Petroleum Exploration Opportunities in Western Newfoundland Offshore and Sydney Basin: CFB NL08-3 and 4

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On Behalf of NLDNR

Newfoundland Labrador

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St John’s, NL

Euxinic Exploration

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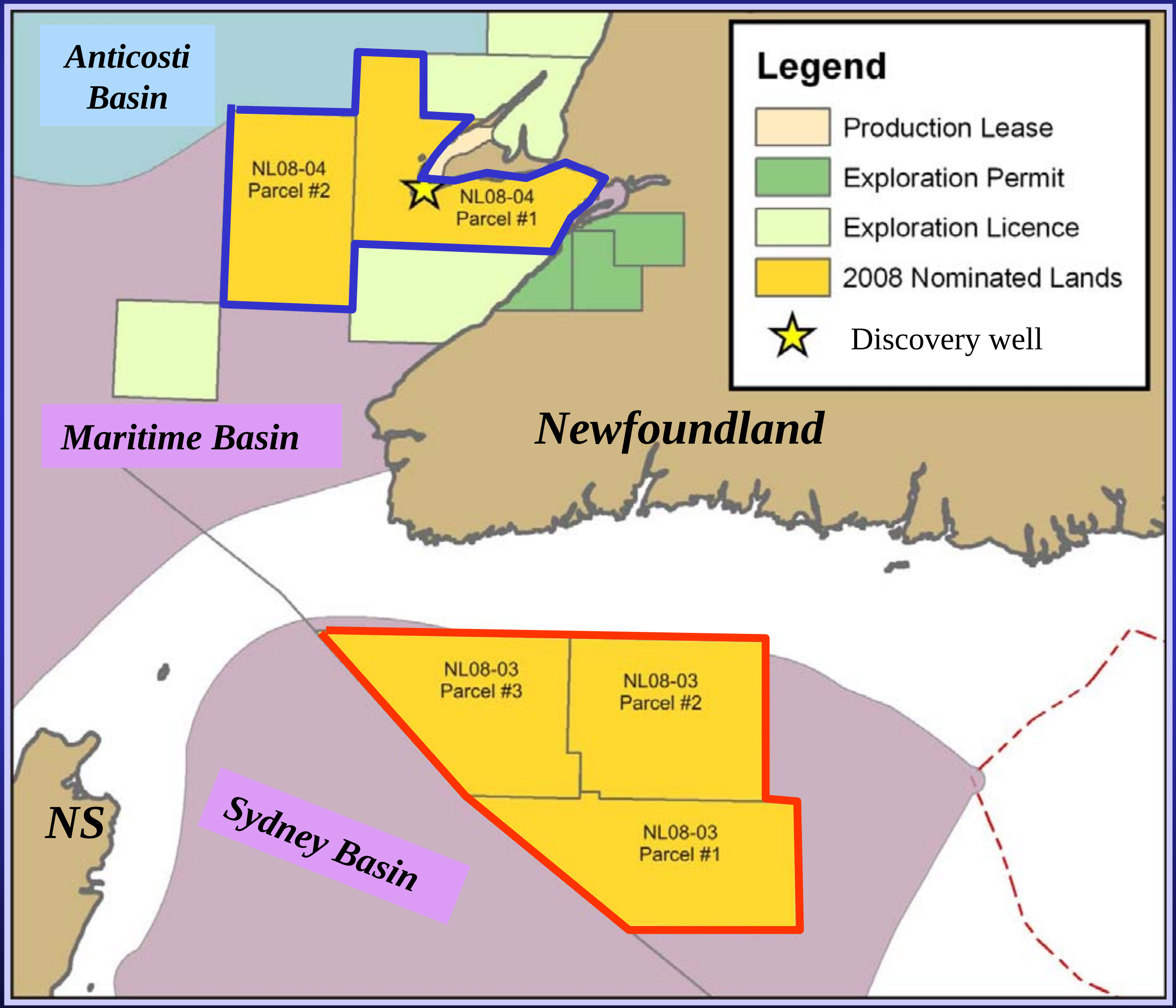
- Regional Geology of Newfoundland's Paleozoic basins
- Petroleum Potential of Call for Bids NL08-3
- Petroleum Geology of the Sydney Basin
- Petroleum Potential of Call for Bids NL08-3 Parcels 1 to 3
- Conclusions

Two Paleozoic basins landsales



- CFB NL08-3 consists of three large parcels.
- CFB NL08-4 consists of 2 large parcels.
- Significant Hydrocarbon potential in the basins.
- Both CFB close 28 November 2008 4 pm NL time.

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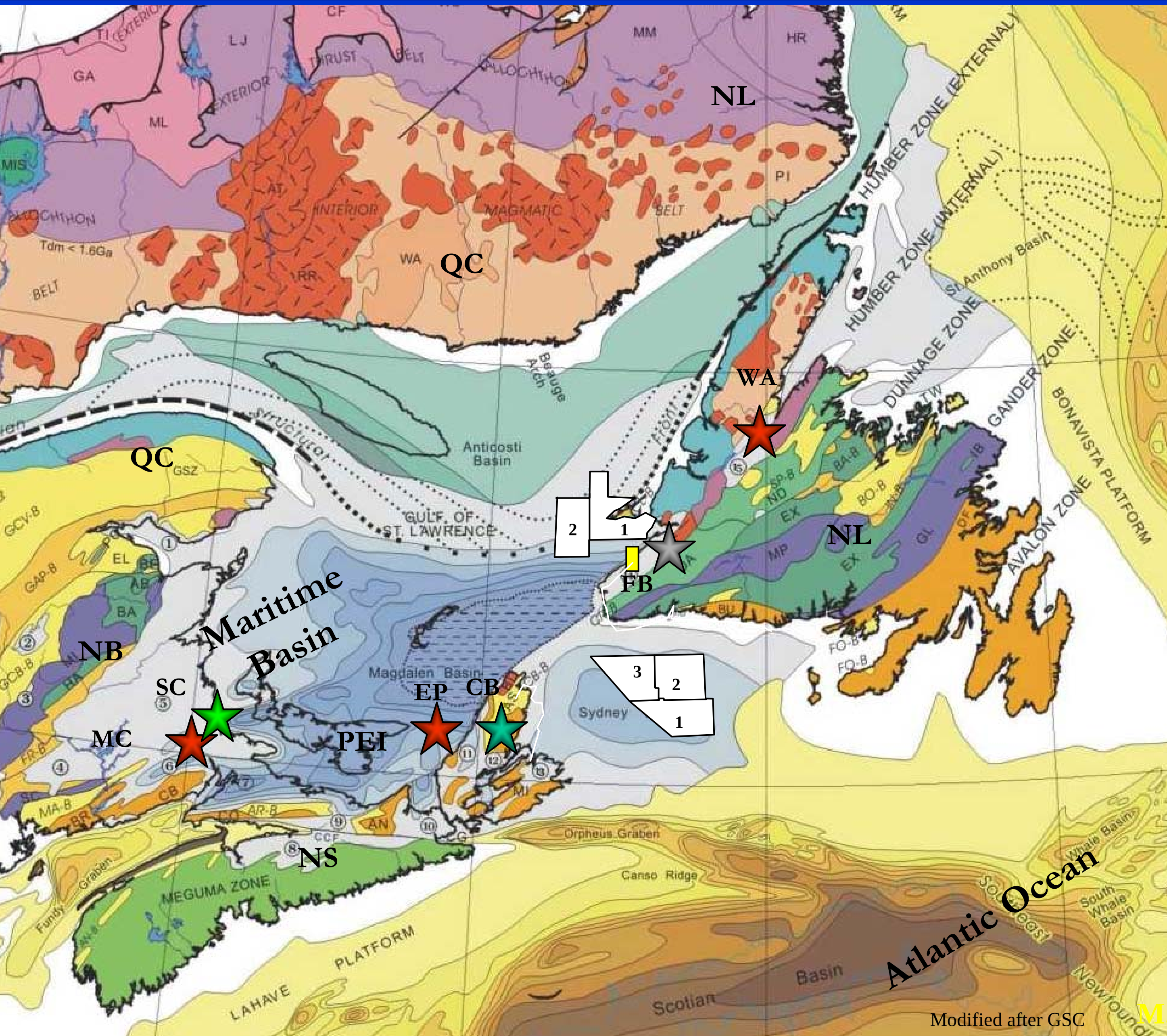
Regional geology map and CFB NL08-3 and 4



Map shows Atlantic Canada's Paleozoic fold belt and associated basins. The Carboniferous hydrocarbon fields MC=McCully, SC=Stoney Creek, discoveries EP=East Point E-49, CP=Cape Breton seeps and shows, coal bed methane; FB=Flat Bay wells that intersected tight oil zone and WA=West Adventure #1 gas flow

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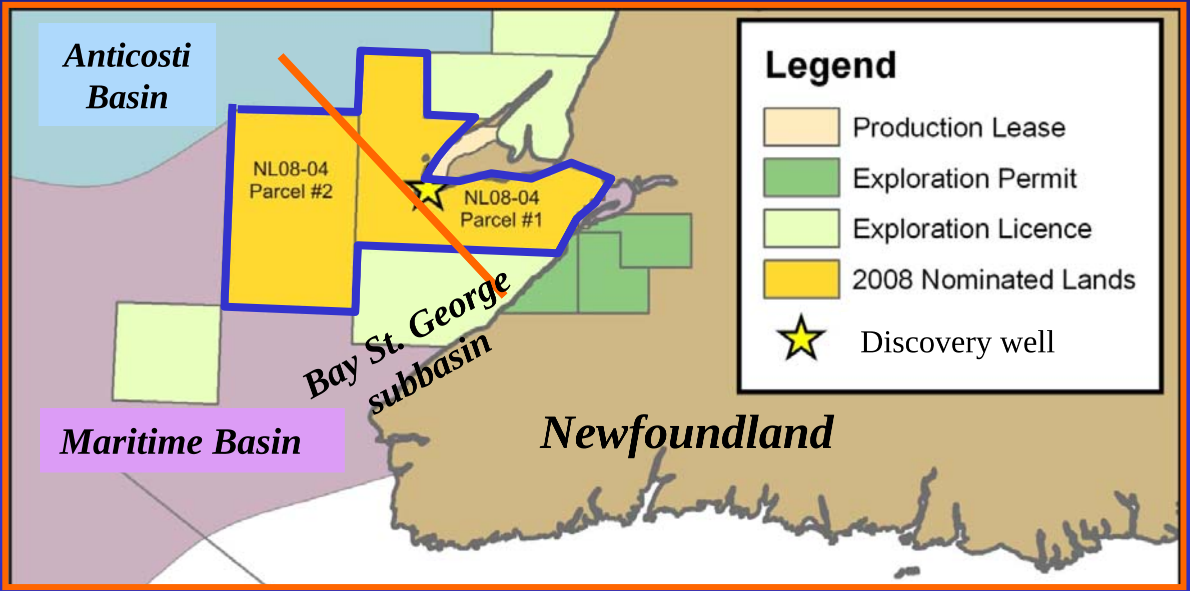
W Newfoundland CFB NL08-4 Parcels 1 and 2



- Part on Anticosti Basin.
- Part on the Appalachian Deformation Belt.
- Most on the Magdalen Basin Salt Diapir Zone.

Exploration Plays:

- Dolomites and ss trapped in rotated blocks on the platform or in the Appalachian Deformation Front.
- Carboniferous ss draped on Salt Diapirs.

Red line shows approx. location of geological cross-section through St. George's Bay A-36 well.

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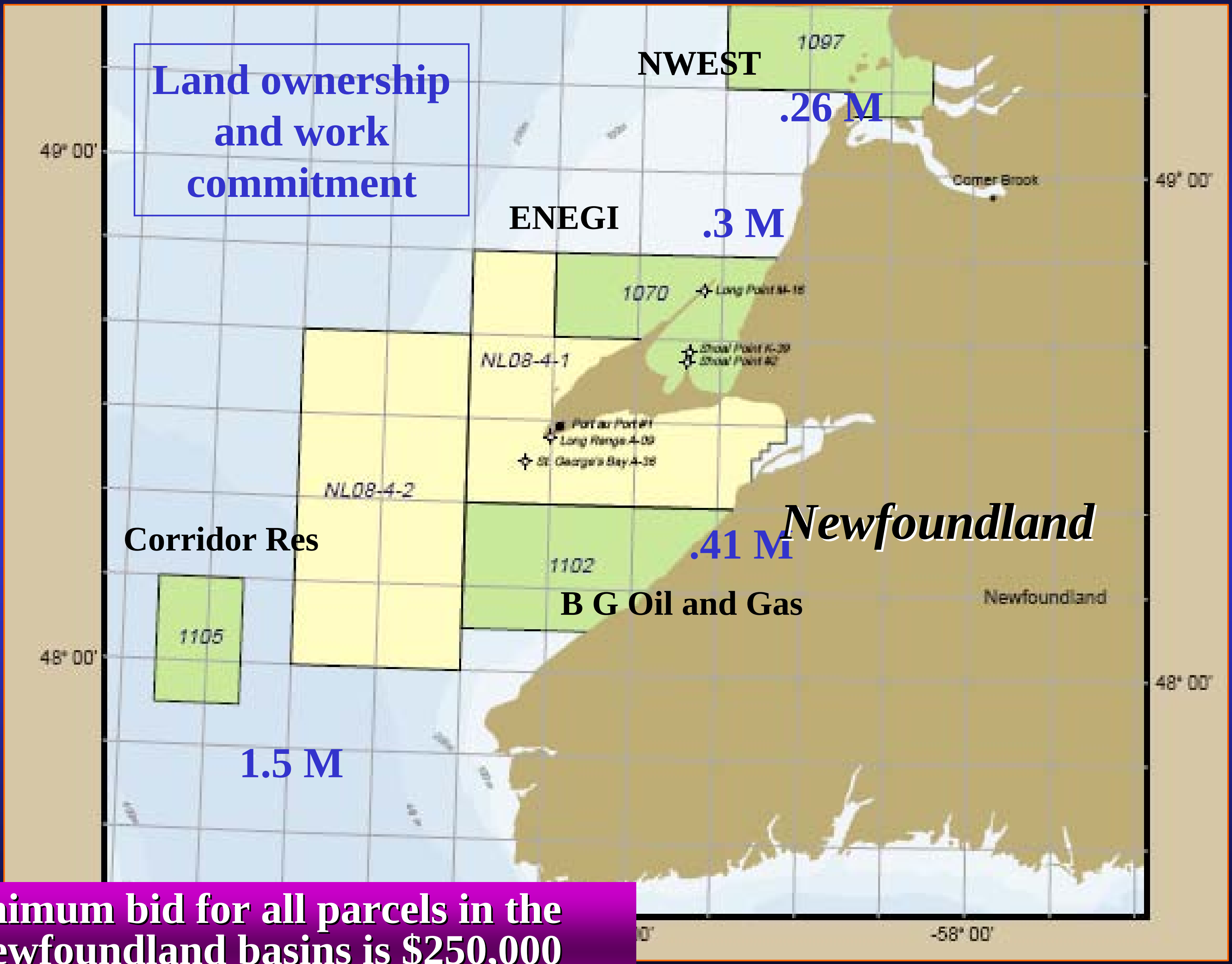
SW Newfoundland Land Situation



The minimum bid for all parcels in the West Newfoundland basins is $250,000 (approximately US $220,000) per parcel.

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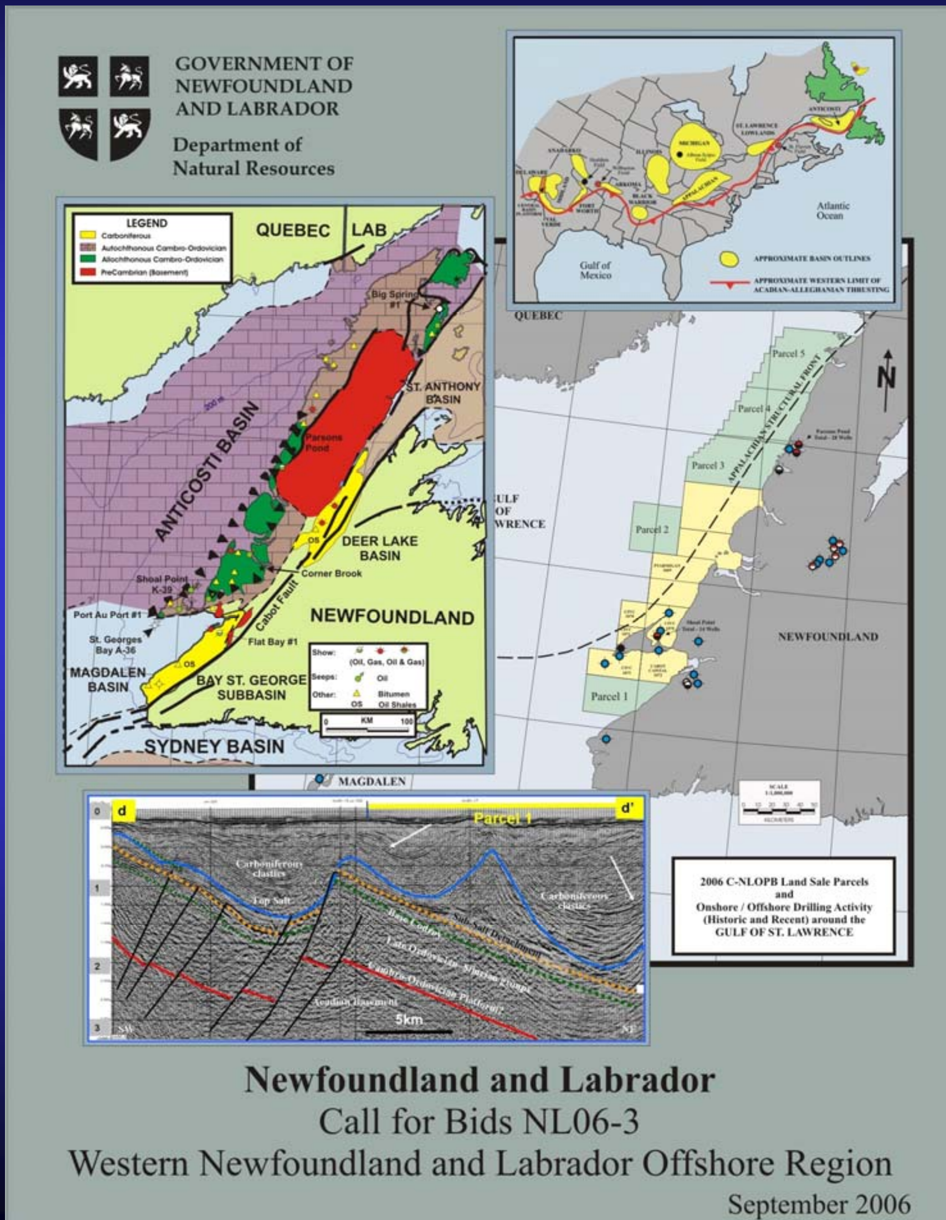
Hydrocarbon Exploration Offshore W Newfoundland



- **An extensive exploration report on the West Newfoundland basins exists on the NL DNR website.**
  - http://www.nr.gov.nl.ca/mines&en/call_for_bids/cfb_nl06-3_%20enachescu_report.pdf
- **This presentation contains only essential elements of the landsale.**

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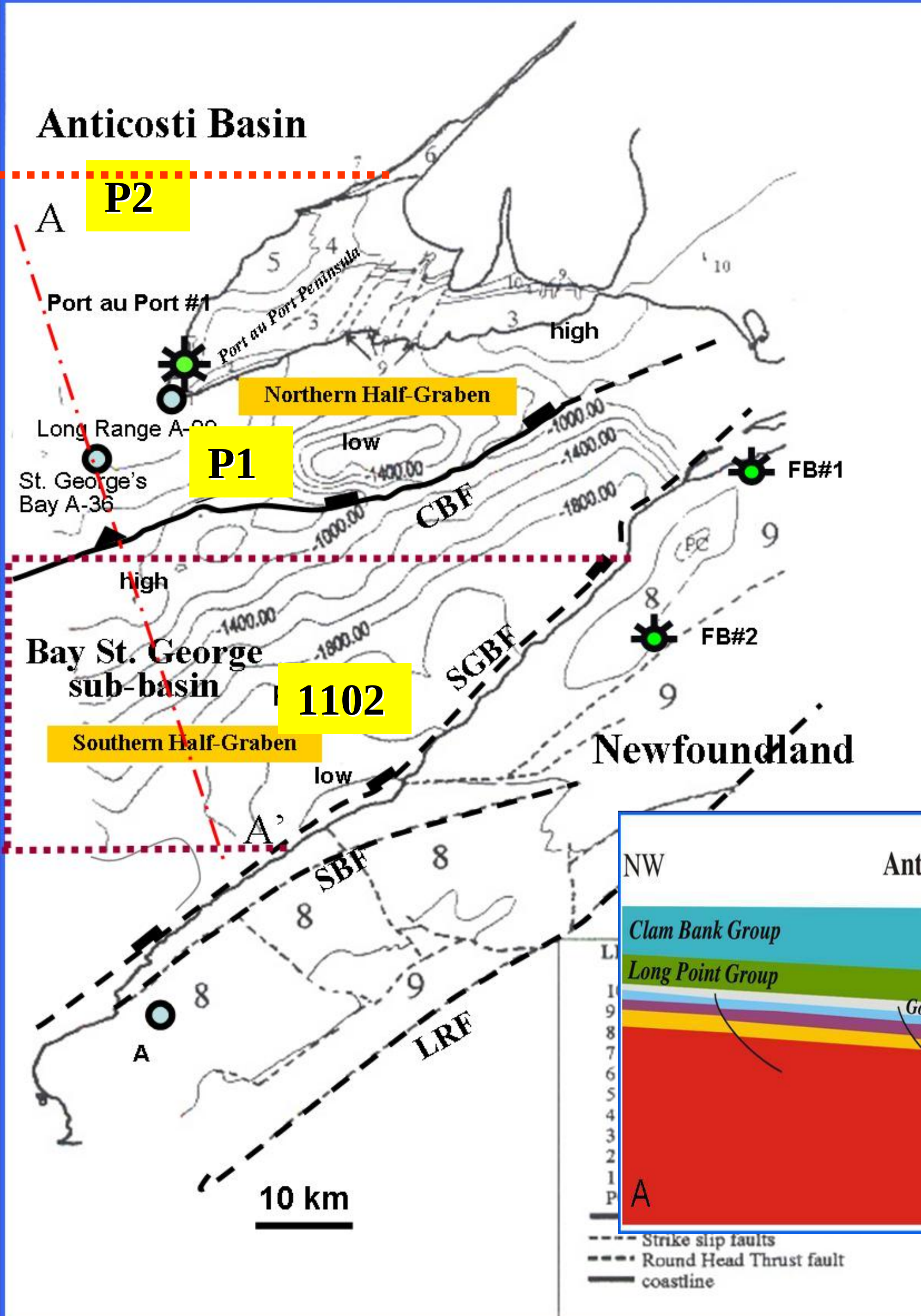
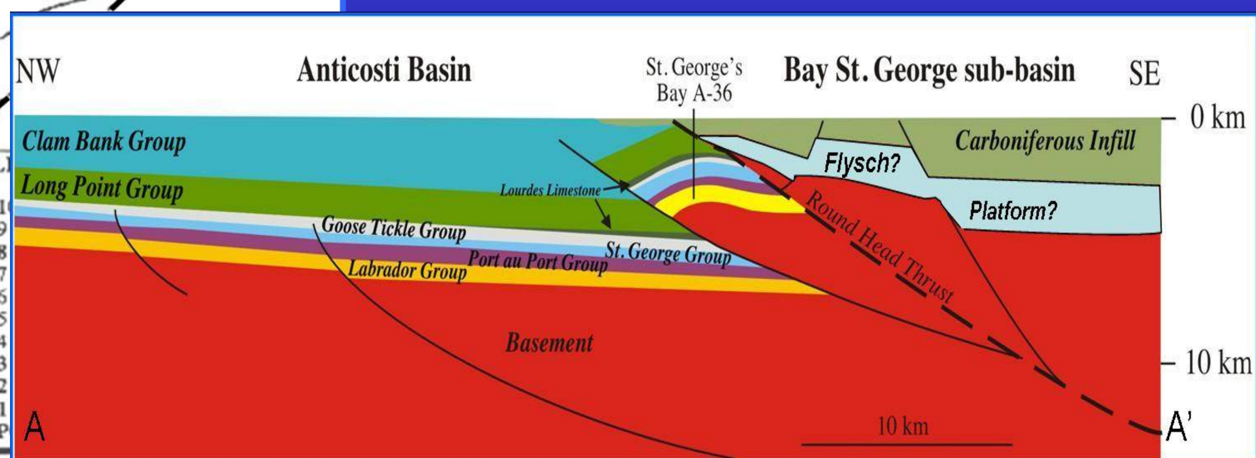


Time structure map (TWT) of the Base Carboniferous (Visean) Unconformity in Bay St. George area showing two distinct half-grabens (modified after Robbins, 2000). EL 1102, Parcels 1 and 2 and A-A' geological cross-section are shown. Abbreviations are FB = Flat Bay wells, FBA = Flat Bay Anticline; A = Anguille H-98 wells; LRF = Long Range Fault, SGBF = St. George Bay Fault, CBF = Central Bay Fault.



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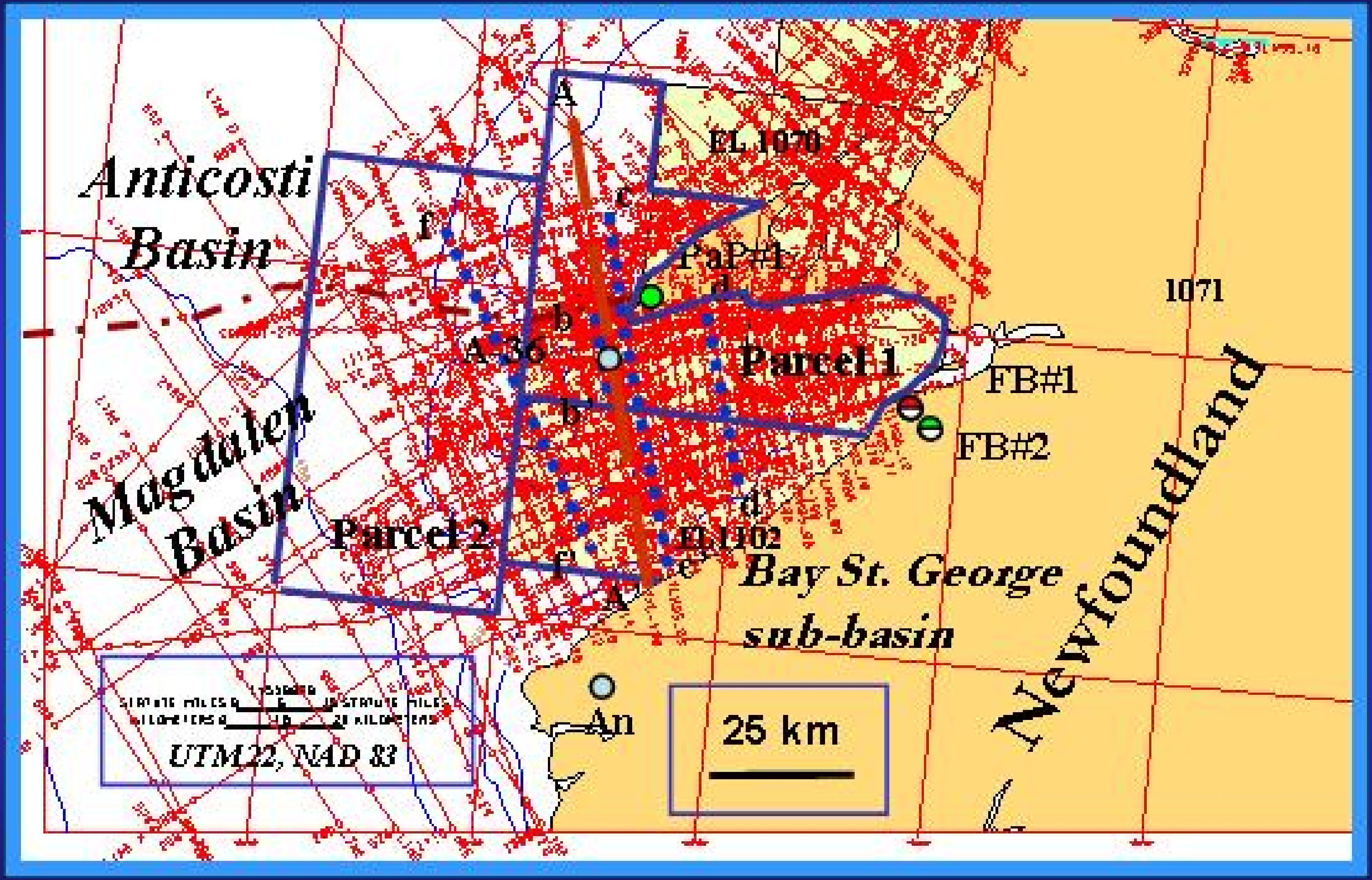
CFB NL08-4 and Seismic Coverage



Map includes the locations of Parcels 1 and 2, significant wells, geological cross-section A-A' and seismic sections b-b', c-c' d-d' and f-f'

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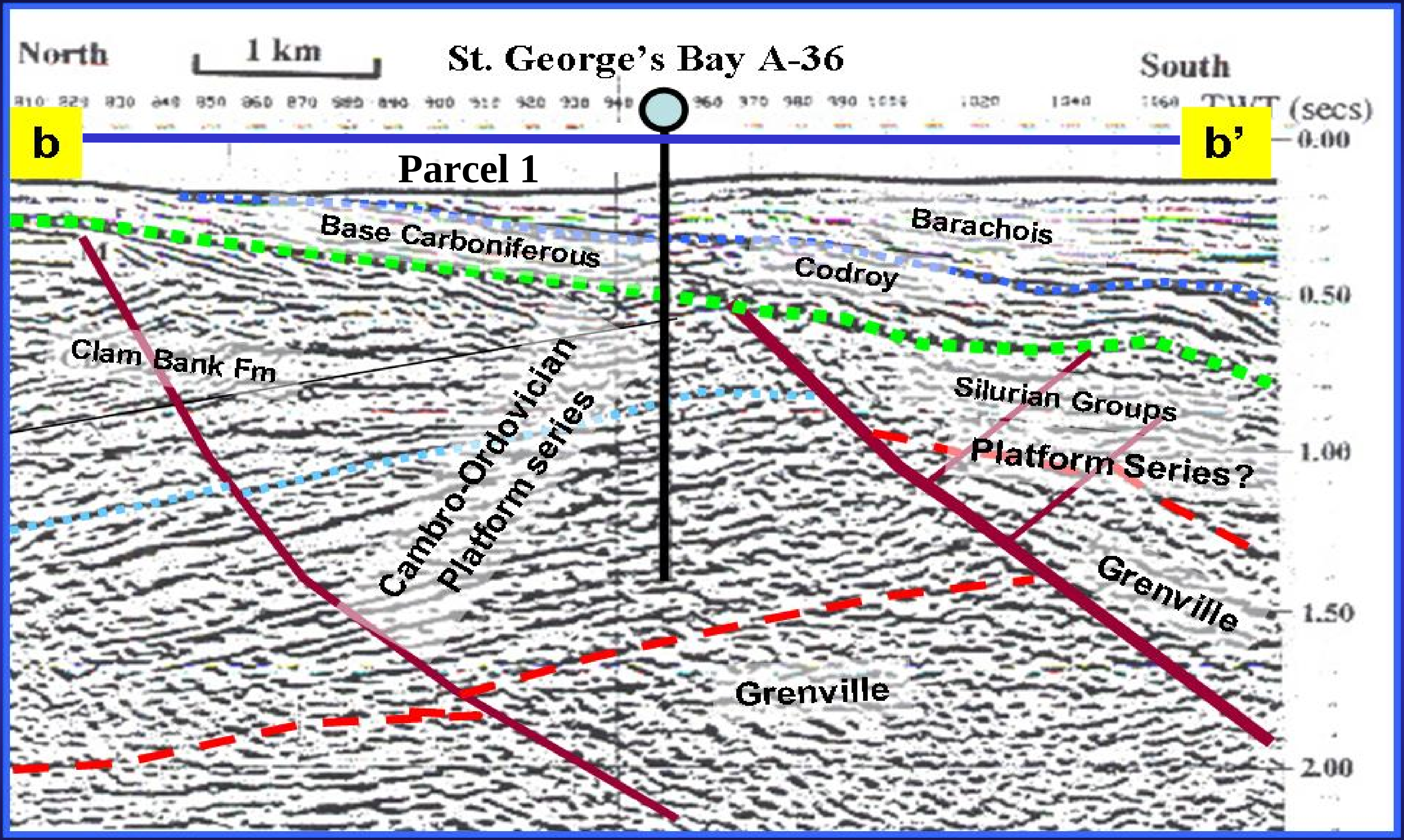
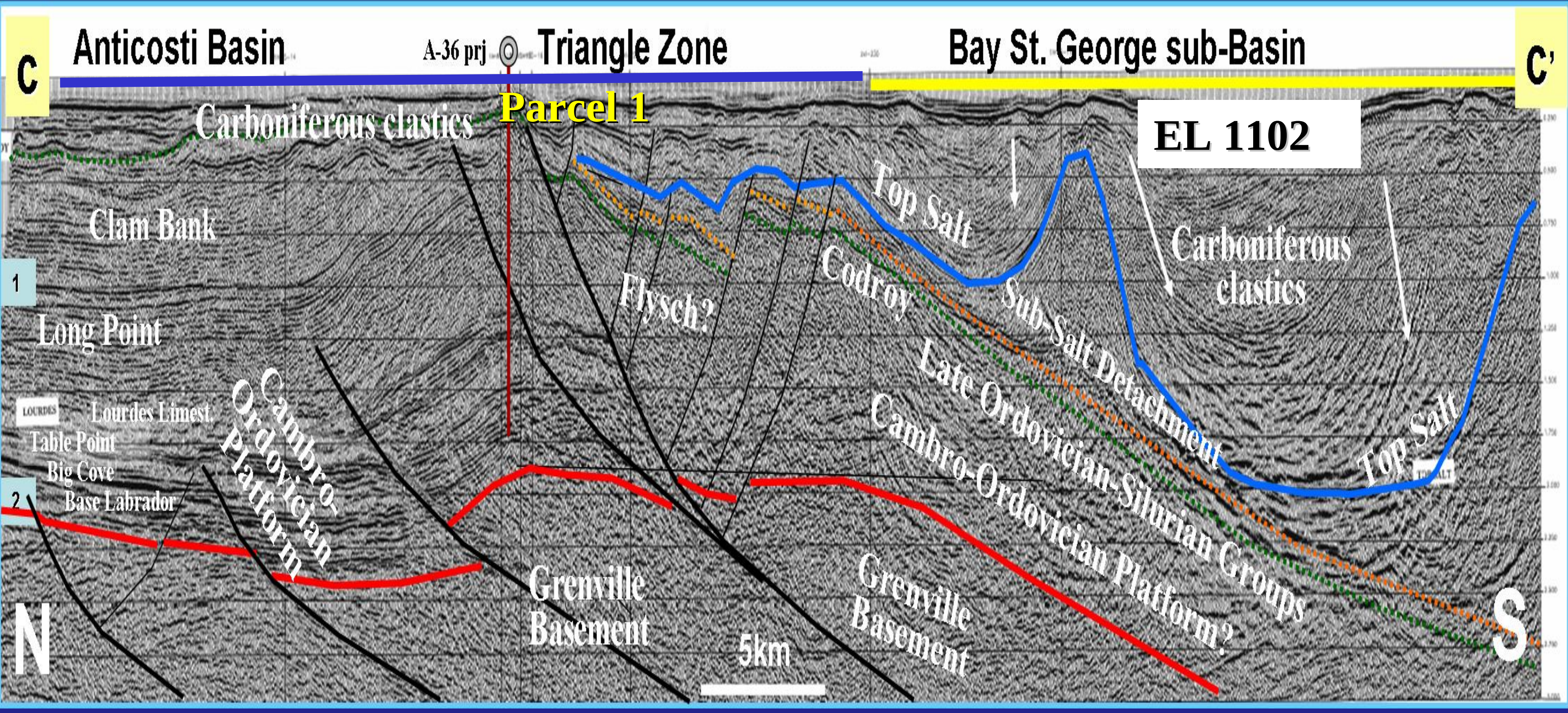
Parcel 1



N-S seismic section b-b' through the Bay St. George sub-basin showing location of St. George Bay A-36 exploration well (modified after Robbins, 2000).

Parcel 1



Seismic line c-c': Carboniferous layers are deformed due to normal and wrench faulting and also due to Codroy (Windsor) Group halokinesis.

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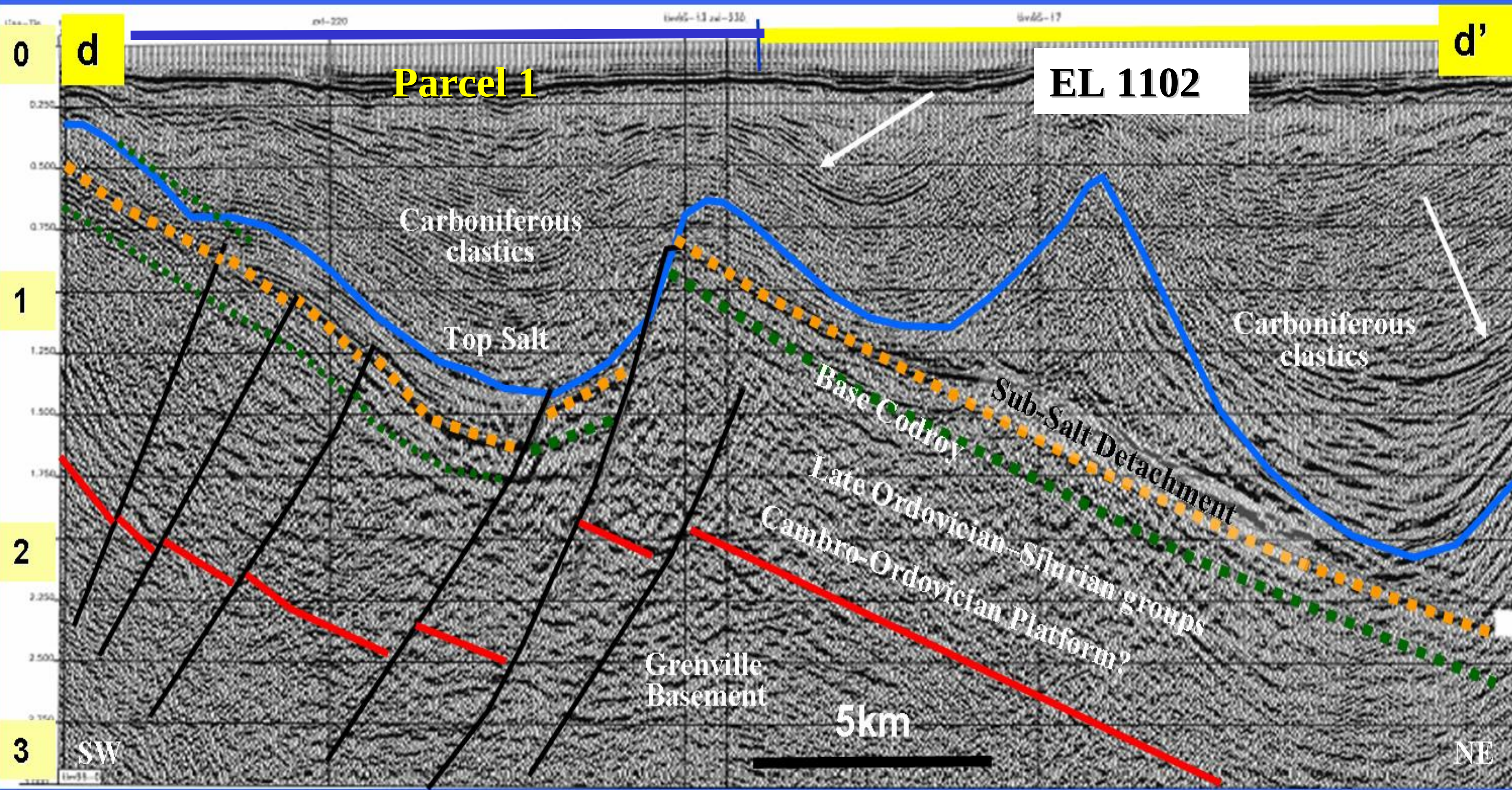
Parcel 1



Seismic line d-d’: Carboniferous layers are deformed due to normal and wrench faulting in Parcel 2 and also due to Codroy (Windsor) Group halokinesis.

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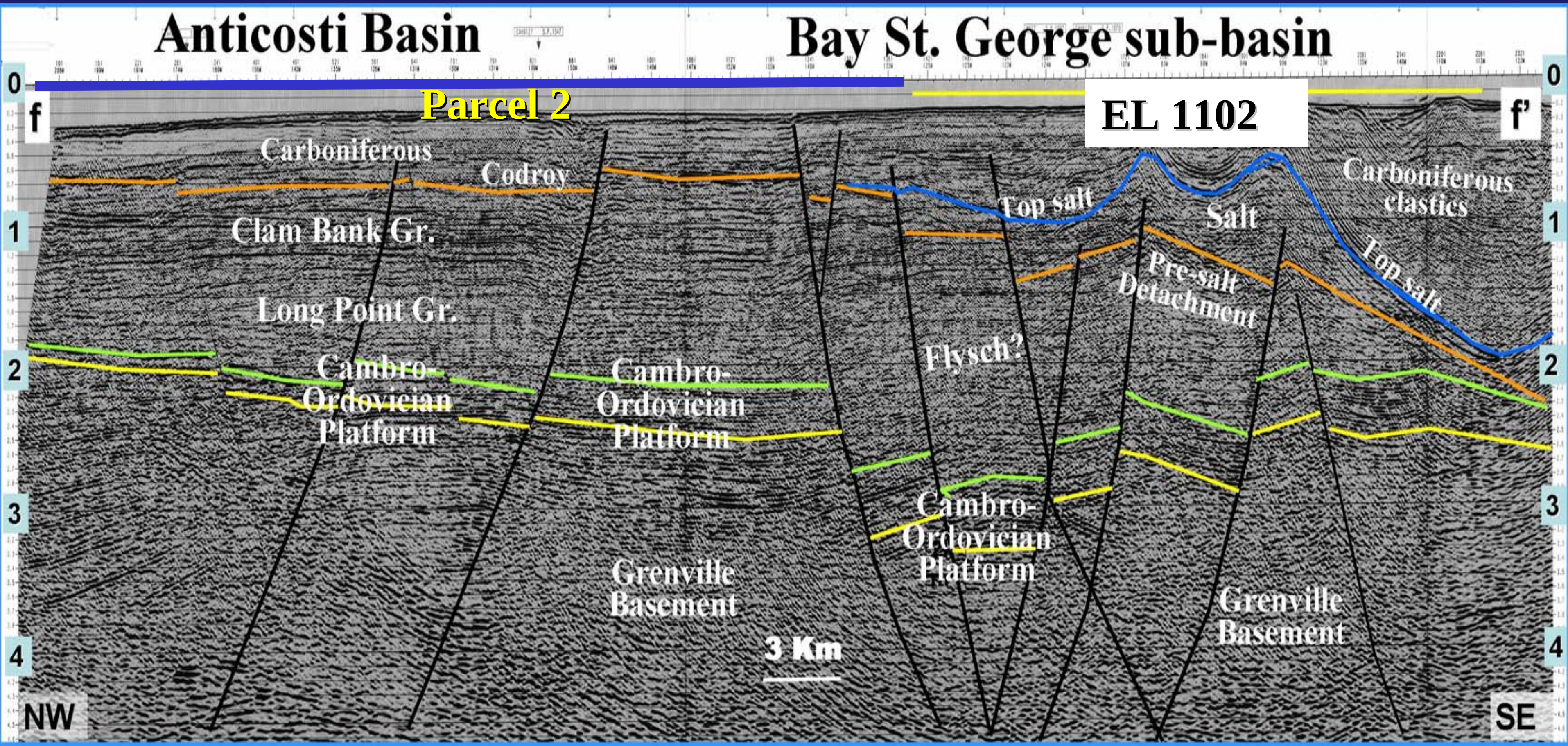
Parcel 2



Seismic line f-f': Carboniferous layers are deformed due to normal and wrench faulting in Parcel 2 and also due to Codroy (Windsor) Group halokinesis in EL 1102.

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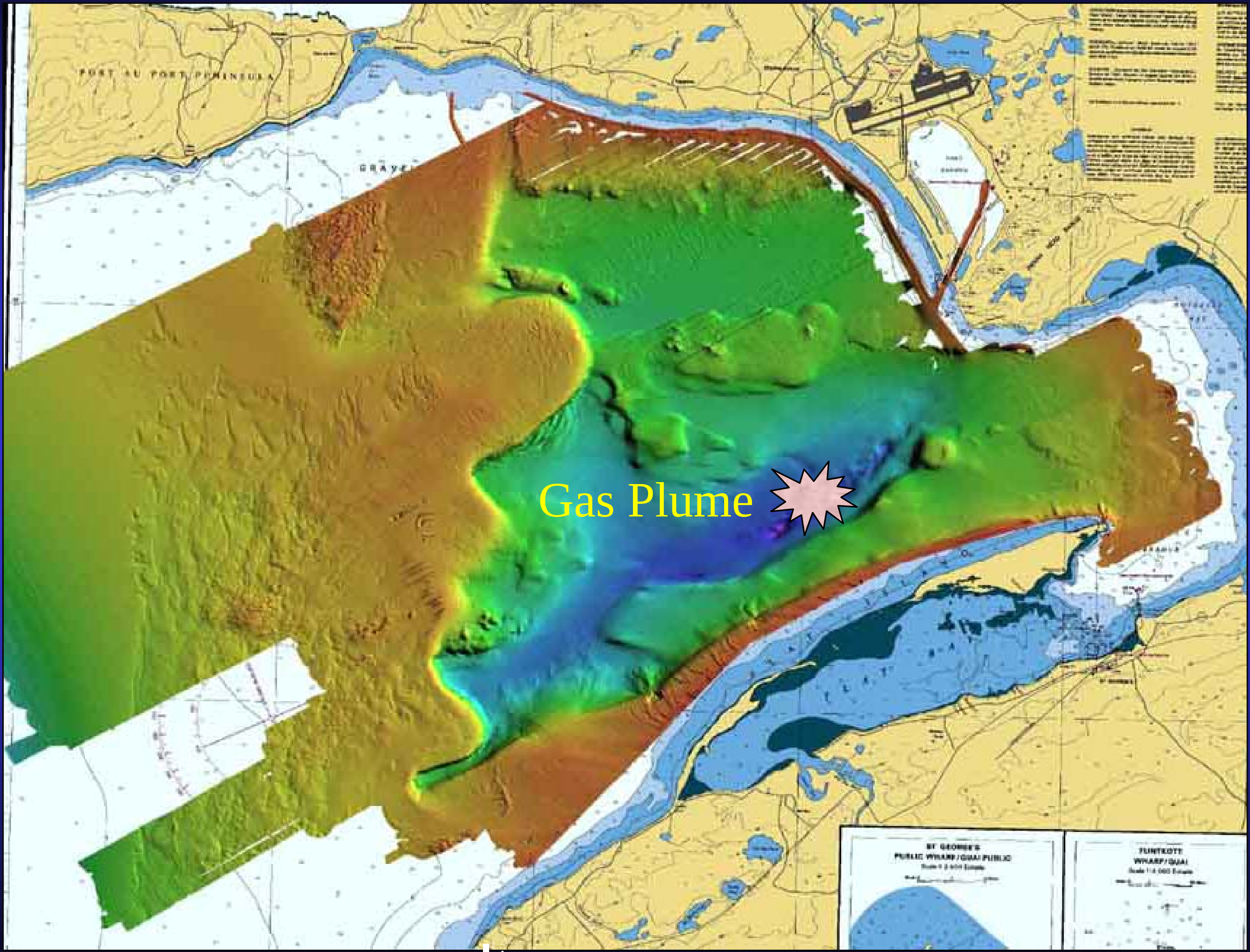
Bay St. George Multibeam study



St. Teresa's

Source: GSC

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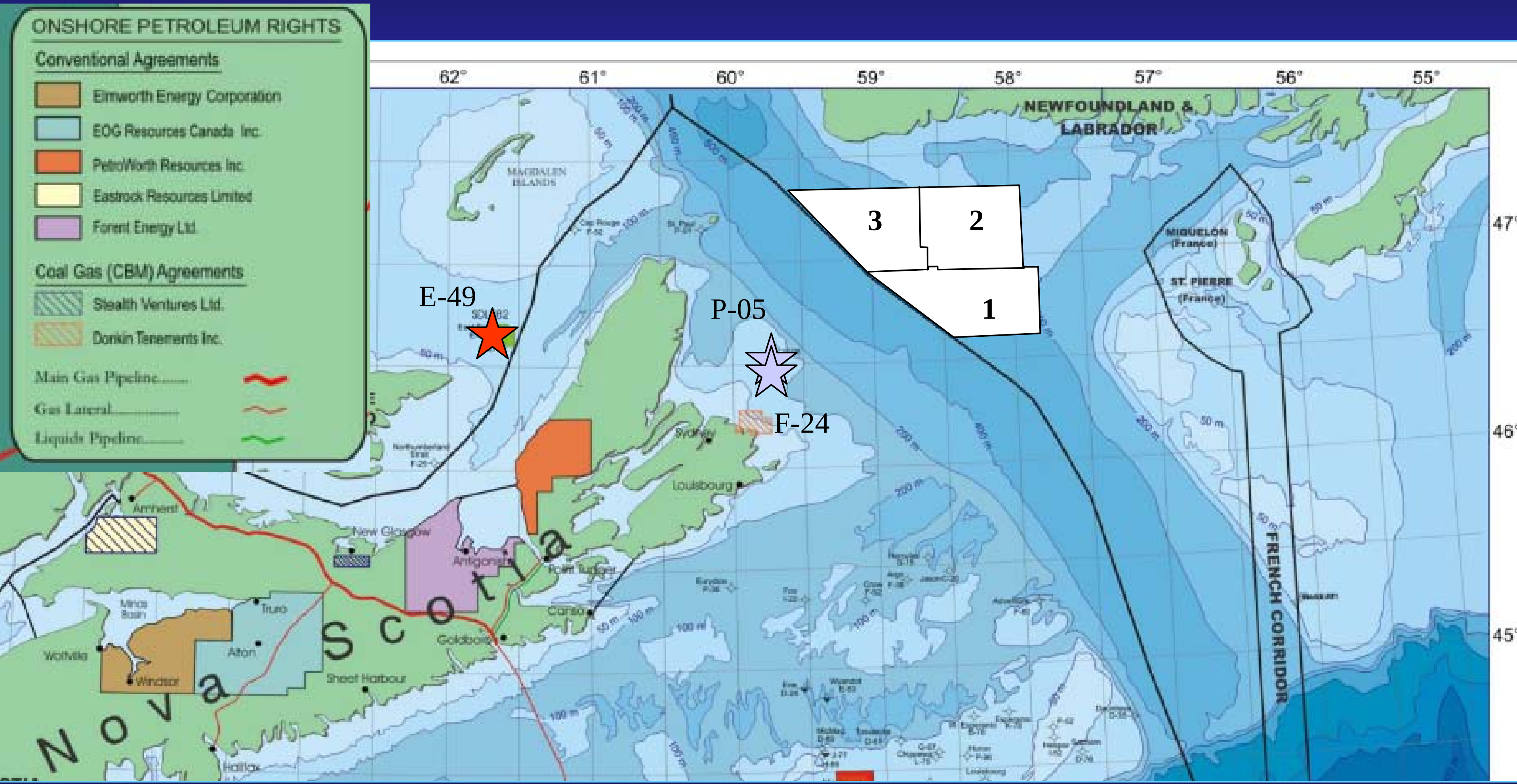
Petroleum System CFB NL08-4
Parcel 1 and 2

- Carboniferous Reservoirs: Albert Fm (Horton Gr, Cumberland Gr, Bradelle and Cable Head ss (Pictou Gr.).
- Carboniferous Source Rocks: Oil source in Albert and Windsor Gr shales and carbonates; Gas source rocks in shales and coal measures.
- Traps: formed in Late Carbon- Early Triassic
  - Salt tectonics, folding and faulting.
- Generation and Migration: Late Carb to Present time.
- Risks: Reservoir cementation, uplift and erosion, trap breaching.

Hydrocarbon Exploration in Sydney Basin



No seismic acquired since late seventies; no current exploration acreage!

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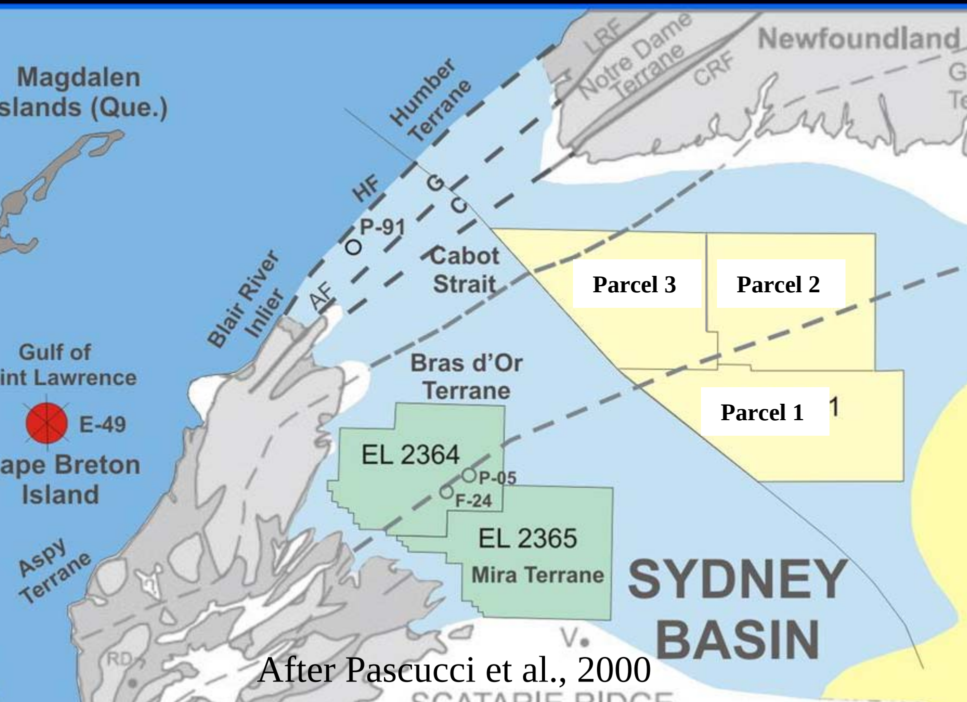

After Pascucci et al., 2000

Sydney Basin is a Carboniferous successor basin situated east of the Cabot Strait in waters shallower than 450 m. The basin covers a large offshore area (35,000 km2) south of the Newfoundland coastline and has a well exposed outcrop belt on Cape Breton Island (NS). The basin extends under the Laurentian Channel and Burin Platform bathymetric features.

The western limit is considered the Hollow Fault (HF). Its eastern limit is not well defined as basin is gradually onlapped by the Mesozoic sediments of the Laurentian Basin. The Hermine E-94 well intersected Carboniferous red beds and Windsor evaporites under Cretaceous sediments. Northward, the basin terminates at the Newfoundland coastline and southward extends onshore into Cape Breton county, while seaward it is bordered by the Proterozoic rocks of the Scatarie Ridge.

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Sydney Basin Discussion

•No production or offshore significant shows exist for Sydney Basin.
•The Sydney Basin encompasses for the most part a large, mostly shallow water, offshore region between Newfoundland and Nova Scotia. Onshore, basin rock exposures are abundant on the east side of Cape Breton Island (Nova Scotia) and to a much lesser extent on the Burin Peninsula (on the south coast of Newfoundland).
•From a logistics perspective the Sydney Basin is less challenging than the Grand Banks and is closer to North American markets, with easy access to export venues. If gas is discovered, it could be tied into the North American grid by a lateral line to the nearby Maritimes & Northeastern Pipeline which delivers Sable Island gas to New England and various Atlantic Canada markets.
•Any significant oil and gas production in the Sydney Basin will also have a rapid and significant impact on the Province's and region's economy.

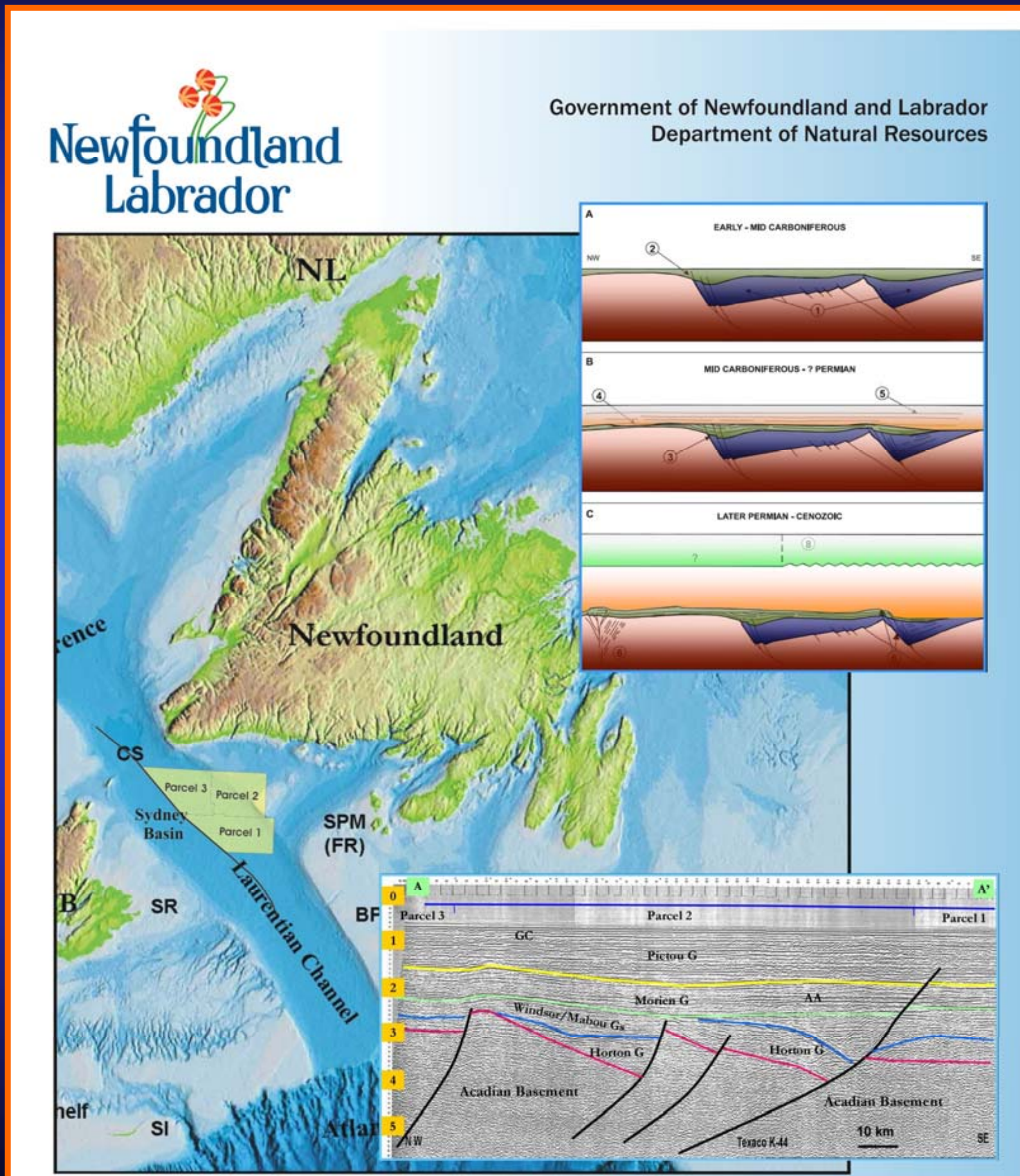
Large Paleozoic Offshore Under Explored Area

- The Sydney Basin is a subdivision of the predominantly Carboniferous Magdalen Basin. Together, the Anticosti and Magdalen basins cover an area the size of the State of New Mexico or about half of the size of the Canadian Province of Alberta.
- The Basin is well exposed on Cape Breton Island but has only minor onshore outcrops on the south coast of Newfoundland. Only two medium depth wells have been drilled on the Nova Scotia side and along with available industry seismic data, provide the fundamental information on the offshore geology of the basin. Due to its rich coal exploration and production history the onshore Nova Scotia part of the Sydney Basin is well known and described in detail in numerous publications.
- The most active phase of exploration within NL's Gulf of St. Lawrence waters took place in the early - mid nineties when several large Exploration Licences were operated by companies such as Hunt Oil, PanCanadian, Talisman, BHP and Mobil. This exploration cycle, which resulted in the drilling of 5 deep wells by the bigger companies and a number of shallower holes by smaller players was focused on Ordovician and Carboniferous rocks of the Anticosti and Deer Lake basins and the Bay St. George sub-basin. No exploration took place at the time within the Sydney Basin.

Large Paleozoic Offshore Under Explored Area

- Although minor oil production was achieved at Parsons Pond in the early 1900s and oil and gas has recently been encountered and tested onshore in the Anticosti Basin, Deer Lake Basin and Bay St. George sub-basin, no oil or gas is currently being commercially produced in western or southern Newfoundland.
- Nevertheless, hydrocarbons were discovered in Carboniferous rocks in other Atlantic Provinces and gas is presently produced and marketed from the McCully gas field in New Brunswick (Moncton sub-basin).
- Significant Carboniferous production is also obtained from the US Appalachian Foldbelt, Illinois Basin, North Sea, the Netherlands, Vienna Basin, Dnieper-Donets Basin, Ural Foldbelt, Timan-Pechora Basin, Barents Sea, Australia and the Middle East. In the eastern North Atlantic region (offshore Ireland), Carboniferous source rocks have charged the Coribb gas field and have produced shows in several other exploration wells. This area was once part of the same intra-continental marine/lacustrine system as the Atlantic Canada basins prior to the breakup of Pangea.

Hydrocarbon Exploration in Sydney Basin



- An extensive exploration report on the Sydney Basin exists on the DNR website.

  http://www.nr.gov.nl.ca/mines&en/call_for_bids/cfb_nl06-2_%20enachescu_report.pdf

- This presentation contains only essential elements of the landsale.

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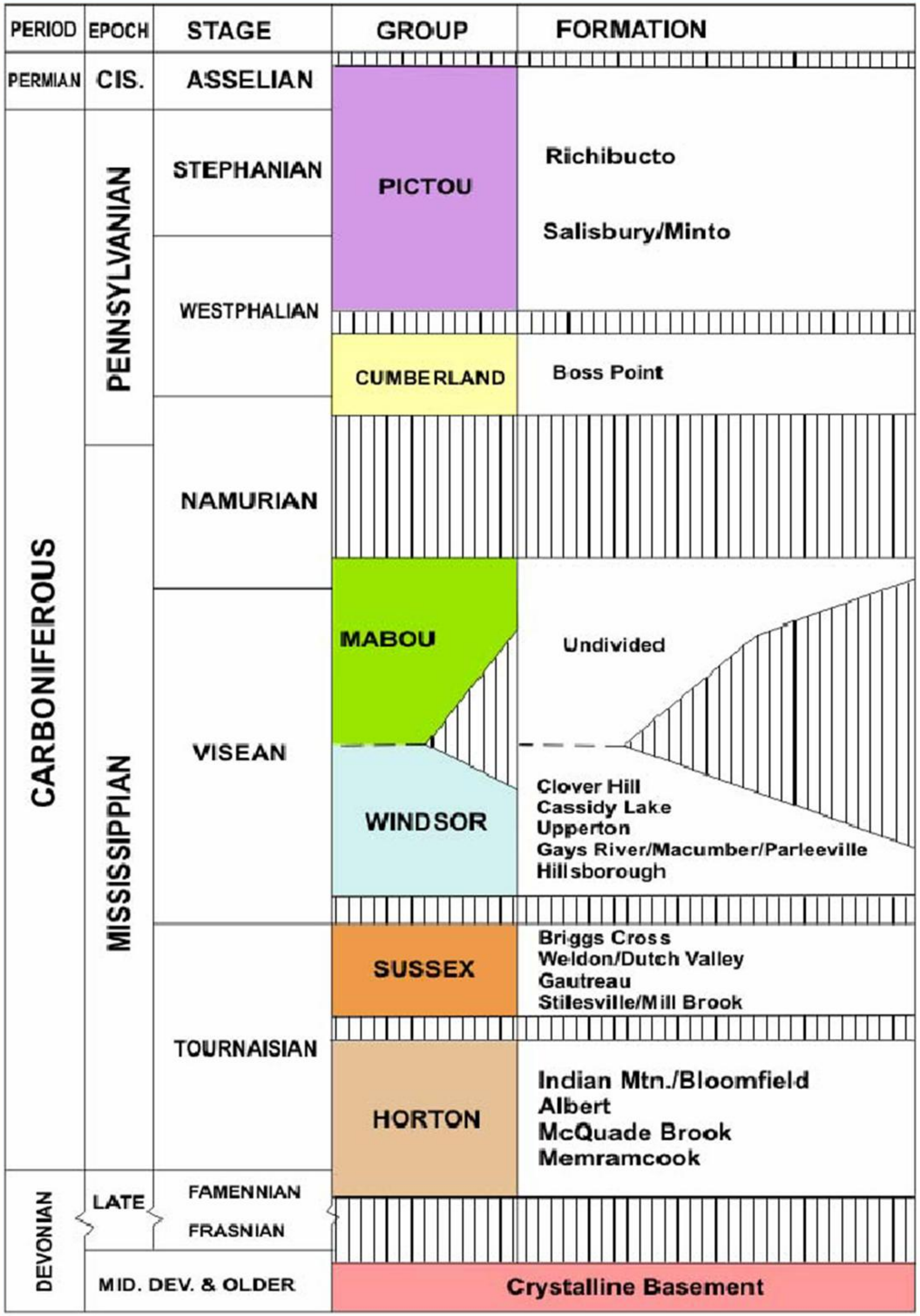

Generalized stratigraphic chart, for the Late Paleozoic onshore sub-basins of New Brunswick including the Carboniferous Stoney Creek oil field and McCully gas field (Fyffe and St. Peter, 2006). With small modifications to recognize localized stratigraphy this chart can be applied to the Carboniferous throughout Atlantic Canada, including Sydney Basin.

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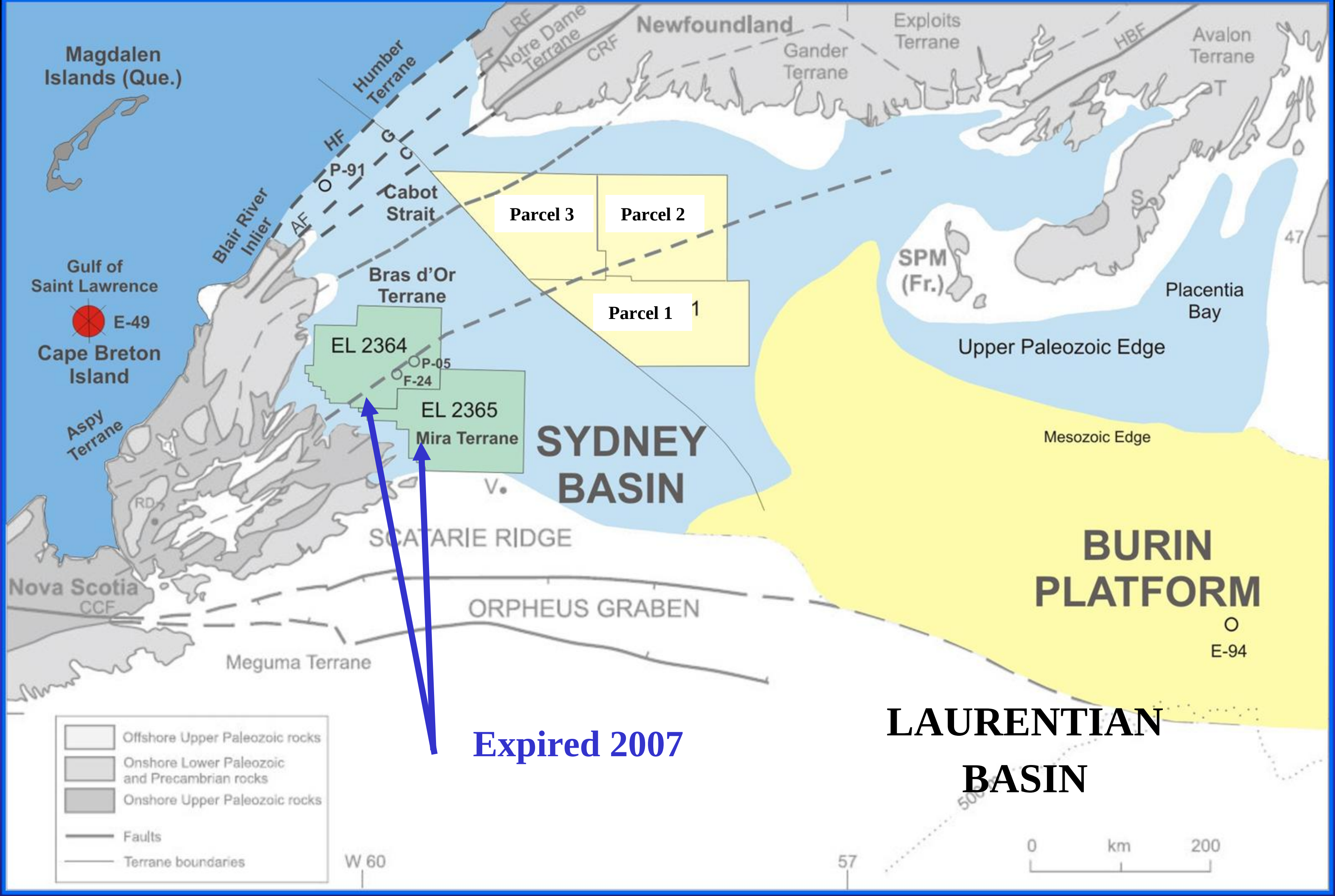

Geological setting of the Sydney Basin and environs (modified after Pascucci et al., 2000), with locations of the North Sydney F-24 and P-05, East Point E-49, St. Paul P-91 and Hermine E-94 wells, expired ELs (Nova Scotia) and CFB NL 08-03 Parcels 1, 2 and 3.

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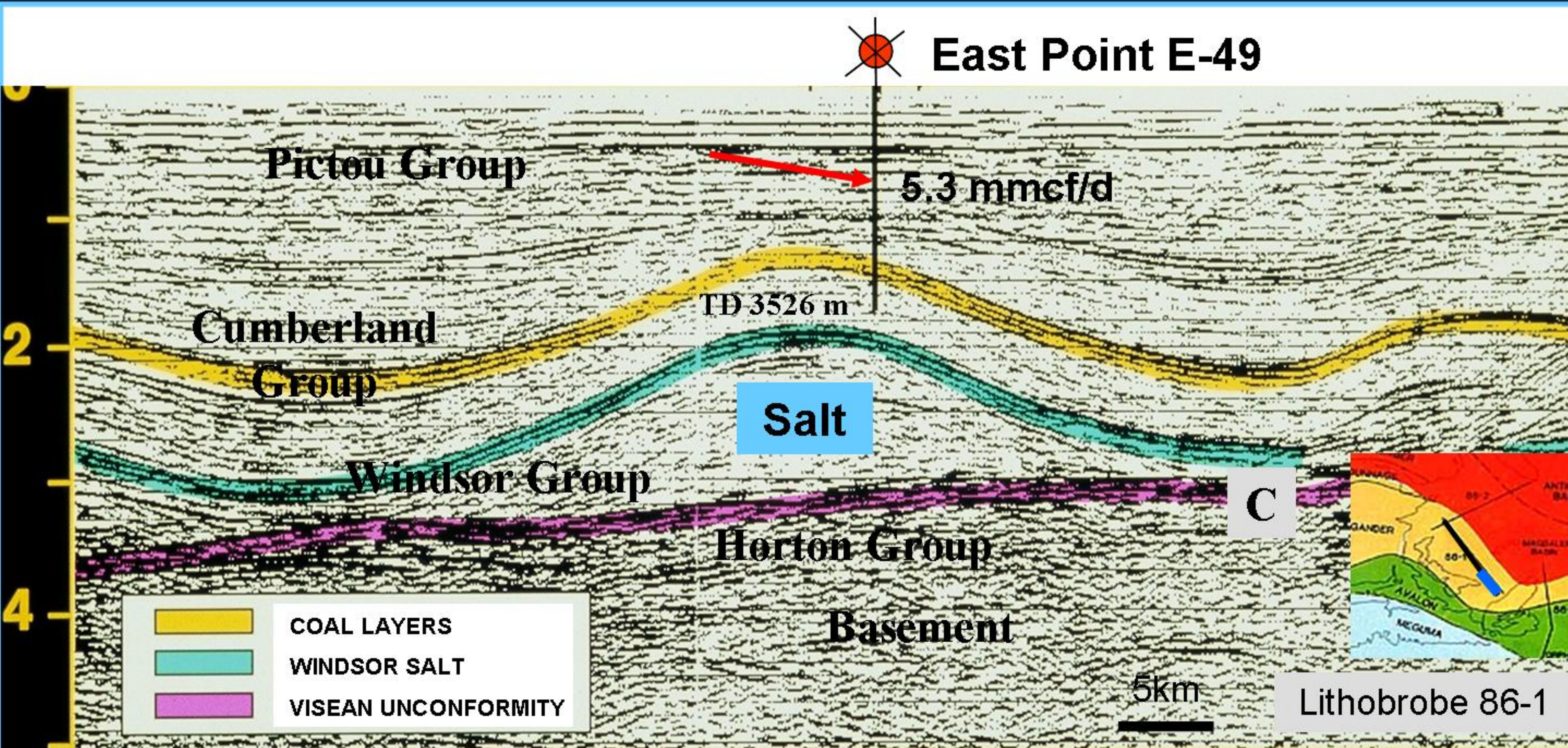
Sydney Basin in Nova Scotia

- East Point E-49, drilled in 1970, flow tested at 5 mmcfd of natural gas from Carboniferous sands (Pictou Group). This well was drilled midway between Cape Breton Island and Prince Edward Island, but the E-47 delineation well failed to encounter the gas reservoir. The discovery is estimated to contain an in-place gas resource of 77 billion cubic feet.

- Two offshore wells (Murphy et al. North Sydney P-05 and Shell et al. North Sydney F-24) were drilled in the 1970s on the Nova Scotia (NS) side of the Sydney Basin. These wells tested a large, seismically defined antiform and encountered gas shows in low porosity/permeability Upper Carboniferous sandstones. The stratigraphically lower Horton and Windsor Group sandstones, which according to Kendell and Harvey (2006) should have better reservoir properties remain untested in the basin.



Interpreted seismic section (segment of Lithoprobe 86-1) over East Point E-49 gas discovery in Magdalen Basin, showing a possible salt structure that may constitute an analogue for Sydney Basin salt induced leads (modified from Kendell, 2006, pers. comm., original from Grant, 1994). See also map insert for location (blue segment).

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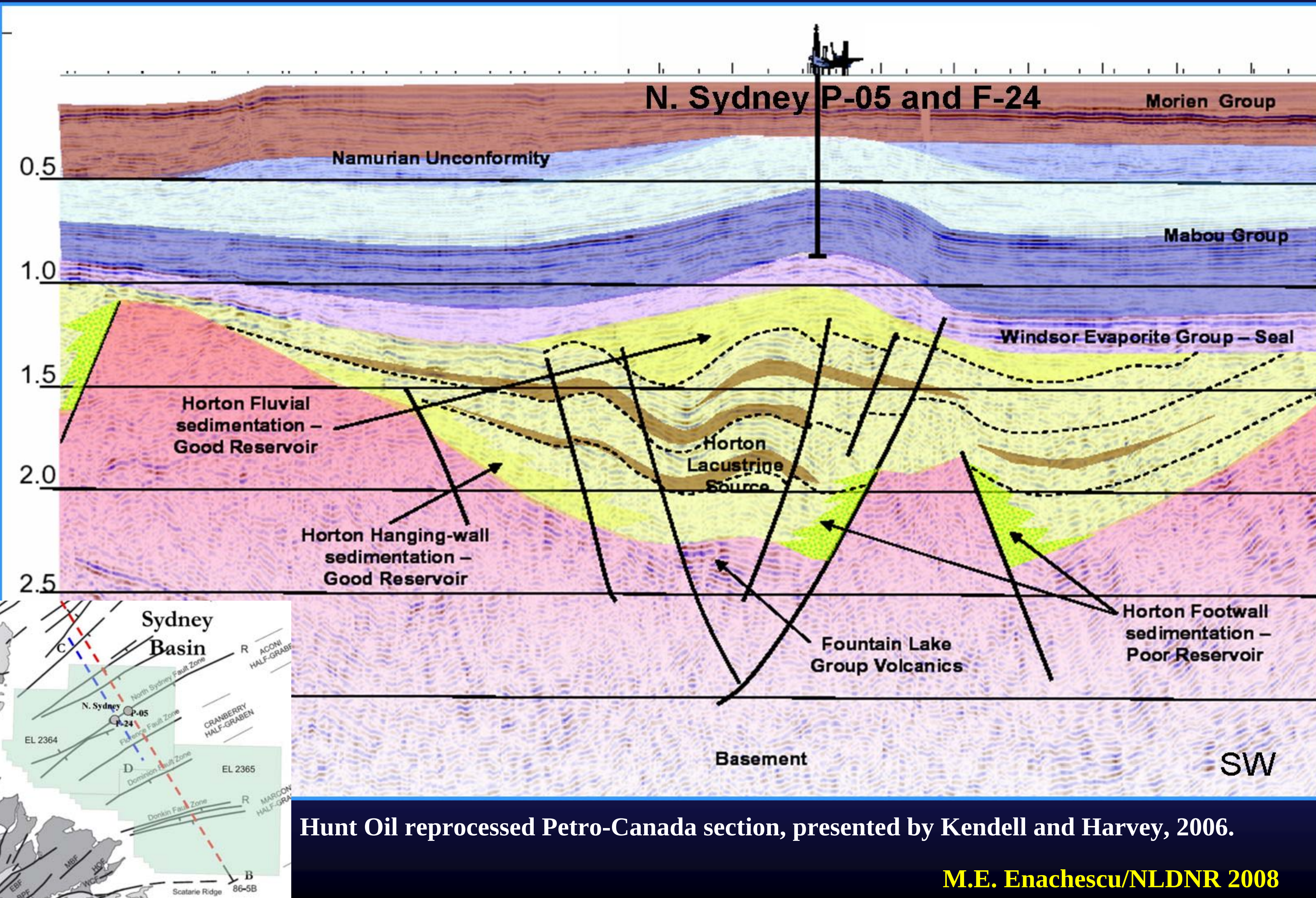
Offshore Well Results



Hunt Oil reprocessed Petro-Canada section, presented by Kendell and Harvey, 2006.

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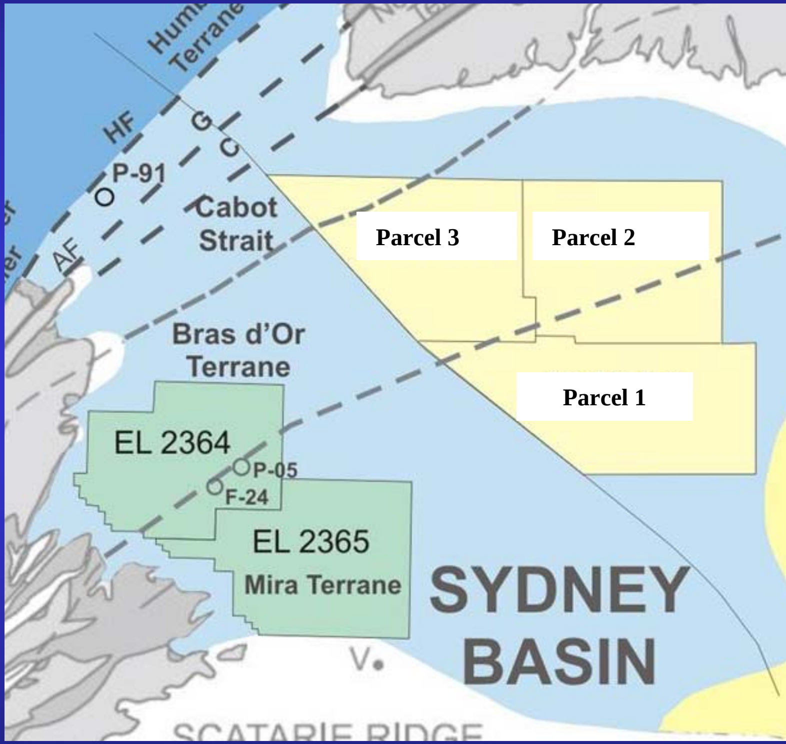
Sydney Basin Offshore Newfoundland

- Offshore Sydney Basin actively explored by Texaco Canada (late 1960s to mid 1970s), when several seismic grids were collected.
- About two dozen seismic anomalies representing various types of leads were mapped on about 8000 km of regional (10 by 10 mile grid) along with some denser 2D seismic grids.
- Texaco estimated an 11 tcf natural gas resource for its licences, which were located mostly on the Newfoundland side of the basin, but did not drill an exploration well. No follow-up exploration has occurred since that time.
- Recently onshore, Vulcan has encountered a thick oil zone in a shallow low permeability reservoir (Carboniferous 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 from a lacustrine source rock.

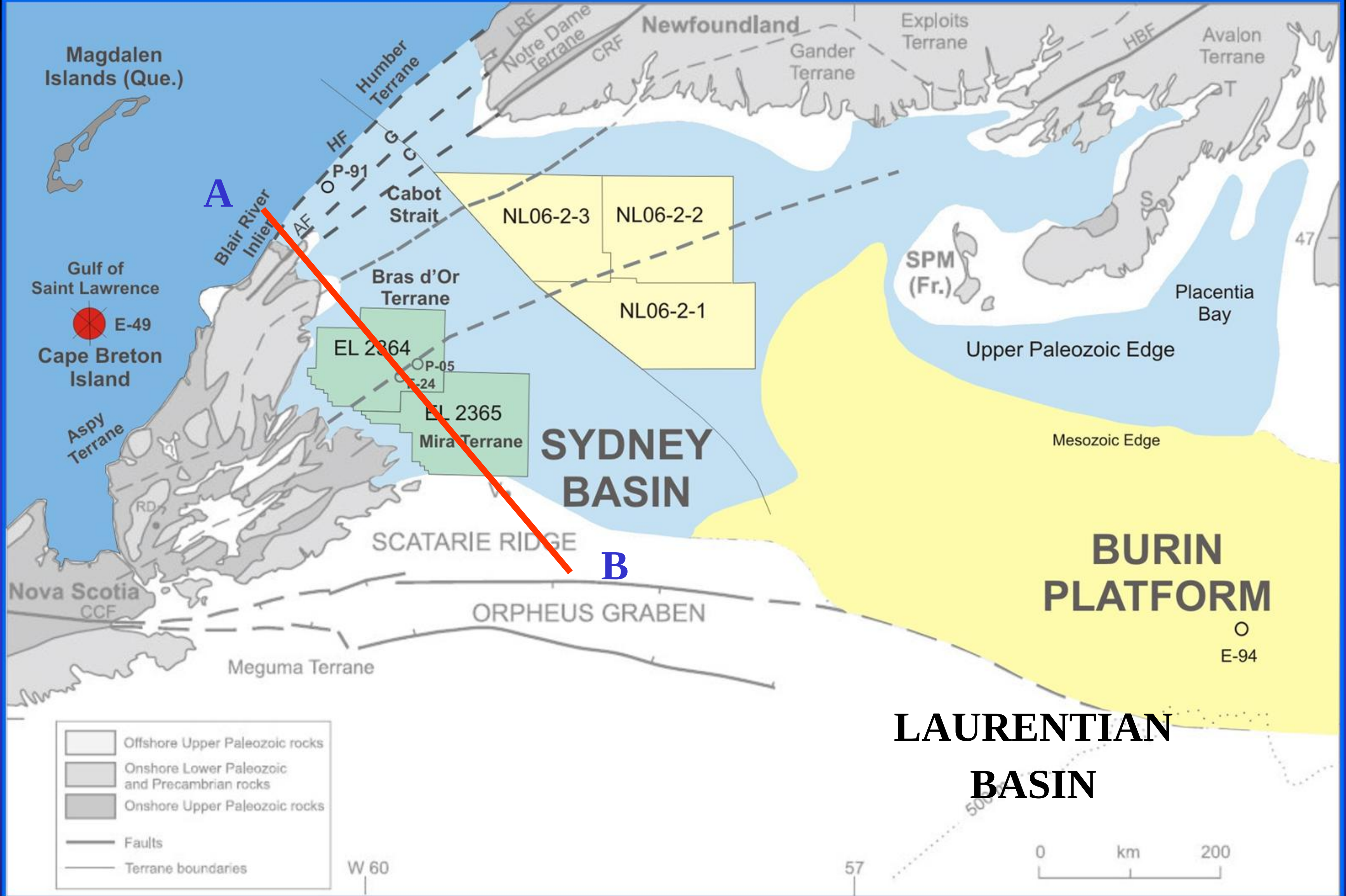
Recent Sydney Basin (Nova Scotia) Landsale

- In 1998, Hunt Oil (100%) licensed two large blocks EL 2364 (225,406 ha) and EL 2365 (244,315 ha) from the C-NSOPB.
- Blocks were located in water depths ranging from 90 to 360 metres.
- Work commitments for each EL was $2,165,000 suggesting that initial exploration would be directed towards geological studies and seismic acquisition.
- 2D seismic was acquired in 2005 and interpreted in 2006 (delays encountered with seismic authorizations relating to environmental concerns).
- No drilling followed due to lack of partners; licences expired in 2007.



Sydney Basin Facts

- Early exploration phase (in the 1960s and 70s) with regional potential field mapping and seismic acquisition
- For more than 25 years, much of the Sydney Basin and the adjacent Laurentian Basin were off limits to exploration due to an international boundary dispute between Canada and France and a provincial border dispute between NS and NL.
- The geology of Sydney Basin is not well documented or understood, seismic data is old and poor, especially when compared to producing areas such as the Grand Banks or Scotian Shelf.
- Southern part of the basin, part of the ConocoPhillips Laurentian Basin acreage was recently relinquished without drilling.



Geological setting of the Sydney Basin and environs (modified after Pascucci et al., 2000), with locations of the North Sydney F-24 and P-05, East Point E-49, St. Paul P-91 and Hermine E-94 wells, relinquished NS ELs , geological cross-section and Parcels 1, 2 and 3.

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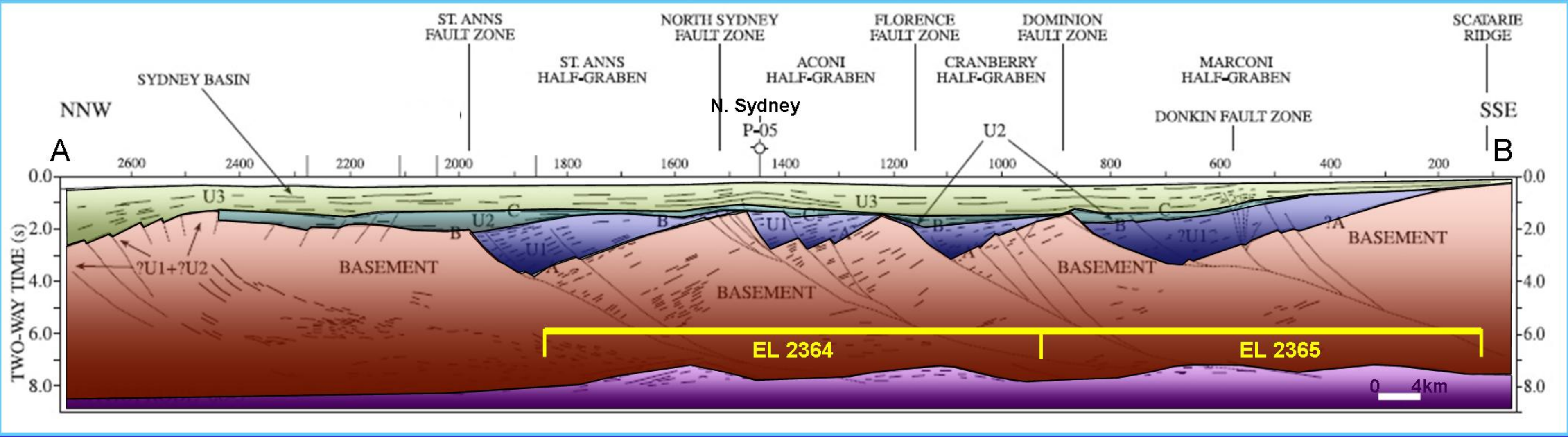
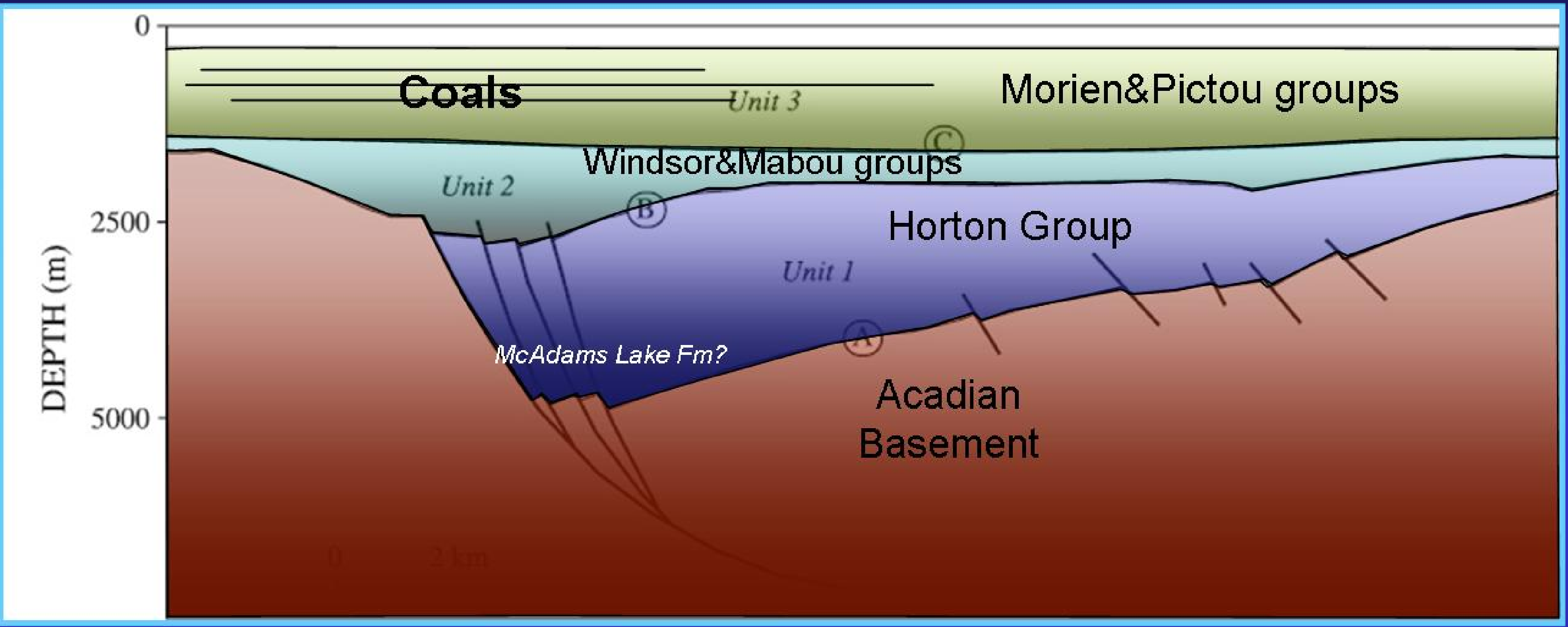
Regional Seismic Line From South Sydney Basin (NS)



Interpretation of Lithoprobe seismic line 86-5 that crosses the southern part of the Sydney Basin, Nova Scotia side of the basin (modified after Marillier et al., 1989 and Pascucci et al., 2000).

- Four half grabens bounded by syn-rift normal listric faults detaching to a mid crustal zone. The graben fill thins toward the southeast indicating the major direction of extension being NW-SE.
- Some of the rotated blocks are slightly inverted bending the youngest sedimentary unit and indicating a final transpressional event in the basin.
- Four seismic megasequences bounded by angular unconformities are interpreted: the Basement and Units 1, 2 and 3. Faults affect mainly the basement, the Horton Gr and to a lesser extent the Windsor and Mabou Grs. Only reverse faults during transpression affect the younger unit.

Schematic model of extensional duplex and basin fill applicable to the Sydney Basin structural evolution (after Pascucci et al., 2000)



•Main seismic Markers are: A (pre-rift Unconformity), B (Visean Unconformity) and C (Base Pennsylvanian Unconformity). Other strong seismic amplitude events in the shallow U3 are due to widespread coal seams.

• The same structural-stratigraphic model should apply for the central and northern parts of the basin where Parcels 1 to 3 are located.

•The interpreted mega sequences correspond respectively to the Acadian basement, Horton Group, Windsor and Mabou groups as well as the Morien and Pictou groups.

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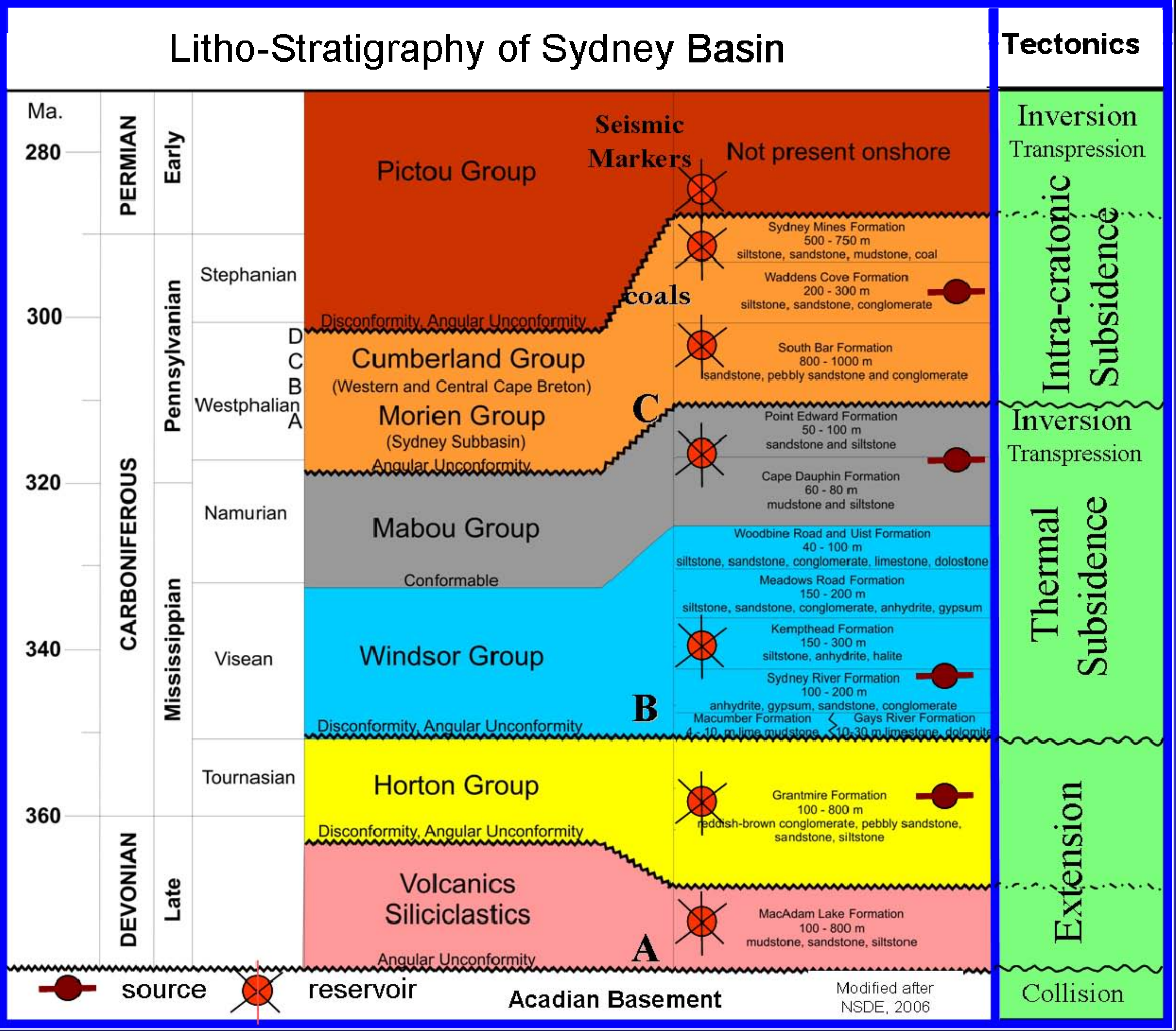
Sydney Basin Overview

•Sydney Basin was formed during 3 orogenic phases: 1). **Taconic** (late Mid-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. The Acadian orogeny resulted in raising of the Appalachian Mountains along the eastern margin of the North American continent.

•A fourth orogenic phase-the **Alleghenian-** during the Carboniferous was manifested by both transtension and transpression, and completed the formation of the supercontinent of Pangea - including the islands of Newfoundland and Cape Breton and the Sydney Basin separating them.

•Erosion, which lasted from Late Paleozoic to Tertiary almost peneplained the Appalachian Mtns. A regional uplift during the Tertiary, related to the readjustment of plate movements during Atlantic Ocean opening, and selective erosion (including glaciations) shaped the mountain chains and hills now forming the Cape Breton and southwestern Newfoundland landscape. Between both islands, erosion and subsidence lowered the Sydney Basin to as much as 500m below sea level.



Source and Reservoir Rocks

Seals: not a problem!

Generalized Litho-stratigraphic column (stratigraphic chart after Gibling, Nova Scotia Department of Energy, modified after Kendell, 2006), depicting main seismic markers, reservoir, source intervals and tectonic evolution for the offshore Sydney Basin.

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Examples of reservoir sands
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Examples of reservoir sands
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Petroleum Geology

- Systematic geochemical investigations and regional geological studies performed mostly on the Nova Scotia side of the basin have shown that for the Sydney Basin all prerequisites for viable hydrocarbon systems are clearly satisfied. Nevertheless this basin and particularly its NL side, is mostly unexplored and contains “high risk-high reward” frontier type plays.
- Some seventy oil and gas shows or stains have been found in Carboniferous reservoirs located onshore Nova Scotia. Both North Sydney F-24 and P-05 offshore wells had several gas shows. These seep and gas shows encountered at various levels in the basin indicate the presence of a working petroleum system in the Sydney Basin.

Source Rock

Several Carboniferous intervals with medium to rich source rocks have been recognized from drilling and outcrop sampling. According to Pascucci et al. (2000) and Mukhopadhyay et al. (2002 and 2004) the Carboniferous sediments onshore Sydney Basin and environs contain various active and mature oil and gas-prone source rocks that include:

*1.) **McAdams Lake Formation (late Devonian)*** lacustrine and alluvial shales (both oil and gas prone);

2.) ***Horton Group (mainly Tournaisian)*** lacustrine (oil-prone) and fluvio-deltaic shales (gas-prone);

3.) ***Windsor Group (Visean)*** marine shale (oil-prone) and carbonates (oil & gas prone);

4.) ***Mabou Group (late Viséan – early Namurian)*** fluviodeltaic shales (gas prone), and

5.) ***Cumberland/Morien Group (Wesphalian A through C)*** lacustrine (oil prone) and fluviodeltaic shale, widespread coal (oil & gas prone), and coaly shales.

Source Rock

•The major oil-prone source rocks in Carboniferous onshore Atlantic Canada are relatively thin and restricted while the gas-prone sources are thicker and dominant in most basins. As proven by the McCully field in NB (1 tcf), this system has produced at least one large scale gas accumulation.

•Moreover, source rocks, especially oil prone lacustrine types may thicken in the large half-grabens identified on seismic data in the offshore Sydney Basin. Fingerprinting of oil stained sandstones from the N. Sydney F-24 well (Mabou Group) suggests the presence of both terrestrial and marine source rocks (Mukhopadhyay et al., 2004).

•Maturity profiles of Carboniferous source rock in the Windsor, Mabou, and Cumberland Groups suggest that these sedimentary units are within the "oil window" in most areas of onshore Nova Scotia (Mukhopadhyay et al. (2002), a conclusion that can be logically extrapolated to similar offshore sequences.

Reservoir Rock

•Reservoirs rocks in Sydney Basin are predominantly sandstone that range in facies from lacustrine shoreface to channel fill and alluvial fans. Good to fair reservoirs can be encountered in Late Devonian to latest Carboniferous stratigraphic intervals listed below:

1. ***McAdams Lake Formation and Horton Group*** alluvial fans, sandstone and conglomerates
2. ***Morien Group (South Bar and Sydney Mines Fm)***
3. Multy-stacked sands within the ***Cumberland and Pictou Groups***

•Windsor Group carbonates, although thin, are widespread and exhibit good porosities in onshore exposures in Cape Breton and within reefal build-ups observed in outcrop in western Newfoundland, mainland Nova Scotia and New Brunswick.

Seals

•Finding good seals should not be a problem in the Sydney Basin as the Carboniferous succession contains a number of tight shales and carbonates.

•Additionally the Windsor evaporites may form a regional seal for the syn-rift McAdams Lake Formation, Horton and Windsor Group reservoirs.

•Thick mudrock intervals are seen in the Mabou and Morien groups - which provided the seal for the East Point gas accumulation.

•Interbedded shale within the coaly Cumberland/Morien Group can also provide a very effective seal for gas generated within the same succession.

Hydrocarbon Traps

•The plays that have been drilled or traditionally prospected in the southern part of the Sydney Basin are transpressional anticlines.

•However a variety of stratigraphic and structural plays are possible including inversion along half graben bounding faults, or large anticlines relating to wrenching along older steeply dipping Acadian faults during the Alleghenian Orogeny or in Early Permian. The observed antiforms are usually elongated and aligned in NNE-SSW direction and they may or may not be faulted. Kendell and Harvey (2006) have described and illustrated on a seismic line several untested Horton Group plays in the inverted North Sydney structure:

1. rotated blocks and multi-fault bounded closures, four way closures and pinchouts within the Horton Group;
2. structural and stratigraphic traps within the Windsor Group and within Sydney Mines Formation clastics.

Hydrocarbon Traps

•In South Sydney Basin, certain syn-rift traps such as rotated blocks and extensional roll-over anticlines have only become visible with the newer vintages of seismic data or after expert reprocessing of older data. Elimination of multiples has proven to be essential to imaging the Horton Group and McAdams Lake Formation.

•Although diapirism within the Windsor Group is not as pronounced as in some of the other Carboniferous Basins in the area, it does play an important role in the creation of anticlines in the Sydney Basin. A possible analogue for salt induced structures in the Sydney Basin is the East Point E-49 salt structure drilled in 1970 that tested 5.3 MMcfd from Pictou Group sandstones.

• East Point E-49 seismic data shows a Windsor salt pillow and large salt anticlines above the salt. The Windsor salt has been intersected by five exploration wells east of the Sydney Basin including the adjacent Hermine E-94.

•Stratigraphic traps are also widespread in the basin. The most common are: a) onlap of sandstones beds on basement - either on the margins of the basin or against basement highs; b) unconformity traps; and c) pinchout of sandstones against the flanks of salt pillows. Some of the seismic sequences also show significant amplitude anomalies.

•It is worth mentioning that only recently has data reprocessing been effective in preserving the necessary amplitude and frequency range needed for seismic attribute studies and possible reservoir prediction.

Maturation and Migration

•In both N. Sydney wells, a rapid increase in vitrinite reflectance from 0.0 to 0.85% is observed between 0 and 1000 m depth. This is followed by very little increase in maturity from 1000 to1700 m, suggesting that sediments at the bottom of these wells are still within the oil window (Mukhopadhyay et al, 2004).

•Summarizing older results (Pascucci et al, 2000) conclude that maturation levels of Morien Group coals and shales are in the hydrocarbon generation zone as are Horton source rocks in Cape Breton. Vitrinite reflectance for strata at the bottom of the P-05 well approaches 1.8% (Cooper et al. 1974), indicating that these sedimentary units are overmature, but it is not known if these values are representative of these sediments throughout the basin.

Petroleum Potential of Call for Bids NL08-3 Parcels 1 to 3

The Call for Bids NF06-2 Parcels 1, 2, 3 covers a total area of 768,768 hectares (1,899,667 acres) within the Newfoundland and Labrador jurisdictional part of the Paleozoic Sydney Basin.

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Petroleum Prospect Risks

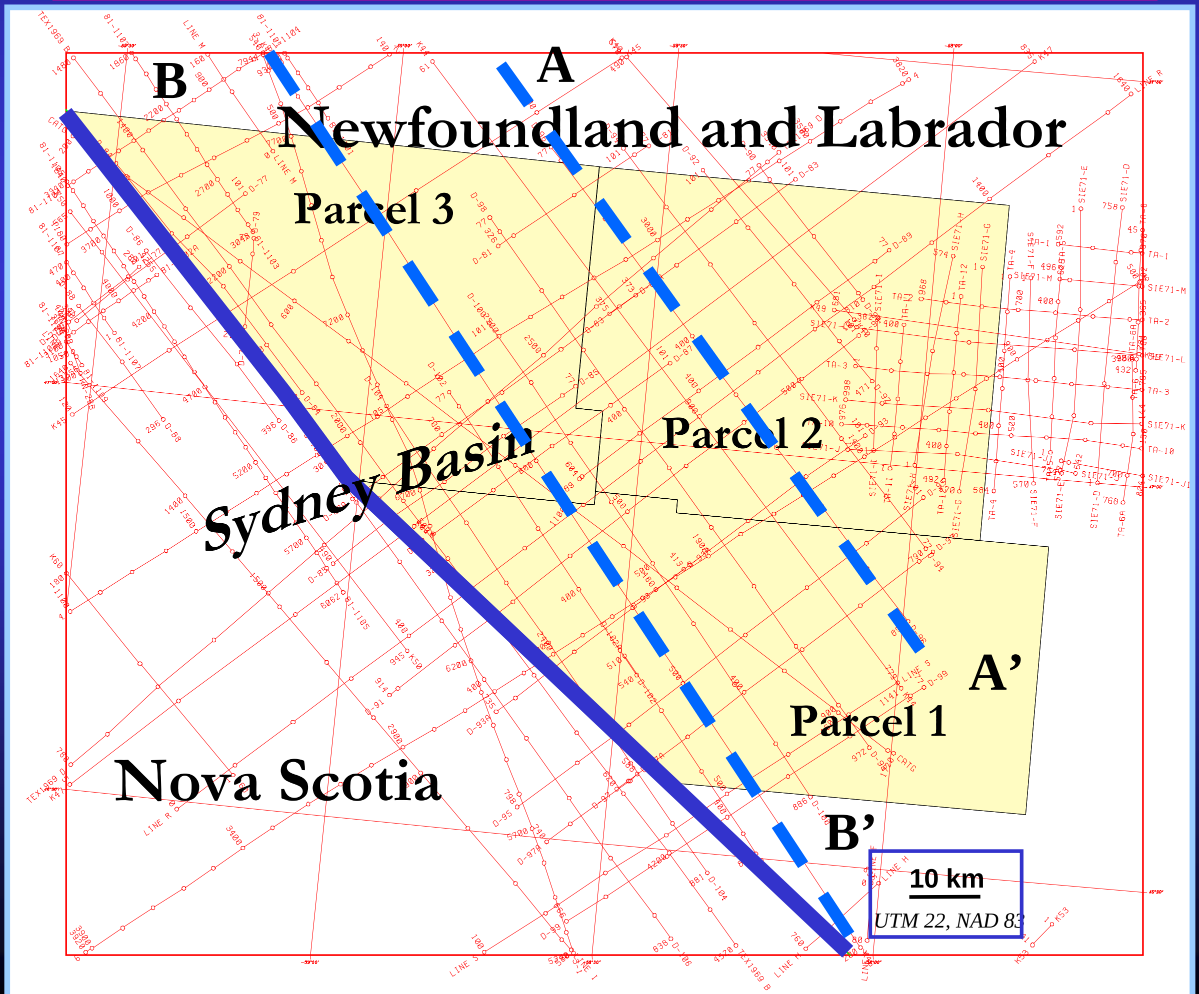
•While large leads and prospects are observed in the Sydney Basin, the preservation of porosity and permeability in Carboniferous reservoirs must be considered a risk factor. However, quality reservoirs have been encountered in numerous localities around the world where Carboniferous rocks have followed a similar multiphase geodynamic evolution. Similar sands with analogous reservoir characteristics are excellent producers in NE Europe and the North Sea.

•The possibility must also be recognized, that intervening deformation events could have breached pre-existing reservoirs or, alternately, created new structural traps for hydrocarbons and generated later accumulations.

•The complexity of the basin's history will require better seismic data and refining of geological and geochemical models to properly evaluate the hydrocarbon potential of the Sydney Basin.

Current Seismic Coverage and Seismic Line Location

The minimum bid for all parcels in the Sydney Basin is $1,000,000 (approximately US $940,000).



- There were no ELs awarded on the Newfoundland side of the Sydney Basin during the past three decades.
- Texaco Canada, (now Chevron) relinquished most of its acreage in 1975 without drilling.
- No new marine seismic data has been acquired on the Newfoundland side of the Sydney Basin since 1974.

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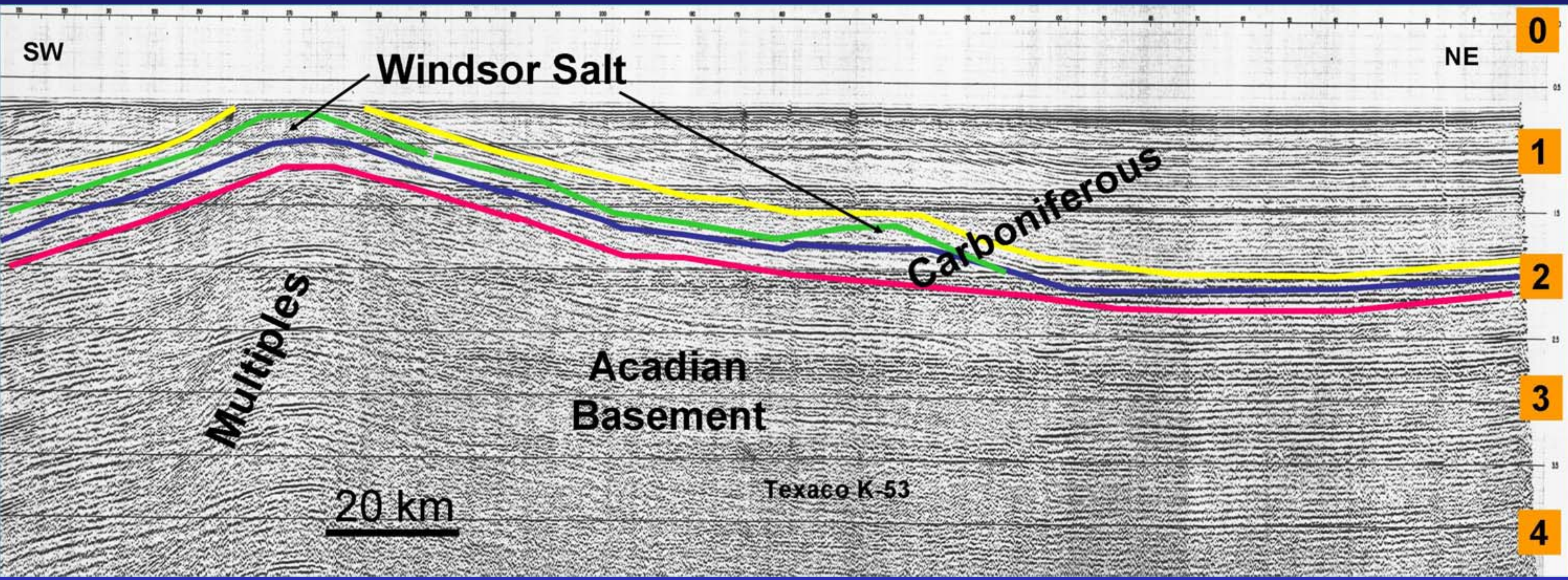
Seismic Line Example



NE-SW on strike representative seismic section through the Sydney Basin. A large post Carboniferous fold that involves the Acadian Basement is observed. Salt pillow within the Windsor group are also seen. This is an example of a large anticlinal feature present in the basin that may exist in Parcel 1 to 3.

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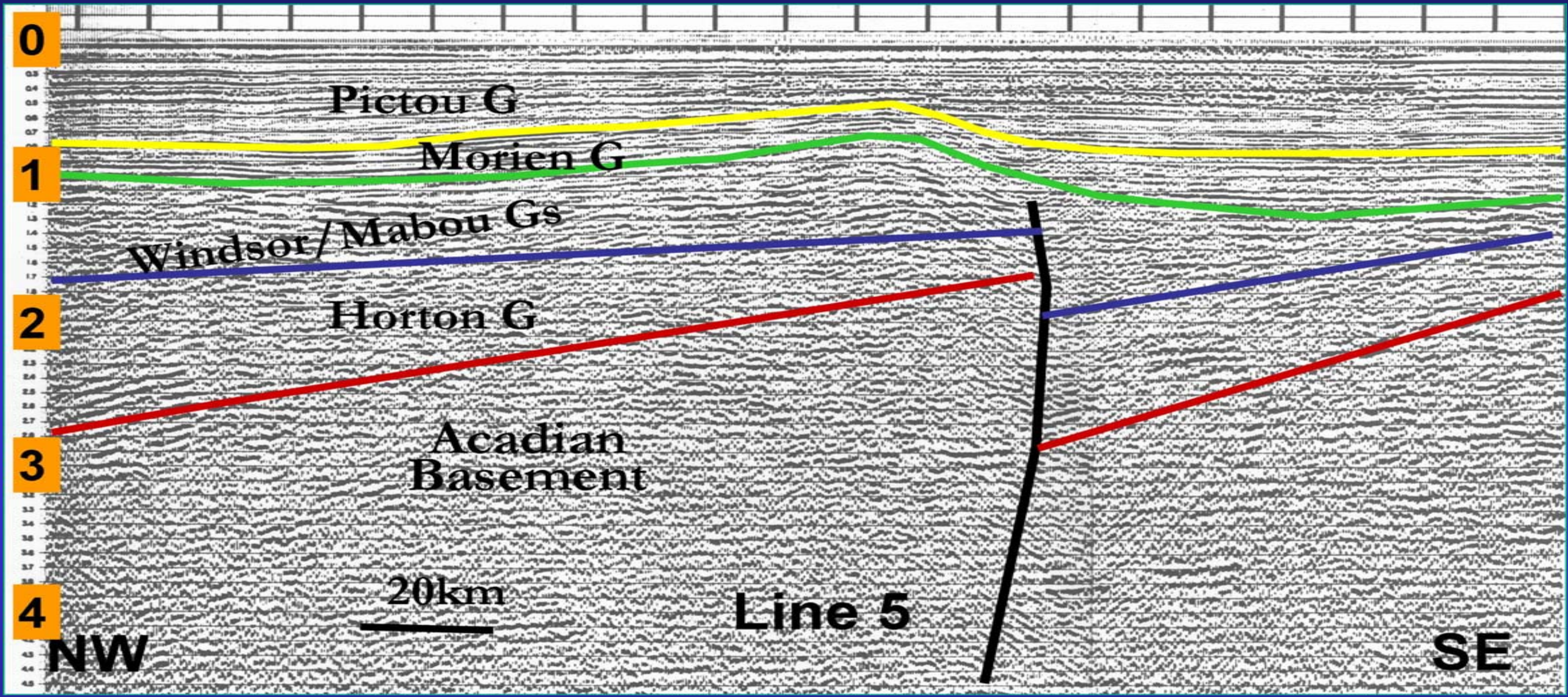
Seismic Line Example



NW-SE dip representative seismic section through the Sydney Basin. The line shows a large post-Carboniferous reactivated fault that involves the Acadian Basement. An inversion fold is observed on the upthrown block of the fault. Windsor salt may also create pillows. This is another example of a large anticlinal feature present in the basin that may exist in Parcel 1 to 3.

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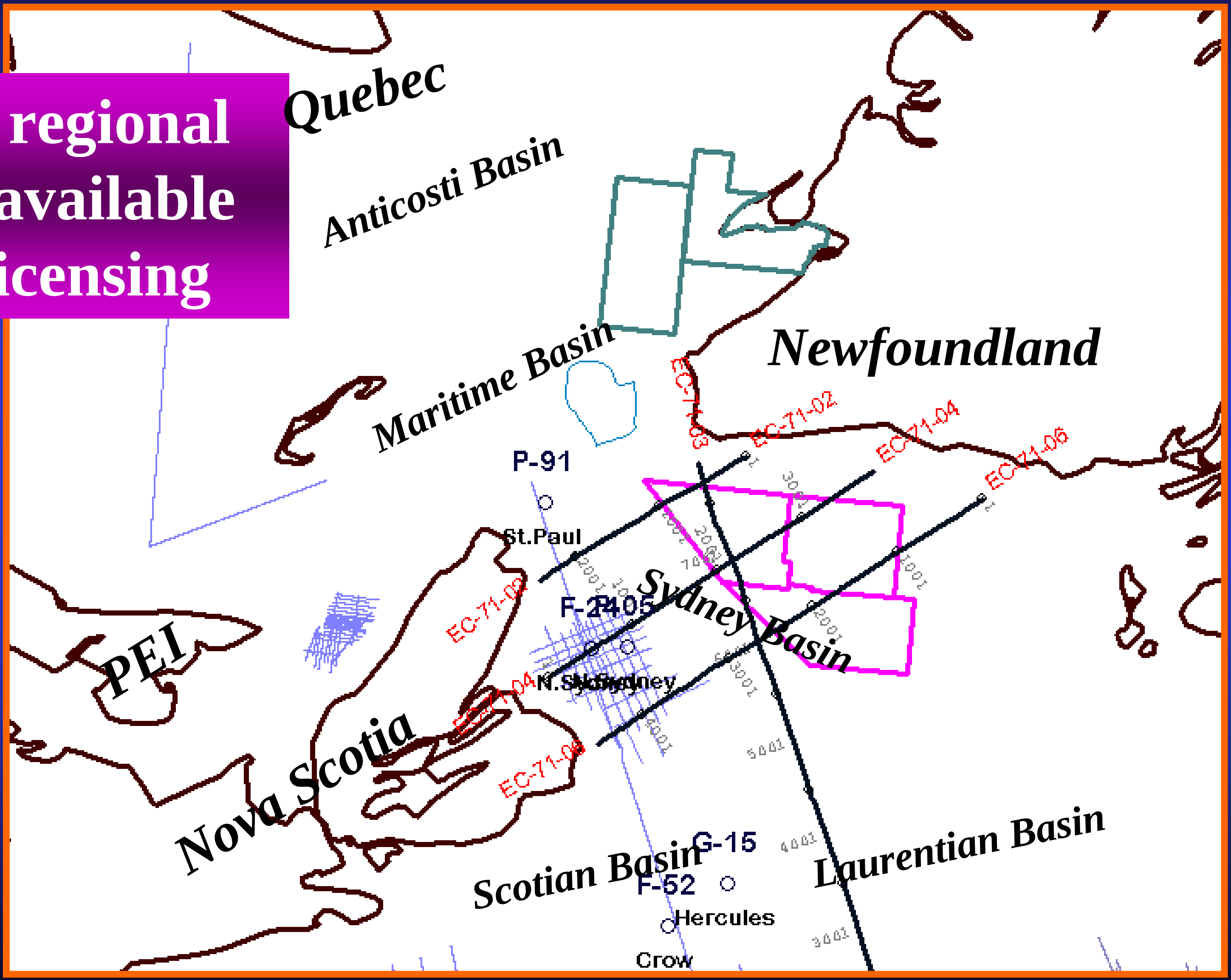
GSI Data Base in the area

Four regional lines available for licensing



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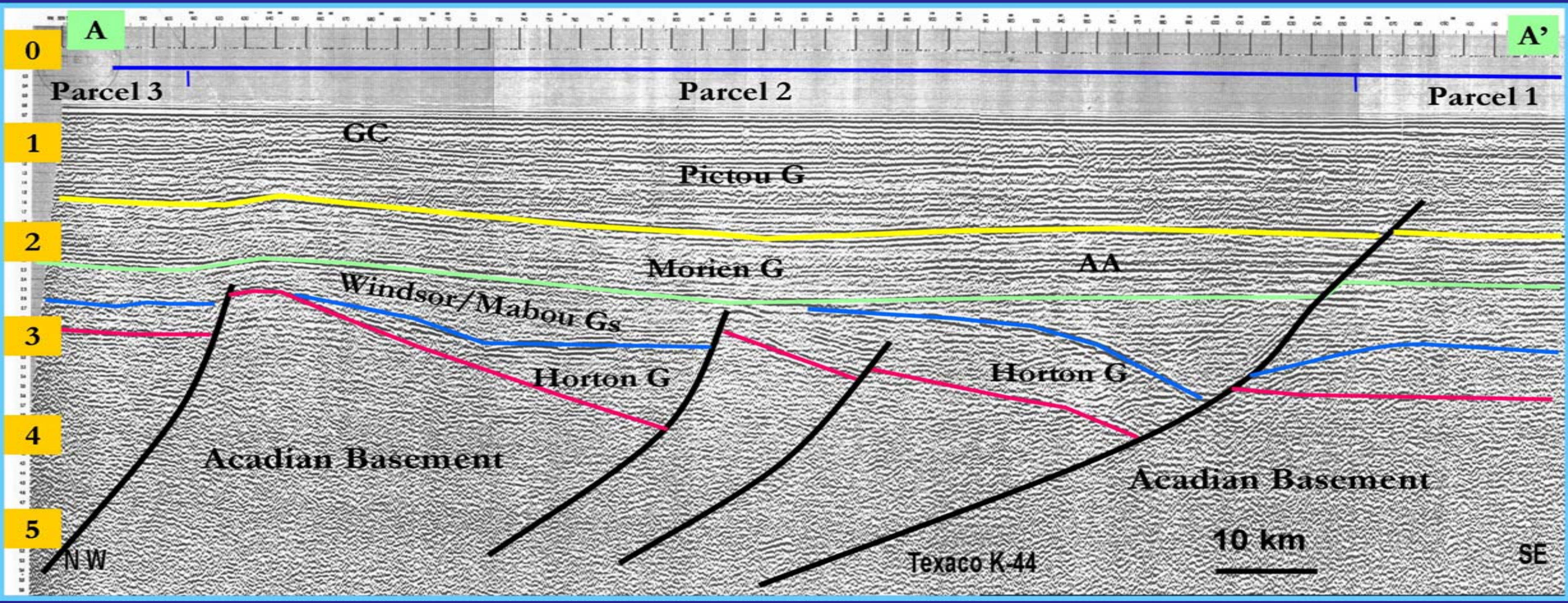
Seismic Coverage

- More than 6000 km of late 1960s to early 1970s seismic data.
- Data quality varies from good to poor. These lines were recorded with a short 2400 m streamer and this is detrimental for imaging deeper sedimentary layers and for the efficacy of multiple elimination routine used at the time.
- During the recording at sea, there was poor navigation control and some lines do not tie properly. The lines were recorded using different sources available at the time such as: explosive, marine vibrator, vaporchoke or airguns.
- The data is 2400% or 4800% and is not migrated. As the water bottom is quite hard in the area and under the thin Quaternary deposits there are Carboniferous rocks with high velocities, a large number of lines are severely contaminated by strong multiples (water bottom multiples, peg-legs and reflected refractions type).
- Most of the area is covered by a 17 by 17 km grid (10 by 10 miles), directed in the dip (NW-SE) and strike (NE-SW) direction. Certain areas have a denser coverage and some have no coverage at all.
- Some lines are no longer retrievable either from tapes, films or paper copies and only microfiches are available. Unfortunately no data was reprocessed since the initial mid 1970s.

Seismic Coverage

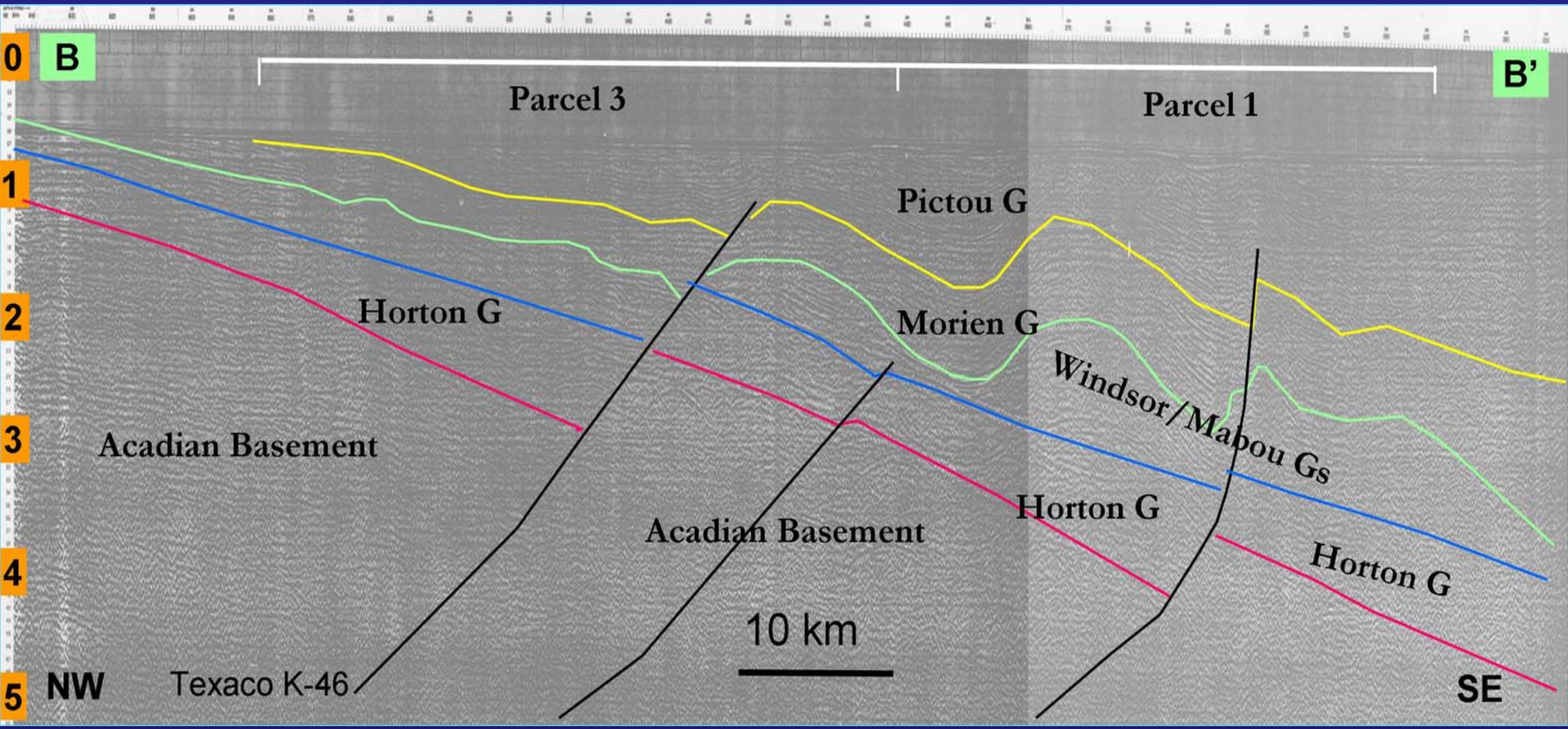
- Modern seismic data starting with a regional 2D grid
- High resolution aeromagnetic measurements and marine EM required

Seismic Line Example



NW-SE dip representative seismic section through parcels 1, 2 and 3, in Sydney Basin. Synrift and inversion-type features are visible.

Seismic Line Example



NW-SE dip representative seismic section through parcels 1 and 3, in Sydney Basin. Synrift, salt induced and inversion-type features are visible.

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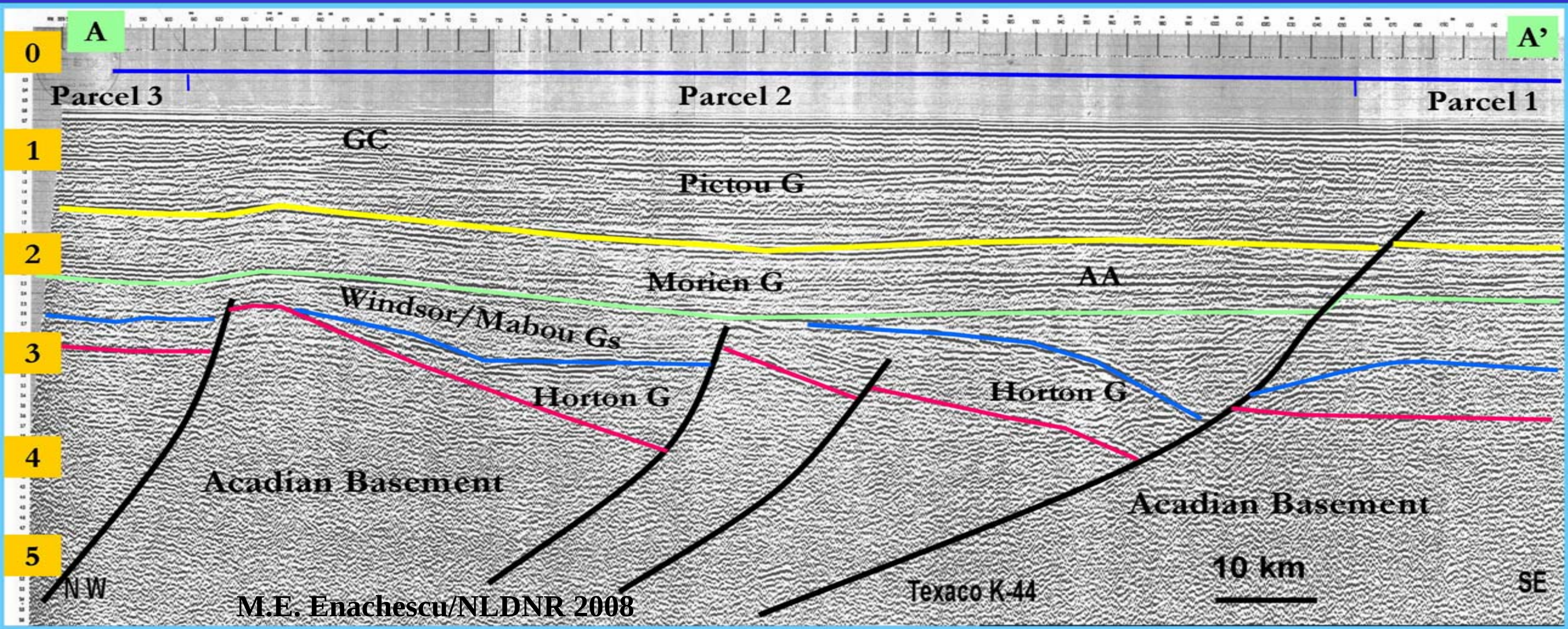
How big are those features?

Due to lack of seismic coverage these features cannot be properly evaluated as area or vertical closure, but their amplitude on individual lines is impressive. Some anticlines are as wide as 10-20 km and this suggests that if they are symmetrical they can be as large as 400 sq km and therefore ranking them among the largest undrilled features in North America. These large features can hold between 300 and 1 billion barrels of oil or several Tcf of gas (unrisked), if adequate reservoir is found.



Discussions

•Exploration in the Sydney Basin is at an incipient stage.
•Several large oil and gas leads are identified with very old seismic data.
•The NL part of the basin has never seen exploration drilling and awaits modern data acquisition and systematic exploration for both oil and gas.
•The three parcels offered in this landsale are located within the western and central part of the Sydney Basin of Late Devonian to early Permian age (approximately 400-280 million years old).
•Four way closures and fault bounded anticlines formed by extension, structural inversion or salt diapirism exists.
•The size of the three parcels contained in Call for Bids NL06-2 is very large when compared with Gulf of Mexico block size (100 to 120 times larger) or Grand Banks offerings.

Sydney Basin Discussions

•Known reservoirs, mature source rocks, proven migration paths.
•Risks : quality of reservoir sandstones and the preservation of trap since Paleozoic time.
•Parcels contain multiple reservoir targets within Paleozoic sandstone reservoirs and limited potential for reefal carbonates; target zones can be tested by drilling relatively shallow offshore wells using jack-ups or semi-submersible rigs (2000-3500 m drilling depth).
•Only leads can be tentatively mapped with the scarce, old vintage, nonmigrated, low quality seismic grid in the area.
•Systematic 2D and 3D mapping and post-stack analysis of seismic attributes extracted from newly acquired and processed data may further reduce the geological risks associated with reservoir and trap integrity.

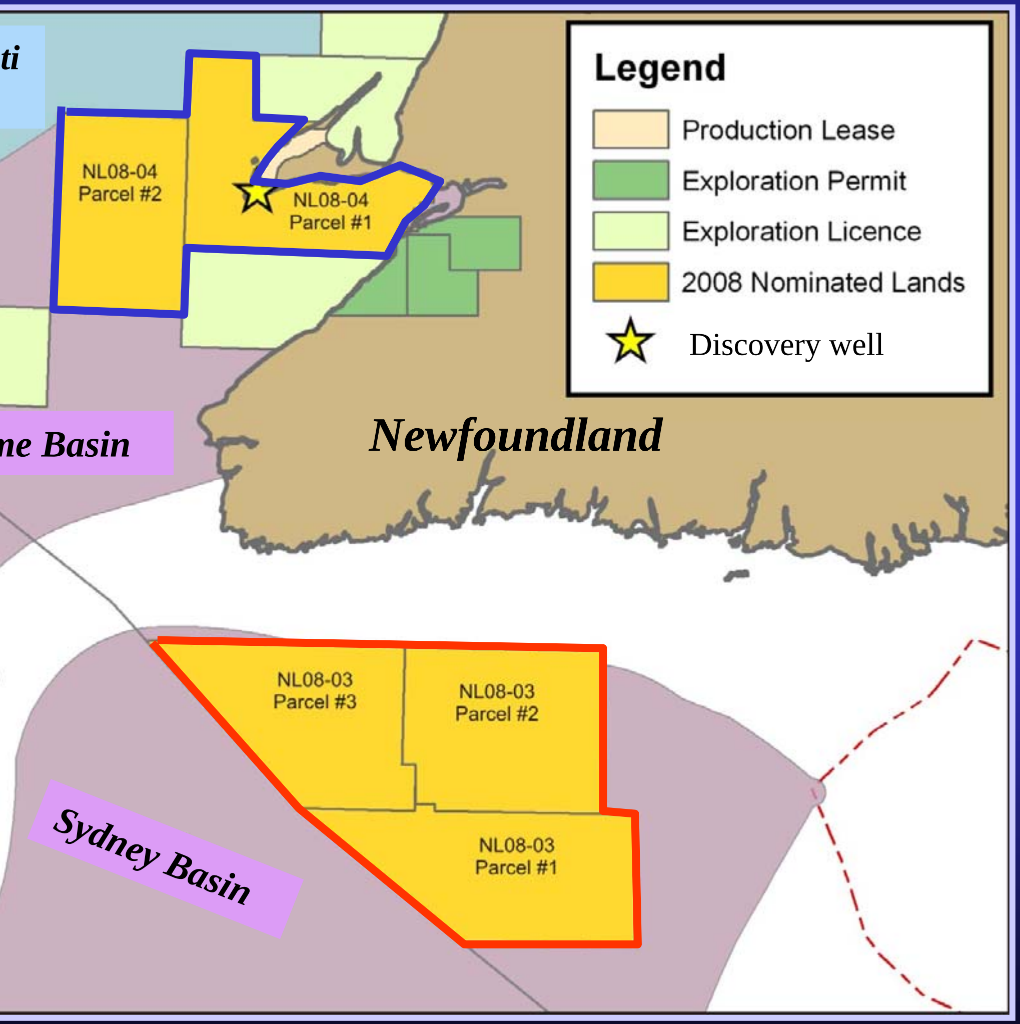
Discussions

•In the Sydney Basin an offshore well in water depth between 80 and 450m may cost from Can $15 MM to $ 25 MM, depending on total depth.

•Metocean conditions are fair to good. Sea ice is infrequent and iceberg presence is very low and very sparse (from one iceberg every 8 years to one iceberg every 25 years) (C-NLOPB, 2006). The ocean has some one-year ice cover or ice flows only 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.

Conclusions CFB NL08-3 and 4



•Parcels are very large exploration blocks situated in shallow water, some in the territory of jack up rigs, in an area where drilling can be performed year-round.

•The W Newfoundland and Sydney Basin parcels are in practically unexplored basins but close to NE American and Canadian markets in an area with low political risk.

•Acquiring these parcels present a unique Frontier opportunity for companies looking for large oil and gas reserves within the North American continent and willing to take a long term view to hydrocarbon exploration and production.

Thank You for your Attention!

Euxinic Exploration

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Newfoundland Labrador