

A New Light Oil Unconventional Play (Eastern Québec, Canada)*

Bernard Granger¹

Search and Discovery Article #10290 (2010)

Posted December 17, 2010

*Adapted from oral presentation at AAPG Conference and Exhibition, Calgary, Alberta, Canada, September 12-15, 2010

¹Geology, Petrolia, Quebec, QC, Canada. (amorin@petroliagaz.com)

Abstract

The Eastern Gaspé area is characterized by the presence of numerous oil seeps (more than 50 known sites) in the Devonian sandstones, which explains the interest in this region by explorers for more than a century. Since 2005, Pétrolia has drilled five wells in the Eastern Gaspé to evaluate the oil potential of the York River Formation. The last three wells encountered light crude oil over thick intervals of tight York River sandstones reservoirs. The company has completed preliminary tests on these three wells.

Further works are planned in the first half of 2010 to prove up the oil potential of the York River sandstone and demonstrate the applicability of modern drilling and completion techniques, including multi-stage fracturing. Success will allow further developing the potential of the York River Formation over a large territory. The presentation will summarize the results of the 2010 evaluation program.



A new light oil unconventional play

(Eastern Québec, Canada)

Bernard Granger: Chief Geologist





A new light oil unconventional play

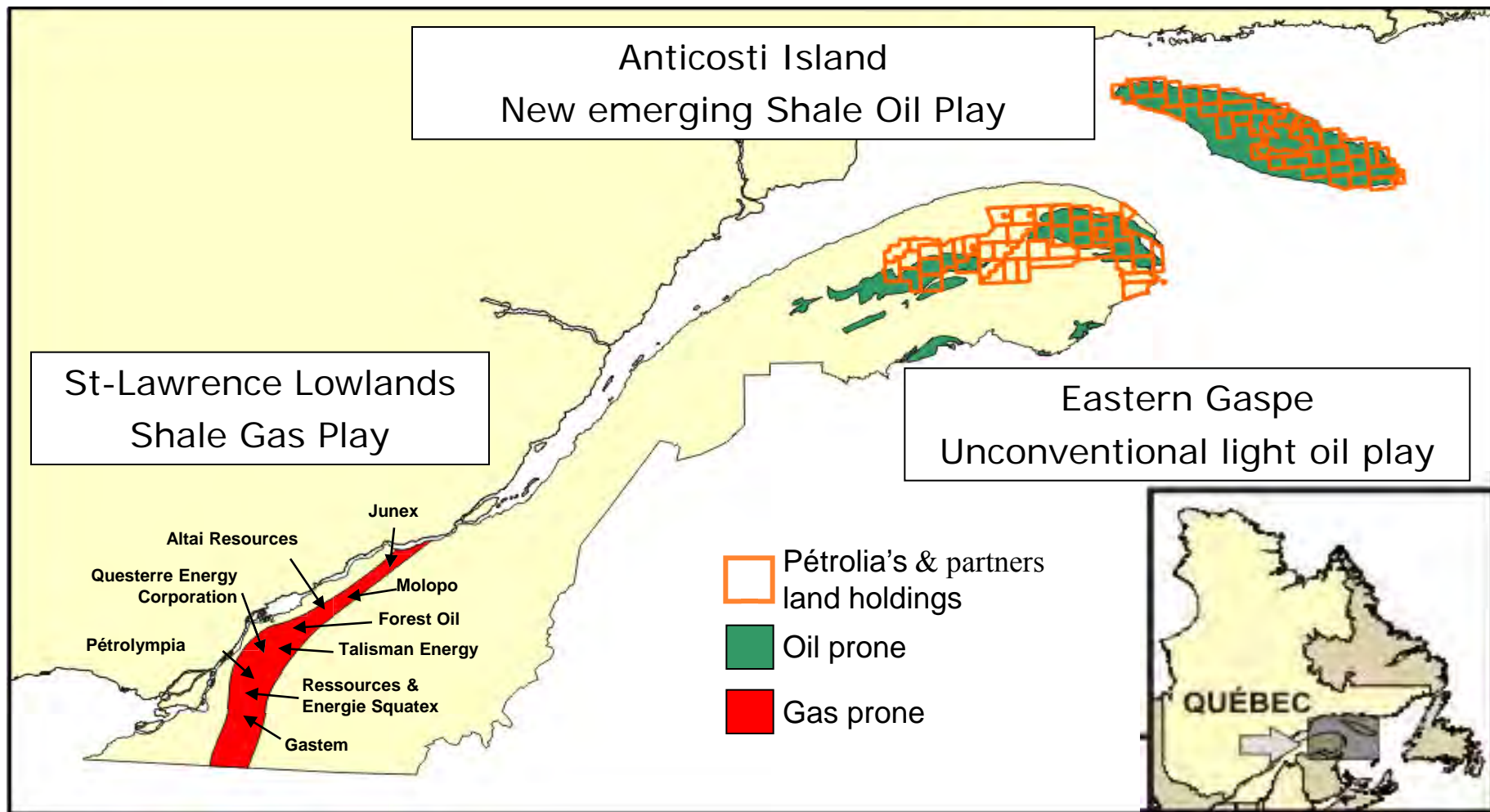
Introduction

**The York River Fm - A new light oil
unconventional play**

Conclusions

Introduction

Current exploration activity in the province of Quebec





Current activities

St-Lawrence Lowlands (Shale Gas Play)

Number of fracs conducted on the Utica shale in the St. Lawrence lowlands in both vertical and horizontal wells with increasing levels of success over time.

Anticosti Island (New Emerging Shale Oil Play)

Much of Utica Fm on Anticosti Island falls within the oil window (Macasty Fm on Anticosti).

27 meters of full diameter cores were collected in order to evaluate the shale oil potential of the Macasty Fm

In the St-Lawrence Lowland, one Frac was conducted in a vertical well in Utica shale that was in the oil window. The well produced 47 bbls of 37 API oil in the first 109 hours.

This established that the Utica shale can produce both oil and gas depending upon the rock maturity.

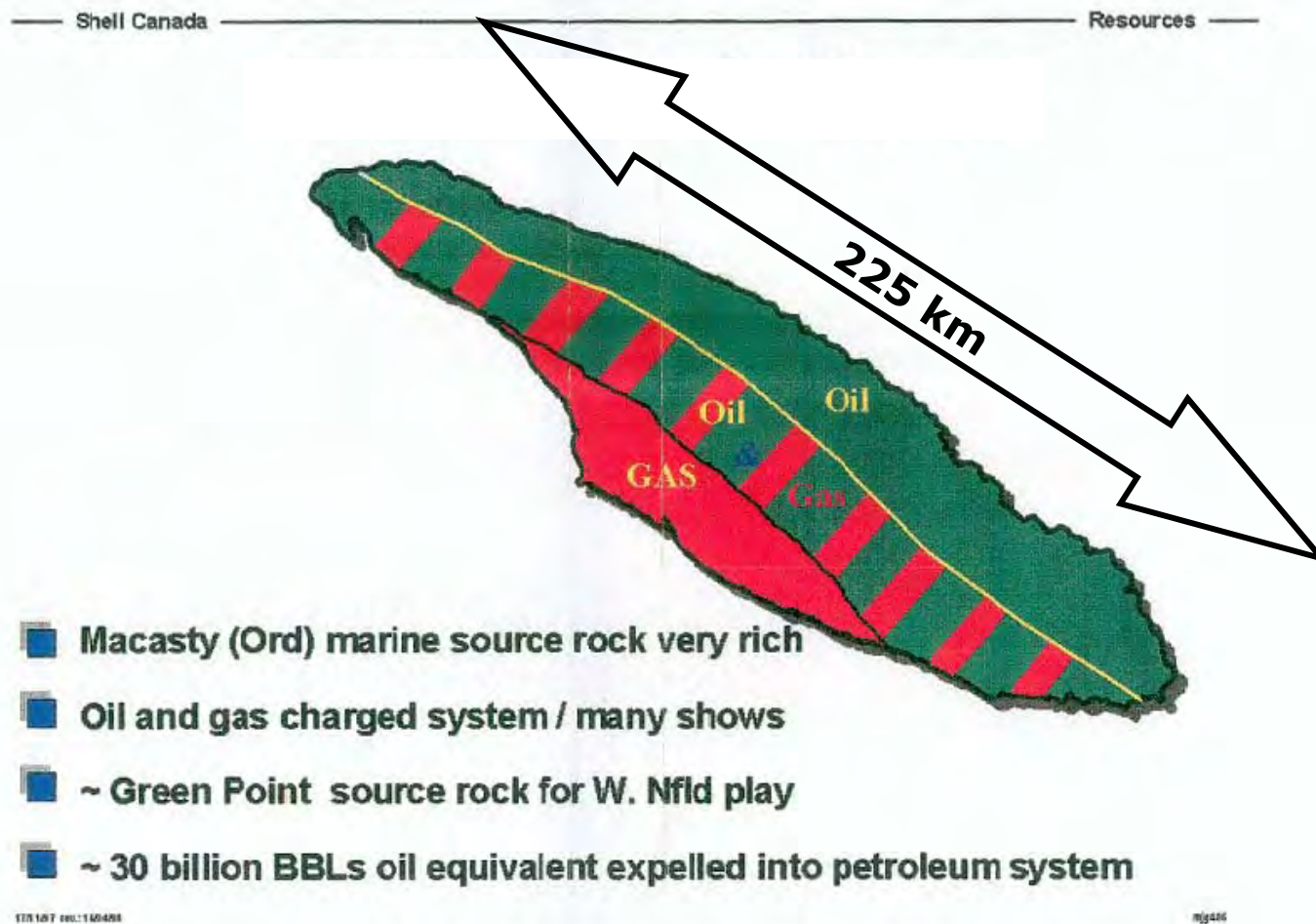
Eastern Gaspé Peninsula (A new light oil unconventional play)

Pétrolia has made the first significant oil discovery in the Province of Québec. The discovery was made in a thick sandstones section of York River Fm.

The Company is in the process to test and prove the oil potential of the York River Formation as a resource play



A New Emerging Shale Oil Play





Current activities

St-Lawrence Lowlands (Shale Gas Play)

Number of fracs conducted on the Utica shale in the St. Lawrence lowlands in both vertical and horizontal wells with increasing levels of success over time.

Anticosti Island (New Emerging Shale Oil Play)

Much of Utica Fm on Anticosti Island falls within the oil window (Macasty Fm on Anticosti).

27 meters of full diameter cores were collected in order to evaluate the shale oil potential of the Macasty Fm

In the St-Lawrence Lowland, one Frac was conducted in a vertical well in Utica shale that was in the oil window. The well produced 47 bbls of 37 API oil in the first 109 hours.

This established that the Utica shale can produce both oil and gas depending upon the rock maturity.

Eastern Gaspé Peninsula (A new light oil unconventional play)

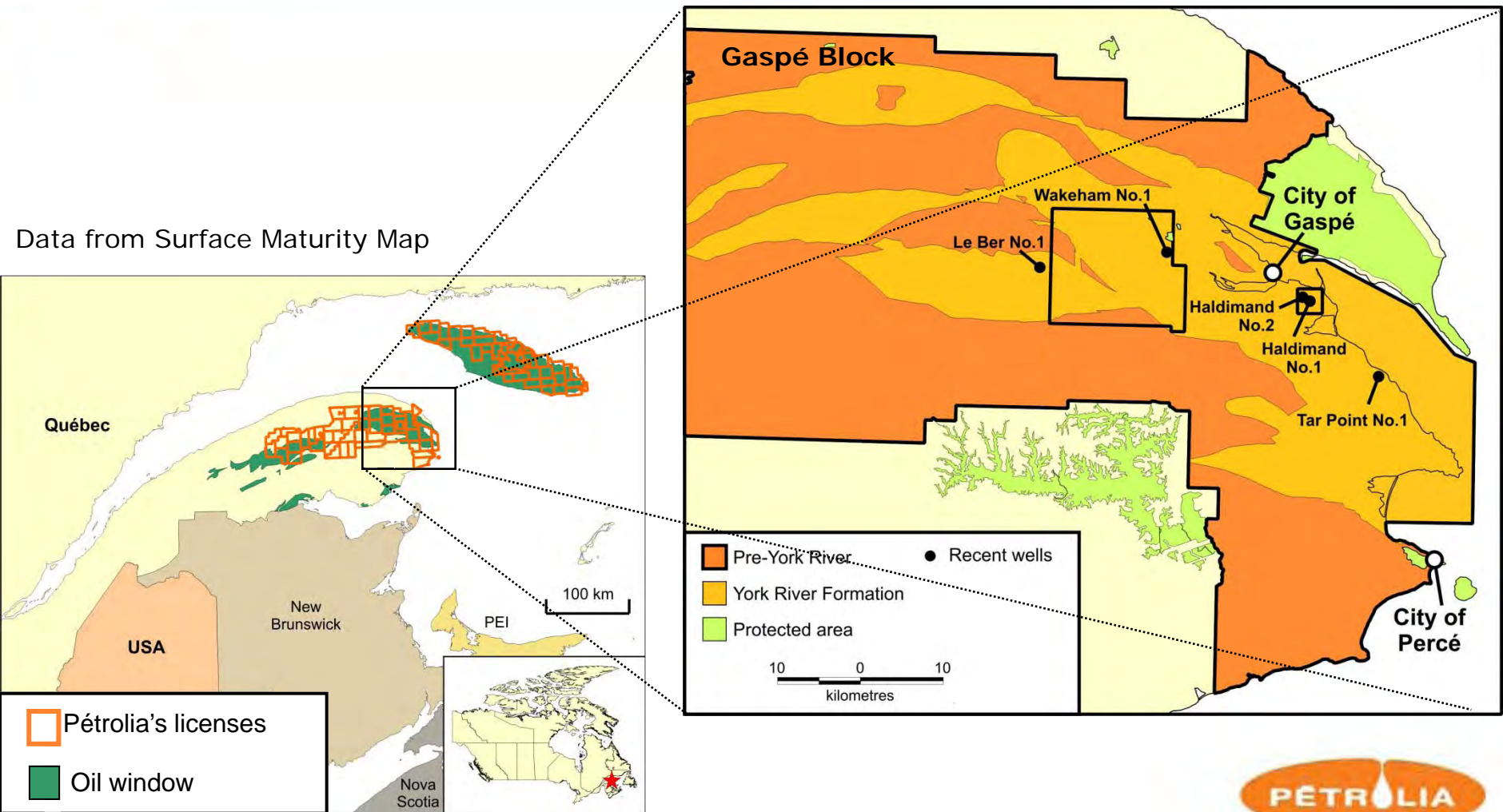
Pétrolia has made the first significant oil discovery in the Province of Québec. The discovery was made in a thick sandstones section of York River Fm.

The Company is in the process to test and prove the oil potential of the York River Formation as a resource play



The York River Formation

A new light oil unconventional play





Undeveloped High Impact Potential

(Short-term development projects, Eastern Québec)

🔥 Proven oil in recent wells drilled by Pétrolia

- First viable oil discovery in the province of Québec at Haldimand
- The play consists of thick succession of tight York River Sandstones saturated with light oil



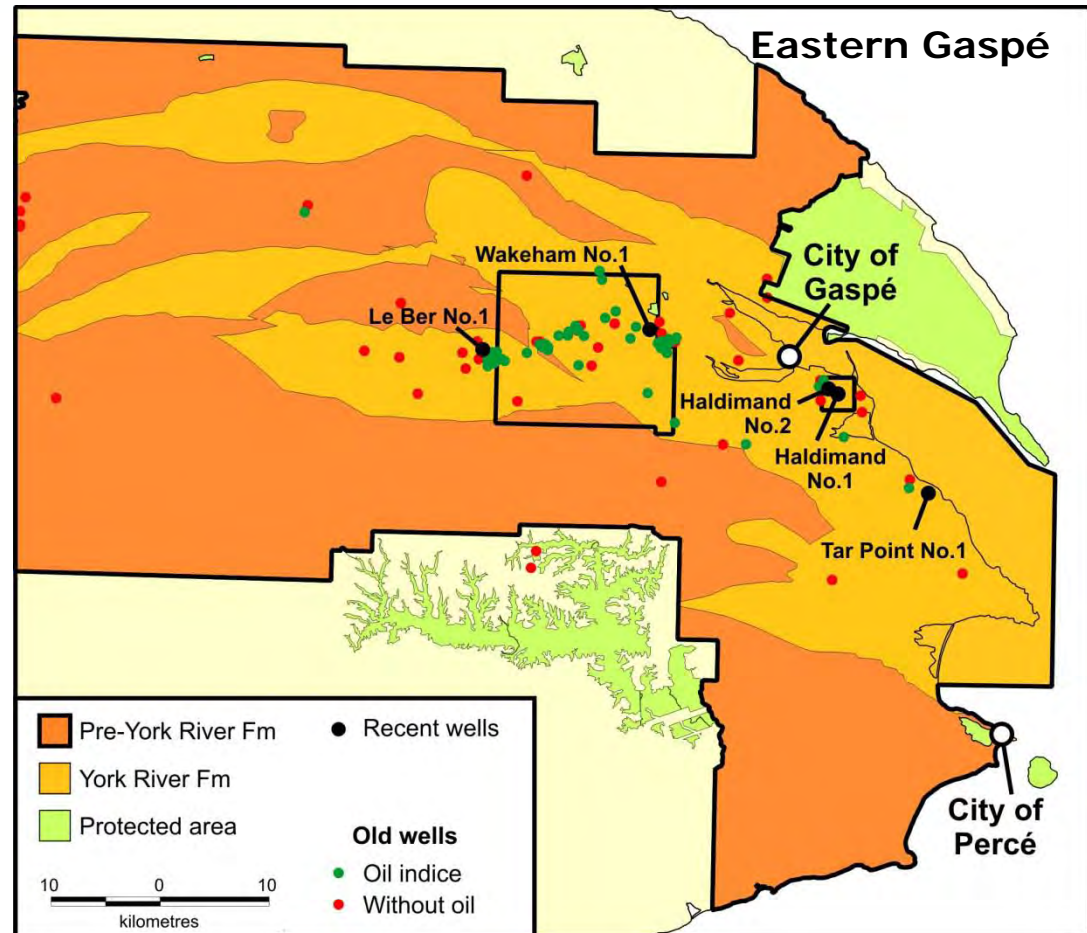
Previous Works in Gaspé

History

- About 50 oil seeps has been described in the Eastern Gaspé area.
- Most of these seeps occurs above the York River Formation
- Since 1860, 134 wells have been drilled in the Gaspé Peninsula region
- Most of these are old wells drilled without the support of seismic.

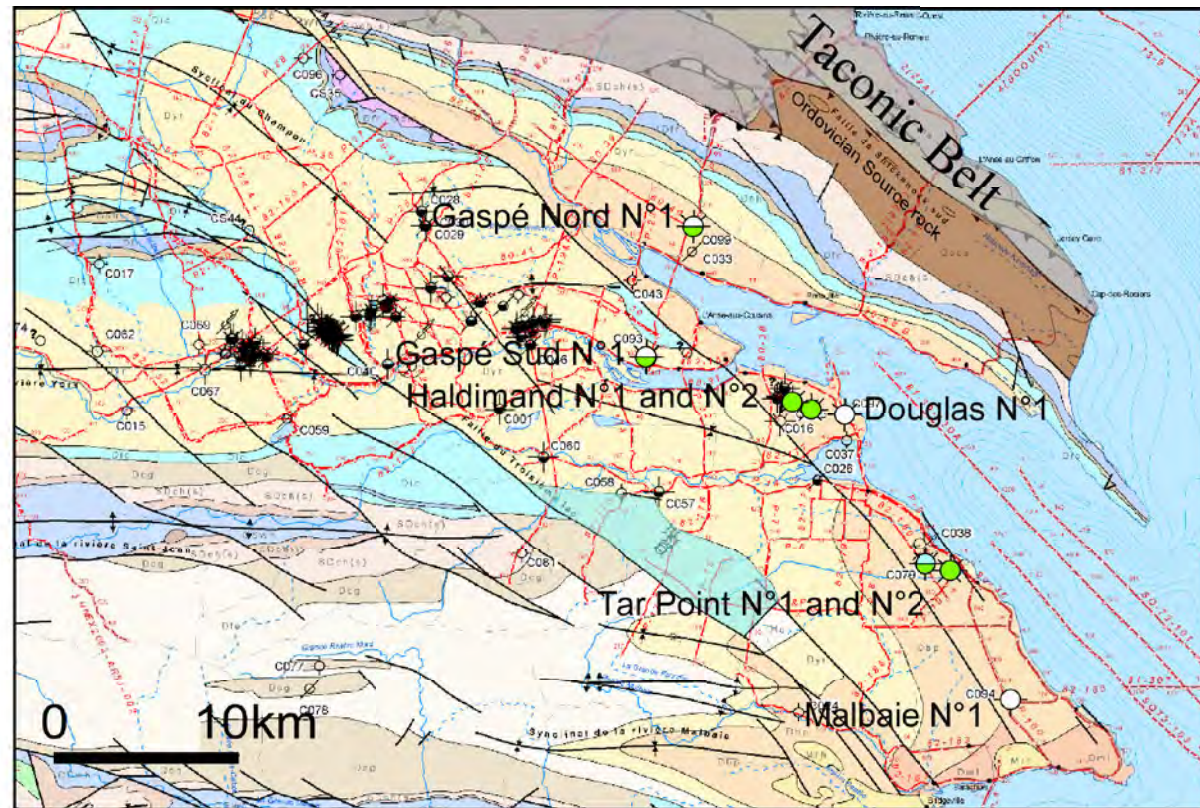
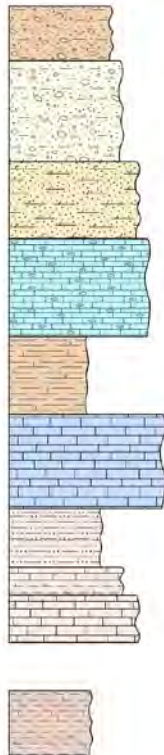
Haldimand play (Lower Devonian Sandstones)

- The Gaspé Sandstones were the first exploration targets in the eastern Gaspé Peninsula during the 19th century
- Since 1970, only 8 wells were drilled based on seismic studies with the York River as primary target.
- Pétrolia has drilled 5 of these wells
- Three of these wells have identified a potential oil play with large upside potential on a contiguous land base.
- Tight Reservoir
- Haldimand is believed to be the first commercially viable oil project in Quebec***



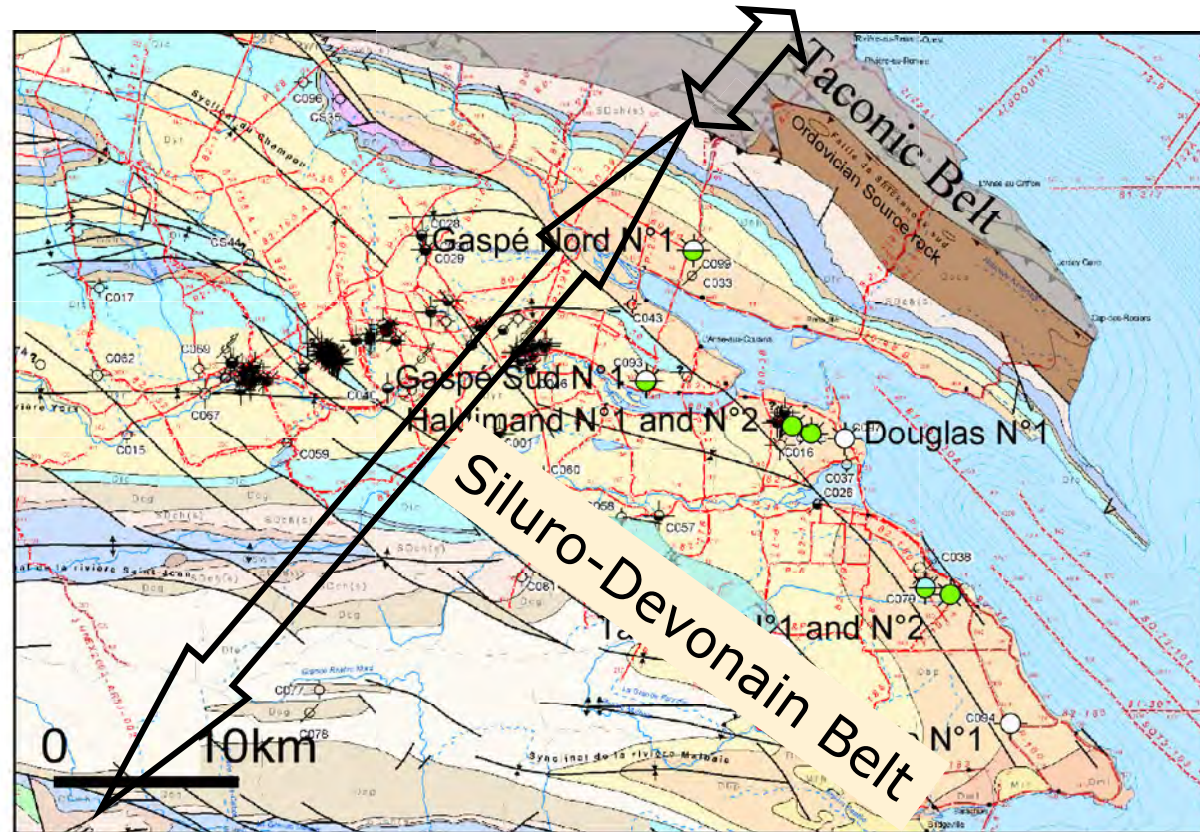
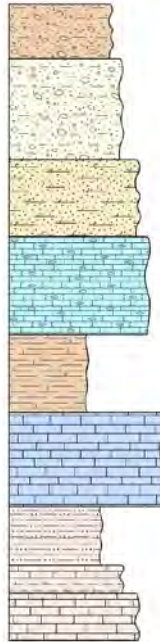
Geological Setting

SIL.	DEVONIAN		
	LATE	EARLY	MID.
Pridolian	CHALEURS	Lockovian	Forillon
			Indian Point
			Roncelles
			West Point
		Pragian	CHALEURS
			Shiphead
			Indian Cove
			UPPER GASPÉ LIMESTONES
		Emsian	York River
			Battery Point
			GASPÉ SANDSTONES
			Mid.
			Eifelien
			Malbaie

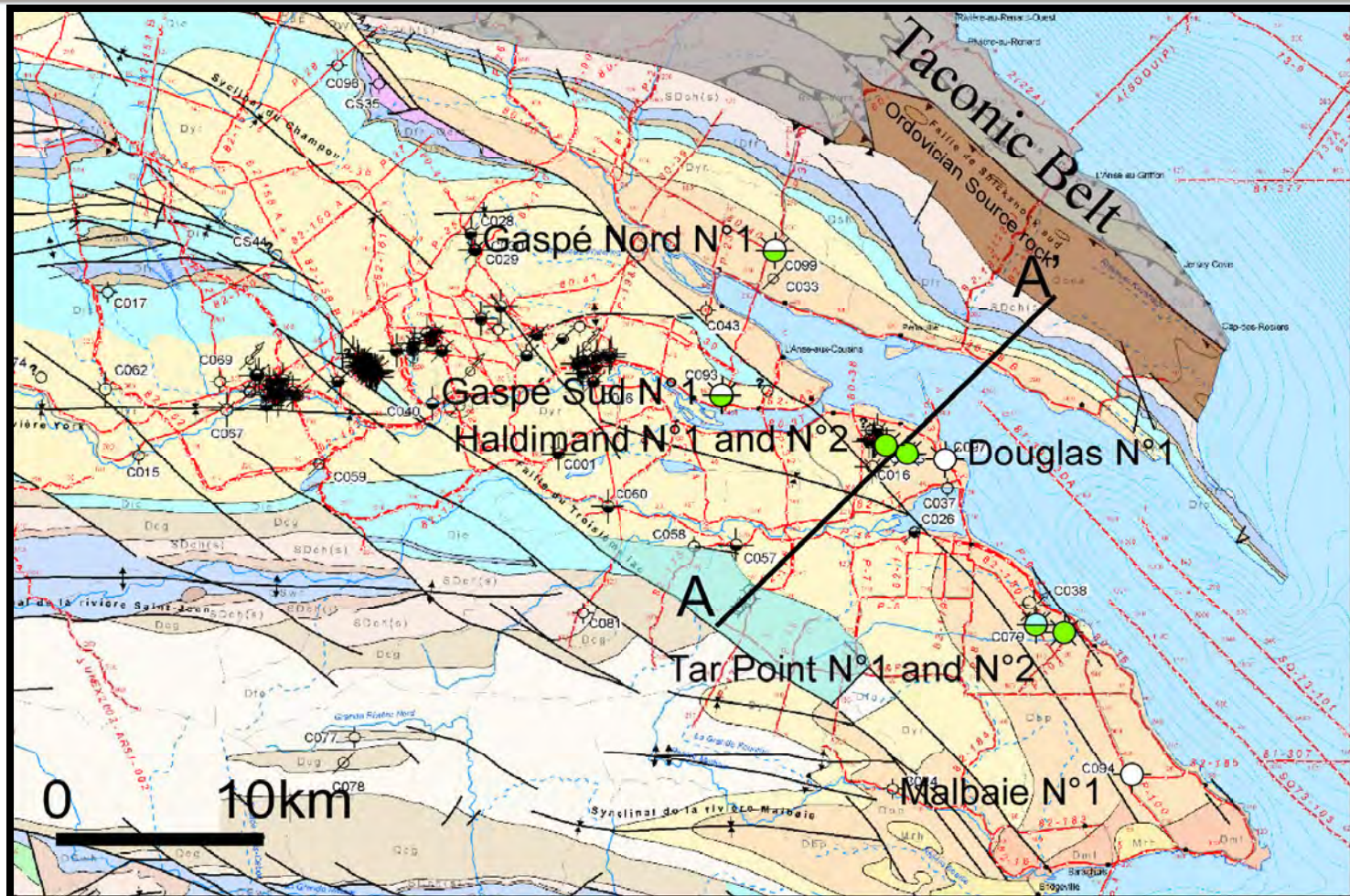


Geological Setting

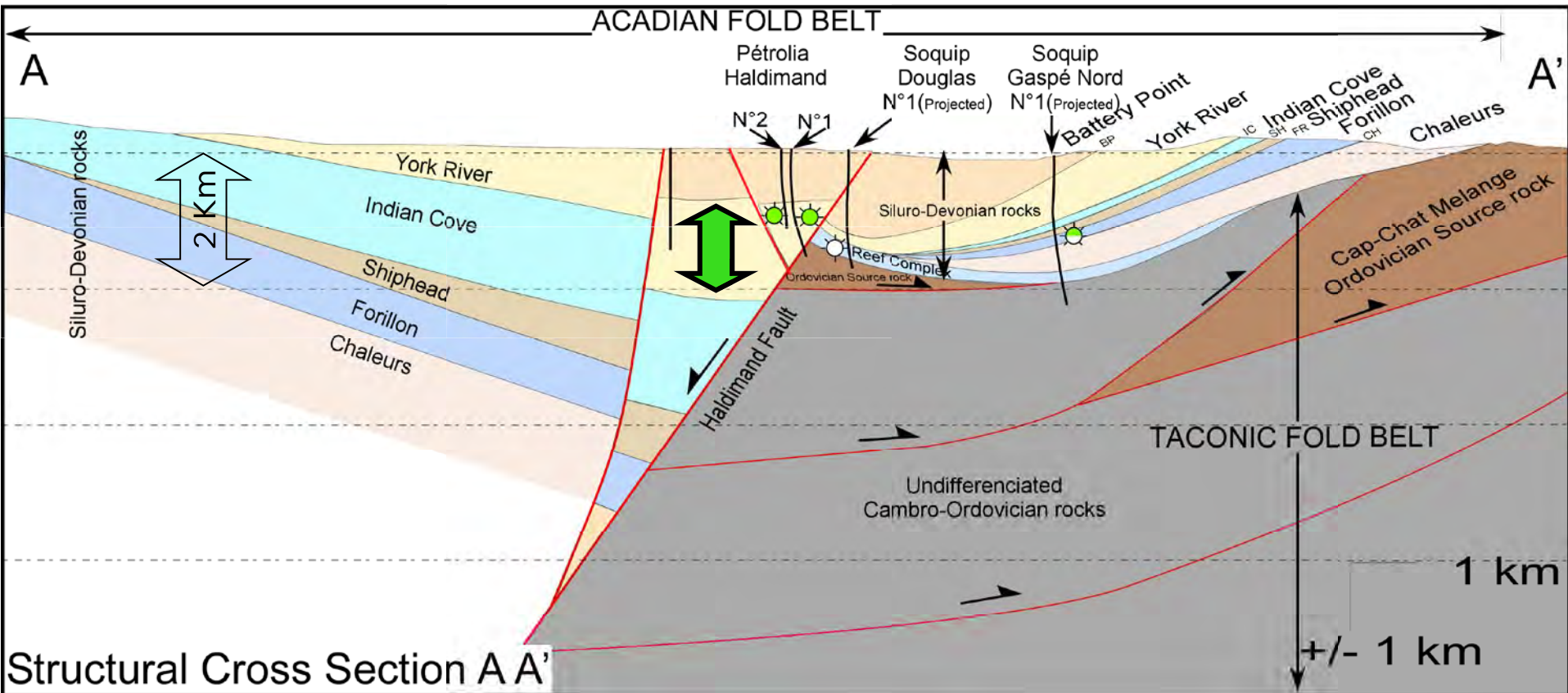
SIL.	DEVONIAN			
	EARLY		MID.	
	LATE			
Pridolian	CHALEURS	Forillon	Lockovian	Pragian
		Indian Point	UPPER GASPÉ LIMESTONES	Shiphead
		Roncelles		Indian Cove
		West Point	GASPÉ SANDSTONES	York River
Eifelian		Battery Point		
		Malbaie		



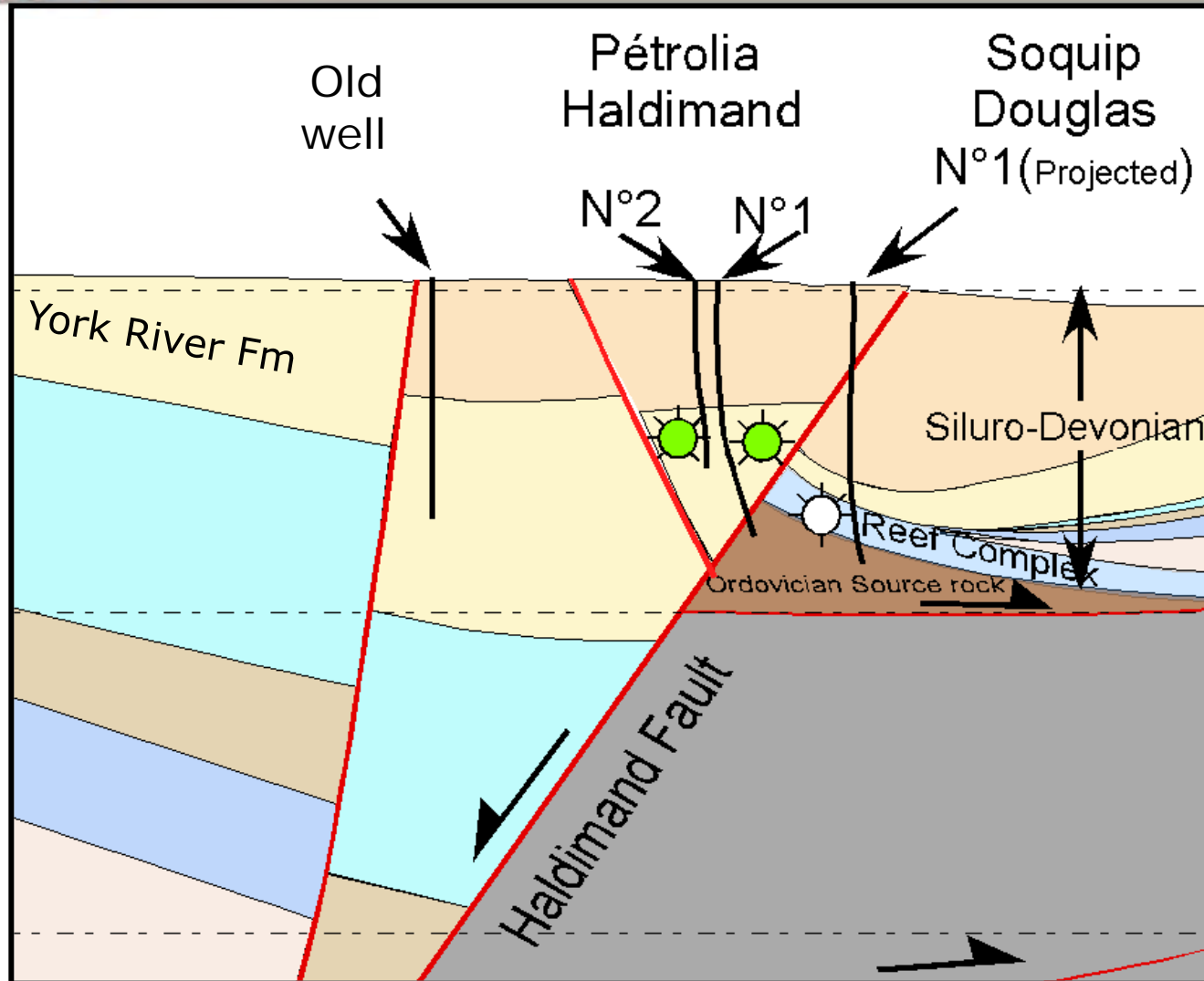
Geological Setting



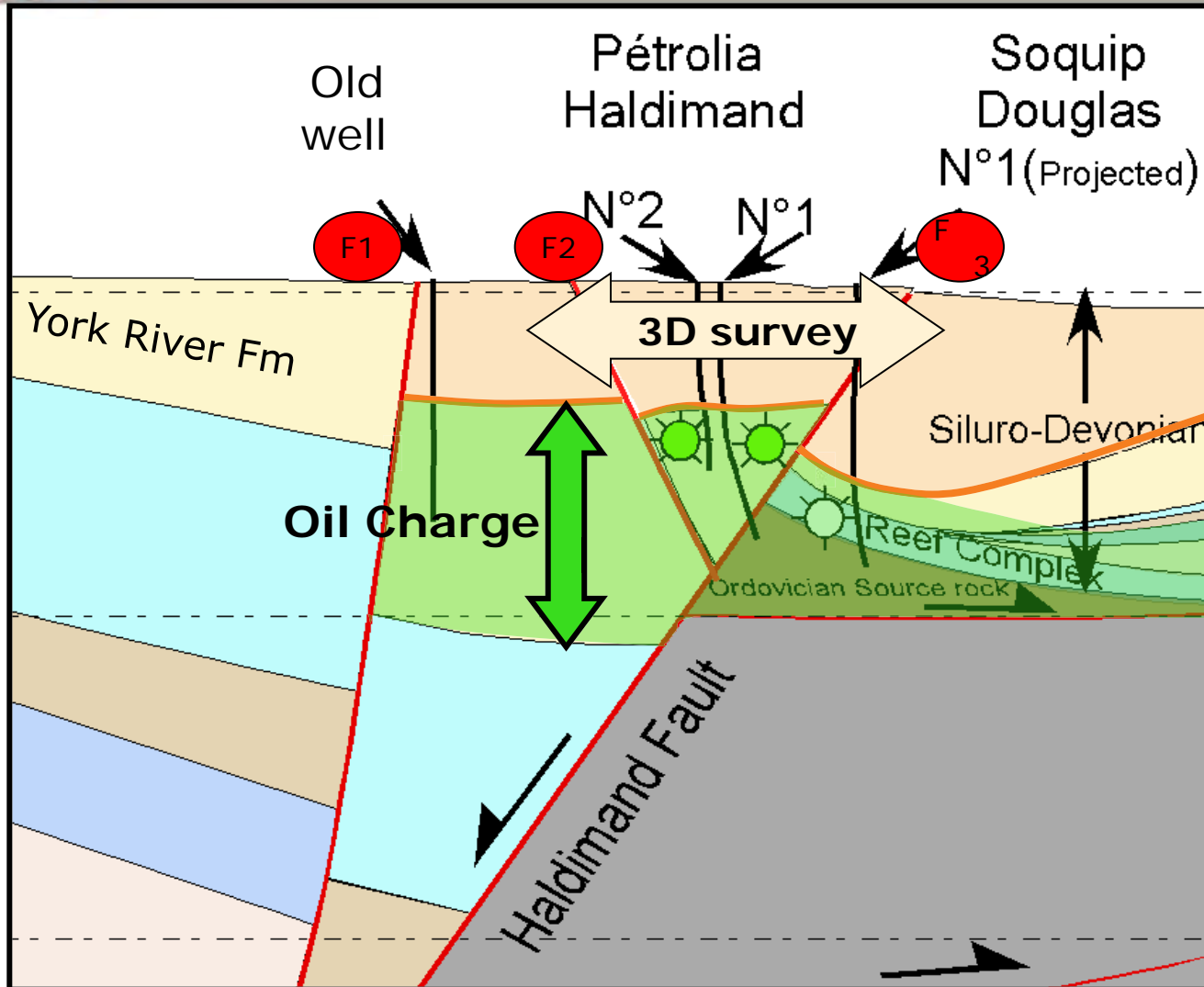
Geological Setting



Haldimand Light Oil Discovery



Haldimand Light Oil Discovery

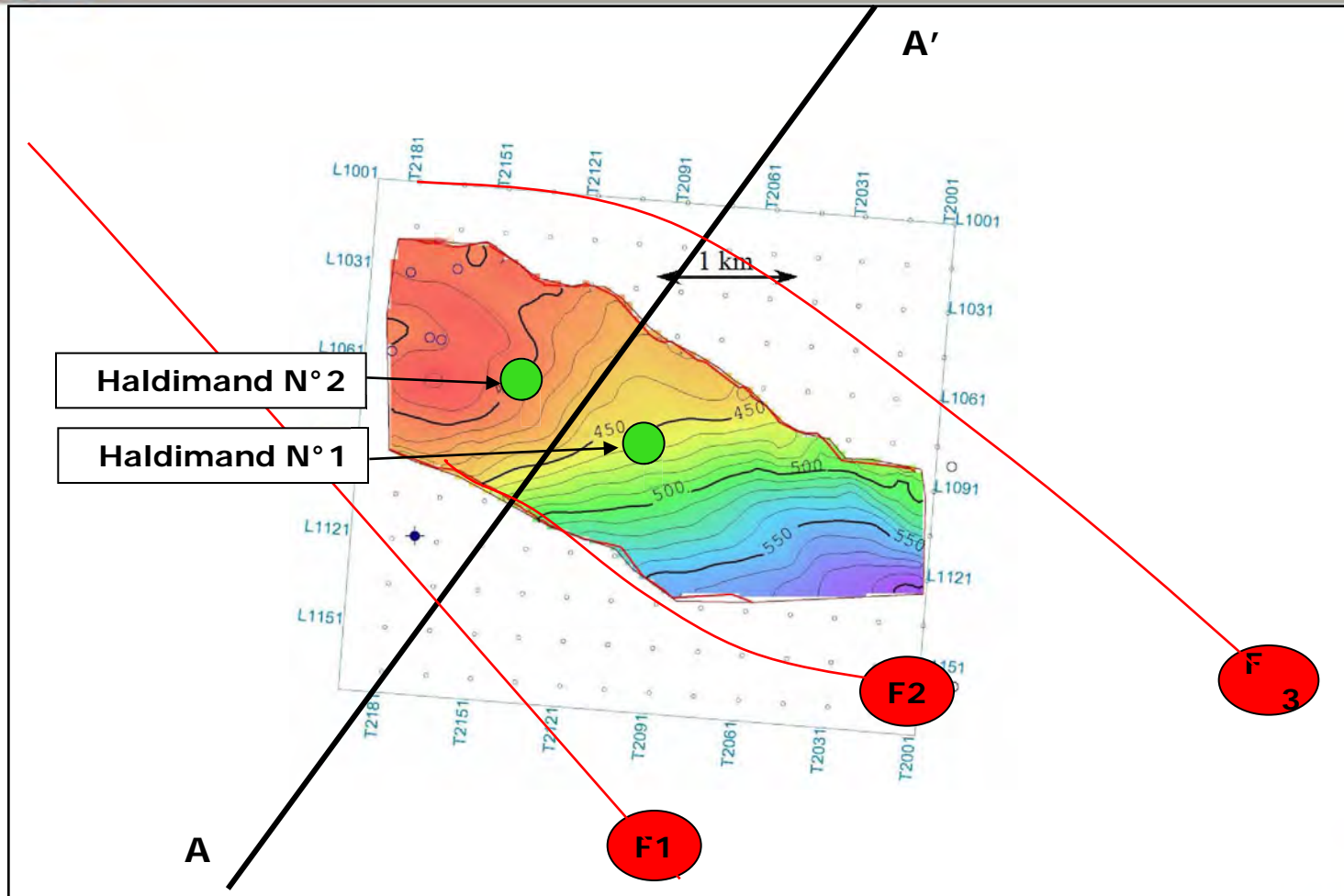


Haldimand Light Oil Discovery

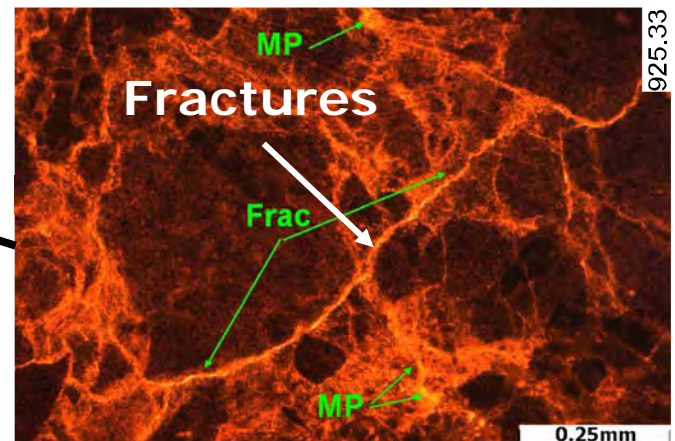
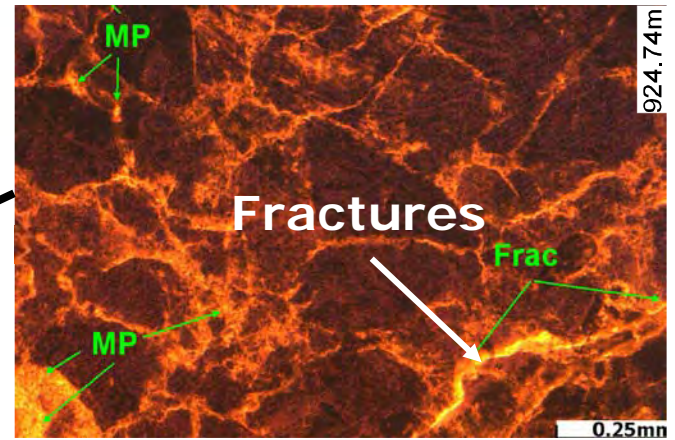
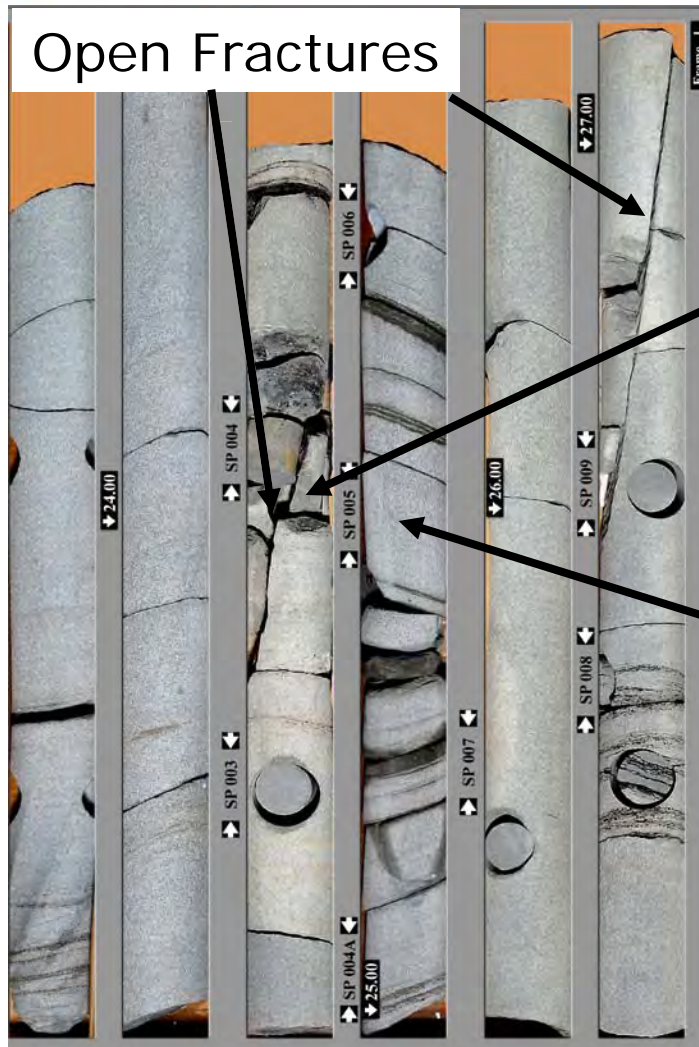
A new light oil unconventional play

Top York River Formation (TWT)

Closure of 4.8 km²



Reservoir Rock



US Bakken vs York River

Reservoir Lithology

- Bitumen rich, tight siltstone, sandstone, silty and sandy dolomite

Thickness

- Vertical pay ($\text{PHI} > 5\%$) = 2.4 m to 4.3 m

Permeabilities Range from Core

- 0.01 to 0.19 md (average 0.04 md)

Porosity Type

- Intergranular commonly related to open horizontal micro fractures

Porosity Range

- 3 to 16% (average 5%)

Oil Gravity

- 42° API at 60 °F (15.5°C)

Natural Fractures

- Open vertical fractures

Average Production per Well

- Antelope field
 - Vertical after frac: 209 bbls/day
 - Cumulative production per well: 307 000 bbls

Reservoir Lithology

- Bitumen rich, tight sandstone and / or siltstones and mudstones, dolomitic and calcitic cement,

Thickness

- Vertical pay ($\text{PHI} > 5\%$) = 170 m (gross 474 m)

Permeabilities Range from Core

- 0.01 to 2.74 md (average 0.04 md)

Porosity Type

- Intergranular commonly related to open micro fractures

Porosity Range

- 2 to 15% (Average 5%)

Oil Gravity

- 53° API at 60 °F (15.5°C)

Natural Fractures

- Open vertical fractures

Average Production per Well

- Haldimand field
 - Vertical after frac: ?

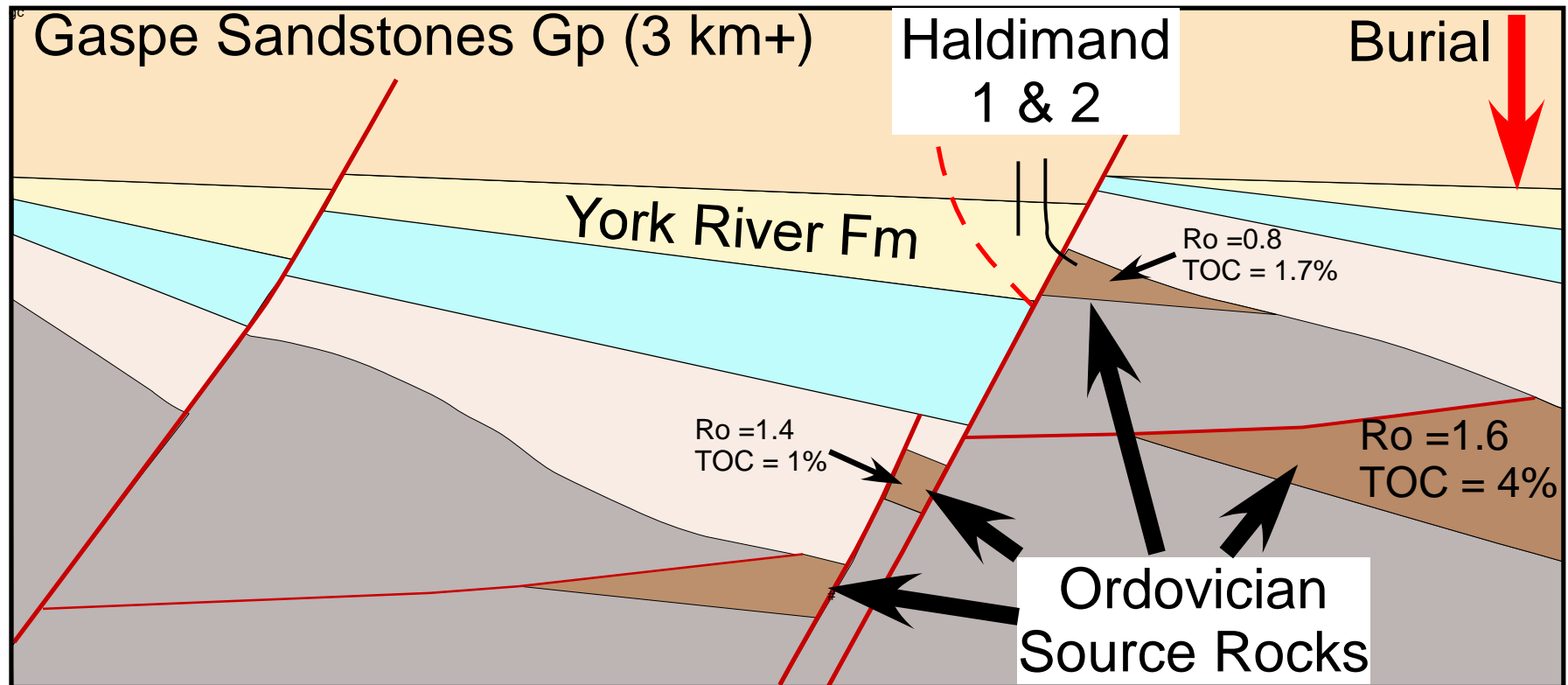


Unconventional play : Haldimand

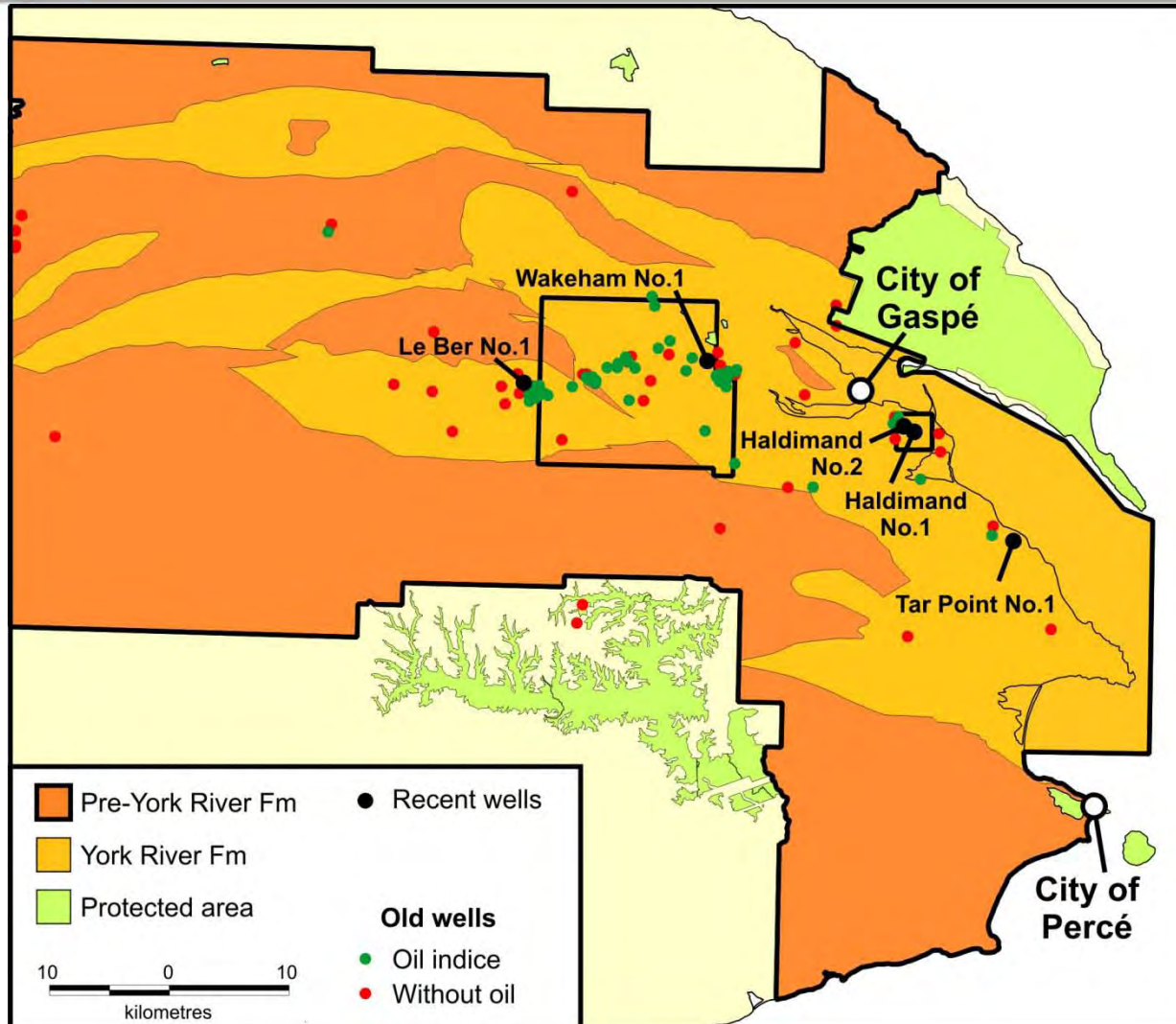
🔥 Haldimand

- First significant oil discovery in the Quebec Province - Light oil (53° API)
- 13 km² of 3D seismic
- Trap closure 4.8 km² - with up dip and down dip potential extensions
- Oil resource in place (4.8 km²- 69.7 millions barrels)
- 2 wells drilled on the structure
 - Pétrolia Haldimand N°1 - discovery well:
 - Pétrolia Haldimand N°2 - appraisal well (1 km from N°1 well)
- **Haldimand N°1**
 - Tested 22 m of net perforated intervals (130 m gross sandstone interval)
 - Average of 34 barrels /d - 12 days test
 - Presently producing at 10 barrels /day from a total of 42 m of net perforated intervals without artificial lift
- **Haldimand N°2**
 - Light oil on DST's
 - Gross reservoir interval : 474 m+ (oil saturated)
 - 170 m of net reservoir thickness (Phi > 5 %)
 - Tight reservoir with sub-vertical open fractures
 - Untested potential for deeper pay

Petroleum System

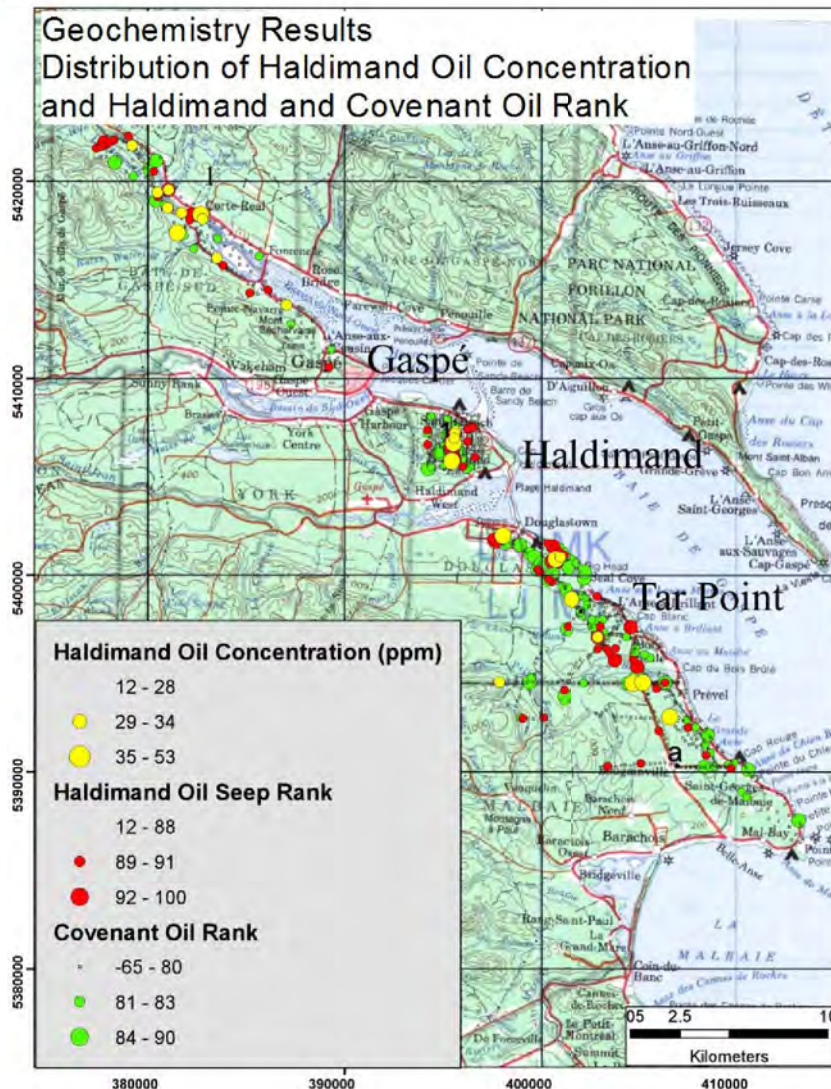


Resource Play?



- Oil has been produced from wells located in structural lows
- Early migration prior Mid-Devonian folding (Acadian Forldbelt)
- Most of the oil has been flushed
- Some of this oil has been preserved under unknown trapping mechanisms.

Micro Seeps Geochemistry



Next Steps

- 🔥 Pétrolia has drilled 5 wells in the Gaspé Block
- 🔥 The last 3 wells encountered light crude oil.
- 🔥 Fracking of the Haldimand No 2 well and Horizontal drilling of a third well on the Haldimand structure is planned
- 🔥 If successful the Company would look to future drilling with the goal of proving up a significant oil development project.



Conclusions

- Large light oil unconventional play in the York River Formation
- Significant upside potential
- Potential to become a resource play