

**INTERPRETATION REPORT - PORT-AU-PORT PENINSULA SEISMIC SURVEY
SEPTEMBER 1993 - APRIL 1994**

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Hunt Oil Company

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INTRODUCTION

In the winter of 1993/94 Hunt Oil Company conducted a seismic survey across Port-au-Port Peninsula, Newfoundland. Approximately 89 kilometres of data over 7 lines were acquired in a continuing effort to understand the structural geology of the area. Hunt had previously acquired a database of marine seismic in 1991 and 1992 covering portions of St. George's Bay, the Gulf of St. Lawrence and Port-au-Port Bay immediately adjacent to the peninsula.

The marine data set gave a partial understanding of the geological complexity of the area but did not reveal the structural significance of Port-au-Port Peninsula. The 1993/94 land seismic survey was instrumental in understanding the regional structural setting and how Port-au-Port Peninsula fit into that setting.

Port-au-Port Peninsula is rugged terrain with carbonates of the St. George's Platform in outcrop over a significant portion of the landmass. Despite a challenging acquisition environment the overall data quality from the survey was quite good.

Lines CaH-93-5 thru CaH-93-9 were shot in the dip direction (NW-SE) across the narrow dimension of the peninsula. These lines show high quality reflection information despite their short length. Lines CaH-93-4 and 4A were acquired in the strike direction (NE-SW) and were adequate for line to line correlation.

Continuation of the dip lines into both the Gulf of St. Lawrence and St. George's Bay would have been very useful for interpreting regional geology and tying existing marine data sets, however an acquisition crew capable of deploying "bay cables" or similar technology would have been needed.

INTERPRETATION

Previous seismic data from 1991/92 had led us to believe that the Acadian-aged "triangle zone" represented by the Tea Cove Thrust and imaged on marine line CaH-92-1 B would somehow be preserved across the Port-au-Port Peninsula. However, the dominant feature on the new dip lines (NW-SE), shows an inversion fault feature (the Round Head Fault) that brought Port-au-Port Peninsula to surface from an original depth of burial of at least 3000 metres. This uplift occurred subsequent to the emplacement of the triangle zone. The sediments of the Humber Arm Allochthon originally covering Port-au-Port Peninsula have been eroded off leaving exposed platform carbonates with small remnants of the allochthon preserved on the northern part of the peninsula, south and east of the town of Lourdes. Port-au-Port Peninsula represents the "hanging wall" of this thrust fault. The underlying "foot wall" can also be identified from seismic character.

With no subsurface control available, it was necessary to maximize the use of surface geology from Port-au-Port Peninsula to make a preliminary correlation to seismic reflectors. We knew from previous interpretive work that the top of the St. George's Platform carbonates would represent a major velocity

increase and a strong reflection event on the seismic data. We could also see a package of reflection events, interpreted to represent the platform sequence, that could be correlated from the foot wall to the hanging wall. We have tentatively identified these events by following them updip on the hanging wall to outcrop. They are:

"Blue" marker: top of the St. George's Platform sequence,

"Orange" marker: Campbell's Member within the Port-au-Port Group and

"Purple" marker: near the base of the Labrador Group, near top of basement? The platform sequence on the hanging wall can only be identified towards the northwest edge of Port-au-Port Peninsula; to the southeast the upper platform is eroded off and even the lower markers must be "phantomed" on the seismic data due to a decrease in fold in the shallow part of the seismic section.

The orange and purple markers have been mapped on the hanging wall but are of limited reliability due to data quality. The blue marker is already in outcrop or is eroded on the hanging wall and therefore has not been mapped.

All three reflections from the St. George's Platform have been mapped on the foot wall and show the continuation of a major structural feature first identified on the earlier marine data in the offshore. This structural feature may represent a drillable prospect and further exploration work will be conducted on it.

Line CaH-93-7 gives a hint of the western limit of the triangle zone. Immediately northwest of the Round Head Fault at a time of 1.4 seconds one can observe the divergence of the flat lying platform carbonates (below 1.4 seconds) and the overlying Goose Tickle and Lourdes Limestone formations as they are peeled back by the emplacement of the Humber Arm Allochthon. We interpret this to represent the "tip point" of the triangle zone as seen to the northeast on line CaH-92-1 B.

Line CaH-93-7 demonstrates the younger age of the Round Head Fault relative to the Humber Arm Allochthon and is the last evidence of the original triangle zone as one moves to the south. The correlation of the platform carbonate reflections from foot wall to hanging wall are also particularly clear on this line.

Line CaH-93-5 suggests another thrust fault feature exists on the foot wall to the northwest of the Round Head Fault. We have tentatively called this feature the St. George's Fault. It is poorly defined on line CaH-93-6 and is not visible on lines CaH-93-7 thru 9.

CONCLUSIONS

The Port-au-Port Peninsula seismic survey has provided the evidence to draw the following conclusions:

- Port-au-Port Peninsula is the hanging wall of a high angle reverse fault (the Round Head Fault) with vertical displacement of at least 3000 metres.
- The age of the Round Head Fault post-dates the emplacement of the (Acadian) Humber Arm Allochthon.
- Structural closures have been created on the foot wall of the Round Head Fault that represent valid exploration targets for hydrocarbon accumulations.
- Additional thrust fault features are evident on the foot wall to the northwest of the Round Head Fault. These faults are not well defined since they lie in the unimaged zone that separates the Port-au-Port land seismic survey from the previously acquired marine seismic data in the Gulf of St. Lawrence.

SEISMIC

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CAH 93-4A (s.p. 469-89) (Migrated DMO & DIP Moveout Stack)
CAH 93-4B (s.p. 1037-89) (Migrated DMO & DIP Moveout Stack)
CAH 93-5 (s.p. 109-368) (Migrated DMO & DIP Moveout Stack)
CAH 93-6 (101-471) (Migrated DMO & DIP Moveout Stack)
CAH 93-7 (s.p. 103-529) (Migrated DMO & DIP Moveout Stack)
CAH 93-8 (s.p. 153-621) (Migrated DMO & DIP Moveout Stack)

ENCLOSURES

Hanging wall of the Round Head Fault:

- | | |
|---------------------------------|-----------|
| 1. Orange Marker Time Structure | 1:100,000 |
| 2. Purple Marker Time Structure | 1:100,000 |

Foot wall of the Round Head Fault:

- | | |
|---|-----------|
| 3. Blue Marker Time Structure | 1:100,000 |
| 4. Orange Marker Time Structure | 1:100,000 |
| 5. Purple Marker Time Structure | 1:100,000 |
| 6. Fault Plane Time Structure of the Round Head Fault | 1:100,000 |

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