan with a risked economic assessment of the mapped prospects. Using a Monte Carlo simulation to statistically model the range of most likely outcomes, MBA identified the key input parameters of acreage, porosity, permeability and assumed net pay, and in modelling the range of possible outcomes, the risked Estimated Ultimate Recovery (EUR) potential of the six combined prospects associated with Ptarmigan's acreage was 67 mmstb (million standard barrels "oil") for the low case, 256 mmstb for the best case (most likely) and 463 mmstb for the high case. Assuming the same reservoir parameters, this translates into 377 bcf to 2.5 tcf unrisked reserves of natural gas. If one lowers the porosity and permeability values, which is the norm for gas reservoirs, the leads can contain even higher resources than introduced above.

A well location, Glori E-67, was selected in the fall of 2008 for drilling onshore-to-offshore to minimum 2,000 m TD, but due to financial problems, Tekoil did not drill this location. A 2008 planned 3D seismic program over some of the prospects and leads was also cancelled. The EL was therefore relinquished as it was not drilled in Period I according to C-NLOPB land tenure regulations. Mapping and evaluating these prospects and leads was beyond the scope of this report. However, Based on the area's oil and gas prospectivity and the existence of large prospects and leads mapped with modern seismic data, the parcel was once again nominated this spring and forms the CFB NL-09-03 Parcel with the bids process to be concluded November 19, 2009.

6. Discussion

Notwithstanding its proximity to the industrially developed regions of central Canada, and to the vast markets of the eastern United States, exploration in the Gulf of St. Lawrence region is still at a very early frontier stage. Numerous oil and gas prospects and leads identified with modern seismic data in this region are still waiting to be explored and drilled. While a relatively good 1990s 2D grid exists over the Newfoundland side of the Anticosti Basin the seismic data needs up-to-date reprocessing. The first dense 2D (exploration 3D) seismic survey was carried out recently in the adjacent northern ELs during the fall of 2008 and is not yet in the public domain, though it is available as speculative data from GSI of Calgary. Eight Exploration Licenses are active offshore Newfoundland, some of them close to surrender if no wells are drilled in the next 1 to 3 years.

The CFB 2009 parcel offered in this landsale is located within Newfoundland's West Coast Paleozoic basins which for the most part have recorded only modest discoveries. However, the recent McCully discovery, in Carboniferous rocks in New Brunswick which may hold about 1 tcf gas in place and the recent Haldimand oil discovery in Quebec provides encouragement. Large gas discoveries in Paleozoic carbonates have also occurred offshore Labrador (Gudrid – 924 bcf recoverable, Hopedale – 105 bcf recoverable), with flow rates of up to 28 mmcfd. Numerous gas discoveries in similar rocks within the USA north-eastern basins and Quebec's St. Lawrence Lowlands recorded in the past decade also provides reason for optimism for a similar strike in Western Newfoundland.

The Parcel NL09-03 is exclusively located in the Anticosti Basin and includes the foredeep and the Triangle Zone of the Appalachian Foldbelt. Call for Bids NL09-03 Parcel 1 is very large when compared with a Gulf of Mexico standard block size (60 times larger) or Grand Banks offerings. The parcel is located in a region with large extensional and compressional traps, known reservoirs, mature source rocks and proven migration paths, but risks are recognized in regard to reservoir quality and continuity and the preservation of traps since Paleozoic time. The parcel contains multiple reservoir targets within Paleozoic carbonate and sandstones reservoirs. These multiple target zones can be tested by drilling relatively shallow offshore wells using jack-ups or semi-submersible rigs (2000-3500 m).

Several prospects have been identified in neighbouring ELs that are ready to drill. A number of large structural leads are seen on the seismic data in the CFB 2009 Parcel 01. Offshore prospects have fully risked recoverable resource estimates of between 100 to 200 million barrels (Atkinson and Wright, 2006) and 1-to 3 tcf. New mapping with reprocessed and newly acquired data may lower the geological risk. The location of prospects in a shallow water environment with less severe climate certainly lowers the economic risk. Western Newfoundland has not seen targeted exploration for natural gas, but a natural gas discovery can be a welcomed event for the Western Newfoundland towns, providing both domestic and export opportunities.

Seismic identification of porosity and gas filled porosity within older carbonate sequences can be challenging but it is occurring in areas such as New York State and the Western Canadian Sedimentary Basin. The geological risk associated with the Paleozoic is considered higher with regard to hydrocarbon migration, oil biodegradation, and lateral seal. However, the risk can also be minimized by regional evaluation, dynamic modelling of the petroleum system, and the use of high quality seismic data, which can allow for the direct detection of porosity and fluid type. At

least two and maximum six, onshore deep wells are planned for 2009-2010 in Western Newfoundland and these will provide additional valuable information for the offshore ELs and Parcel NL09-03.

The cost of an offshore well in the Gulf of St. Lawrence would likely be in the range of Can $20 - $30 million depending on the water depth, depth to the target and distance from shore. Metocean conditions are fair, and the ocean has a one-year ice cover for approximately 3 months (February to early May). Fields can be developed using tie back to shore processing facility, gravity based structures, bottom founded caisson, sub-bottom completion with FPSO (Atkinson and Wright, 2006; Wright, 2007; Klassen, Foote 2008 and 2009; Hicks, 2009a).

The royalty regime is well established and places offshore NL in the middle to upper tier of world's favorable areas for petroleum exploration and production. Canada is one of the countries with the most stable political and financial system and has a long tradition in oil and gas exploration. The Province obtains 36% of the nominal GDP from the oil and gas industry and is actively encouraging exploration of offshore areas and especially Western Newfoundland.

7. Conclusions

One large, offshore parcel located west of the island of Newfoundland, at the approximate latitude of the town of Corner Brook is available for licensing in the C-NLOPB's Call for Bids NL09-03 which closes on November 19, 2009, 4 p.m. NL time.

The parcel contains Cambro-Ordovician Carbonate Platform rocks of the Anticosti foredeep basin and formations of the Appalachian fold and thrust belt. Carbonate sequences of similar age and setting were found to be productive elsewhere in the North American Appalachian trend. Closer to the landsale area, they have also flow-tested oil and gas at the Port au Port #1 discovery well (presently known as Garden Hill Field). The same "Garden Hill" play is viable in parcel NL09-03 together with other favourable structural settings for the carbonate and sandstone reservoirs.

Large fault-bounded blocks such as horsts and tilted blocks, at the Cambrian and Ordovician Carbonate Platform levels provide sizable targets on the offered parcel. The platform sequence is overlain by predominantly clastic sequences of the Long Point and Clam Bank groups which may provide additional reservoir potential. Additional targets may be found within the overthrusted Ordovician sequences, part of the Triangle Zone that forms the easternmost part of Parcel 1.

The recognized source rock for the area is the Green Point shale located within the thrusted sequence. This shale may provide lateral charge to the foreland basin structures and a more direct charge into the thrusted sequences. Other potential source rocks such as the autochthonous Cape Cormorant/Black Cove and the McCasty shales are likely to be present in the foreland basin. Both source and reservoir rocks may exist within the synrift sequences present under the Cambro-Ordovician Carbonate Platform.

Good quality and relatively dense 2D seismic coverage is available in the parcel to image and map hydrocarbon traps within the platform and overthrust. Using the existing seismic grid, four large leads were mapped on the platform and two leads were contoured in the Deformation Front, by the previous acreage owners. Others leads were identified, but due to incomplete coverage could not be evaluated. These leads are located in water depth varying between 90 m and the coastline. Several leads are located at distances of 20 to 10 km from the shore line. Other leads are situated very close to the coastline.

The approximately half dozen leads located in Parcel NL09-03 are situated in a practically unexplored basin, but close to NE American and Canadian markets. The recognized risks in regard to reservoir quality and source rock are mitigated by the presence of very large undrilled features. The presence of an 80 square km (as exposed on land) exhumed oilfield on trend at Port au Choix with paleo-pay thicknesses of up to 100 m demonstrates the presence of a significant petroleum system that was likely charged from the east. Seismic data indicates that these same rocks are preserved at depth in large rotated fault blocks within the foreland basin. Drilling thus far both onshore and offshore has only occurred within the more disturbed rocks of the thrust belt while the essentially undisturbed rocks of the foreland basin have never been drilled offshore Western Newfoundland.

The request for bids parcel constitutes a very large exploration block situated in shallow water suitable for jack up rigs and in an area were drilling can be performed year-round. Some drilling can be performed with deviated wells from land based locations.

The estimated sizes of unrisked reserves (up to half billion barrels of oil or several tcf of natural gas) that may be present in the NL09-03 structural leads strongly encourages the acquisition of this parcel and allocation of funds for new seismic data collection and exploration drilling.

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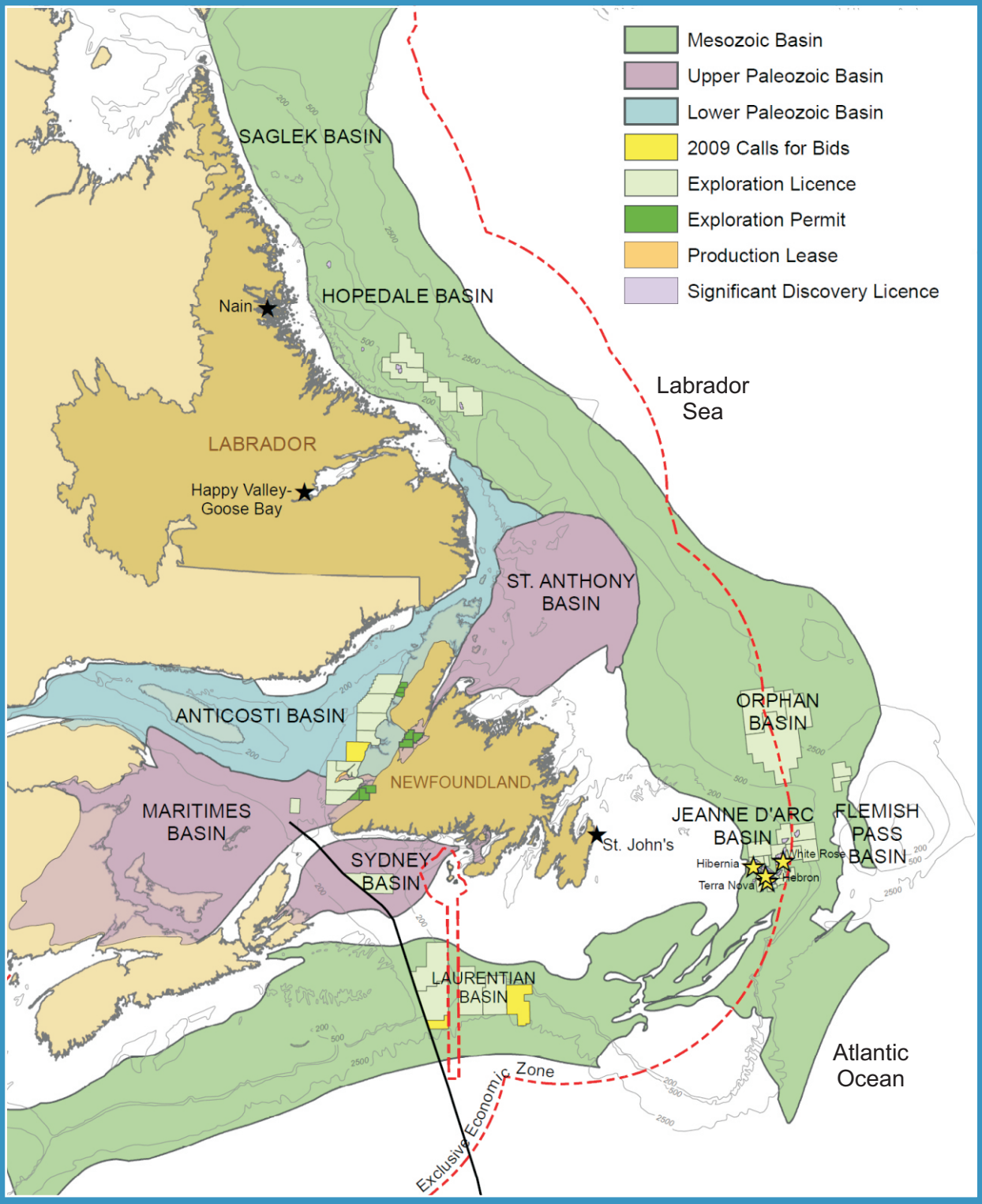

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