

## Petroleum Development

Annual
Activity Report
2009





## IN MEMORIAM

It is impossible to look back over 2009 without recalling the terrible tragedy that occurred on Thursday, March 12, 2009. Approximately 28 miles off the coast of St. John's, Flight 491 crashed into the ocean taking with it 17 lives, mostly residents of Newfoundland and Labrador. There was one survivor, Mr. Robert Decker of St. John's, NL.

Lost on that day were:

Thomas Anwyll Langley, BC

Gary Corbett Conception Bay South, NL

Peter Breen St. John's, NL

Captain Matthew Davis Holyrood, NL

Wade Drake Fortune, NL

Wade Duggan Witless Bay, NL

Keith Escot Goulds, NL

Corey Eddy Sibley's Cove, NL

Colin Henley St. John's, NL First Officer Tim Lanouette Comox, BC

Ken MacRae Kingston, NS

Greg Morris Logy Bay-Middle Cove-Outer Cove, NL

Allison Maher Aquaforte, NL

Derek Mullowney Bay Bulls, NL

Burch Nash Fortune, NL

John Pelley Deer Lake, NL

Paul Pike Shearstown, NL

# Department of Natural Resources Petroleum Development Annual Report - 2009

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## **Executive Summary**

Newfoundland and Labrador has established itself as a significant net energy producer. Few jurisdictions in North America can match the immense combined value of the Province's energy resources, which include oil, gas, hydroelectricity, wind and other resources.

First oil was produced from the Hibernia offshore production platform in 1997 and since that time the oil and gas industry in Newfoundland and Labrador has developed and grown substantially. In January 2009 Newfoundland and Labrador celebrated another significant milestone with cumulative oil production reaching one billion barrels. The province's three producing projects, Hibernia, Terra Nova, and White Rose, produced approximately 100 million barrels of oil in 2009. The oil and gas sector has become an increasingly important part of the Newfoundland and Labrador economy and now accounts for approximately 40% of the provincial Gross Domestic Product (GDP) and 2% of total employment.

Additional projects were under development in 2009 and recent exploration successes point to new projects on the horizon. The province and co-venture partners for the Hibernia South Extension project continue to advance work on completing final agreements resulting from the Memorandum of Understanding for development of the southern region of the Hibernia field. As well, construction and installation of components for the North Amethyst project continued in 2009. Once development is completed for the Hibernia South expansion and the White Rose expansion projects the co-venture partners will have access to additional reserves totaling approximately 220 million and 150 million barrels of oil respectively.

ExxonMobil, the designated operator of the Hebron field, has opened a project office in St. John's, NL and has announced that four joint-venture groups have been short-listed to bid on the design of the topsides for the production platform. Construction of the multi-billion dollar gravity-based structure for Hebron will take place at the Bull Arm industrial fabrication site.

The Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) successfully completed a Calls for Bids for the rights to explore offshore Newfoundland and Labrador in 2009. Work expenditure bids totaling in excess of \$47 million were accepted on four parcels of land. The 2009 Calls for Bids followed on the heels of two other successful rounds that attracted in excess of \$300 million in work expenditure commitments in 2007 and 2008. At December 31, 2009 there were in excess of \$870 million in outstanding work commitments demonstrating industry's interest and confidence in the prospectivity of Newfoundland and Labrador's numerous sedimentary basins.

The rig sharing agreement signed by Husky Energy, Statoil and Suncor Energy for the drilling rig Henry Goodrich, as well as the arrival of the modern drillship, Stena Carron, enhanced exploration activity in 2009. Statoil completed an exploration well at the Mizzen prospect in the Flemish Pass Basin and while no formal well results have been released, the filing of a Declaration of Significant Discovery by Statoil indicates hydrocarbons were discovered. Suncor, utilizing the Henry Goodrich, subsequently drilled an exploration well at the Ballicatters prospect in the Jeanne d'Arc Basin. This well was designed to test prospects on adjacent exploration licenses. In the case of one of the prospects, the well was spud the same year that the license was issued, indicating Suncor's strong belief for petroleum potential in the area. Late in 2009 the Stena Carron arrived in Newfoundland and Labrador waters to commence drilling at the East Wolverine prospect in the Laurentian Basin for ConocoPhillips and their co-venture partner, BHP Billiton. This well will be the first operated by ConocoPhillips in Newfoundland and Labrador territorial waters.

ExxonMobil and co-venture partners completed a large resistivity mapping program in the Orphan Basin in 2009 and, pending partner and regulatory approvals, it is anticipated the Stena Carron could drill a second well in the Orphan Basin in 2010. Also, project descriptions were filed at the C-NLOPB in 2009 by Husky Energy, Chevron Canada and Investcan Energy to conduct major 2D and 3D seismic programs on the Labrador Shelf in 2010. ConocoPhillips Canada and Husky Energy continue with their work in the southern Grand Banks region with seismic plans submitted to the C-NLOPB for work in the Laurentian Basin and the Sydney Basin respectively.

The western portion of the province is also enjoying record levels of onshore exploration activity. In 2009 Vulcan Minerals completed drilling the first two of a three well \$15 million exploration program. The company has reported that both wells encountered an active petroleum system and analysis of the well results is ongoing. Nalcor Energy - Oil and Gas, a wholly owned subsidiary of the province's energy corporation, obtained majority interest in three onshore permits on the northern peninsula in 2009. Planning for a \$20 million, three well exploration program, slated to commence in 2010 is underway.

To date Newfoundland and Labrador has discovered reserves of 3 billion barrels of oil and 11 trillion cubic feet of natural gas. Geoscience data indicate that a further 6 billion barrels of oil and 60 trillion cubic feet remain undiscovered. In 2009 Newfoundland and Labrador continued to benefit from world class discoveries and development, and industry continued to demonstrate strong interest and confidence in the petroleum potential of the province.

#### Introduction

Newfoundland and Labrador, Canada's most easterly province, is home to numerous sedimentary basins containing hydrocarbon systems. This report discusses petroleum resource exploration and development activity that occurred both onshore and offshore in Newfoundland and Labrador during 2009.

The Province benefited from the rebound and gradual increase in oil prices in 2009 (as shown in Figure 1 below) and experienced a very successful year in both exploration and development activity. The province boasts three world class producing oil projects; Hibernia,

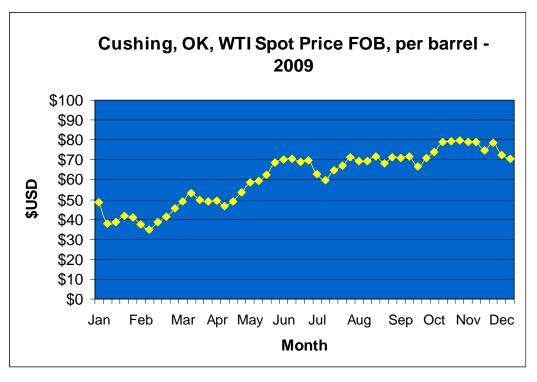


Figure #1 - WTI Spot Price

Terra Nova, and White Rose, and a fourth, Hebron, under development. In 2009 the Province announced that it had signed a Memorandum of Understanding (MOU) with the Hibernia partners for the development of the southern portion of the Hibernia field. Approval was later granted by the C-NLOPB to the Hibernia partners to commence development of the "AA" blocks which is estimated to contain approximately 50 million barrels of oil. Production from this portion of the field commenced late in 2009. Work also continued on the White Rose expansion project as subsea components were installed in 2009 and oil production from the North Amethyst field, estimated to contain 68 million barrels, is expected in the first half of 2010.

Table #1 - Petroleum Reserves<sup>1</sup> and Resources<sup>2</sup> Newfoundland and Labrador offshore Area

<u>Oil</u>			Gas		NGLs <sup>3</sup>	
Field Name	Million m <sup>3</sup>	MMBbls	Billion m <sup>3</sup>	bcf	Million m <sup>3</sup>	MMBbls
Hibernia	197.8	1244	50.6	1796	32.2	202
Terra Nova	66.6	419	1.5	53	0.6	4
Hebron	92.4	581				
White Rose	48.4	305	85.3	3023	15.3	96
Ben Nevis	18.1	114	12.1	429	4.7	30
West Bonne Bay	5.7	36				
North Amethyst	10.8	68	8.9	315		
West Ben Nevis	5.7	36				
Mara	3.6	23				
North Ben Nevis	2.9	18	3.3	116	0.7	4
Springdale	2.2	14	6.7	238		
Nautilus	2.1	13				
King's Cove	1.6	10				
South Tempest	1.3	8				
East Rankin	1.1	7				
Fortune	0.9	6				
South Mara	0.6	4	4.1	144	1.2	8
North Dana			13.3	472	1.8	11
Trave			0.8	30	0.2	1
Sub Total (Grand Banks)	461.8	2905	186.6	6,616	56.7	356
North Bjarni			63.3	2247	13.1	82
Gudrid			26	924	1	6
Bjarni	1		24.3	863	5	31
Hopedale			3	105	0.4	2
Snorri			3	105	0.4	2
Sub Total (Labrador Shelf)			119.6	4244	19.9	123
Total	461.8	2905	306.2	10,860	76.6	479

<sup>1 &</sup>quot;Reserves" are volumes of hydrocarbons proven by drilling, testing and interpretation of geological, geophysical and engineering data, that are considered to be recoverable using current technology and under present and anticipated economic conditions. Oil reported for Hibernia, Terra Nova, and White Rose fields are classified as reserves.

Source: C-NLOPB

<sup>2 &</sup>quot;Resources" are volumes of hydrocarbons, expressed at 50% probability, assessed to be technically recoverable that have not been delineated and have unknown economic viability. Gas, NGLs3, and oil in undeveloped fields are currently classified as resources.

<sup>3 &</sup>quot;Natural Gas Liquids" (NGLs) are derived from natural gas, which is the portion of petroleum that exists in either the gaseous phase or in solution in crude oil in natural underground reservoirs. (NGL estimates have not been updated since 2006).

During 2009 the three projects, Hibernia, Terra Nova, and White Rose, produced a total of 97.7 million barrels of oil. Total cumulative production reached 1.09 billion barrels since first oil production occurred back in 1997. Details on each of the three producing projects can be found in Section 1 of this report while status updates on the projects under development can be found in Section 2.

As of December 31, 2009, Newfoundland and Labrador had less than 10% of prospective onshore and offshore land held under license. The total potential acreage, as outlined on the Sedimentary Basin Map on page 4, is in excess of 80 million hectares offshore and 1.5 million hectares onshore. Note that the numerous offshore sedimentary basins are located throughout Newfoundland and Labrador, whereas, onshore potential is focused around the western portion of the province only.

Petroleum activity in Newfoundland and Labrador is regulated by two distinct authorities. For offshore activity, the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) is responsible, on behalf of the Government of Canada and the Government of Newfoundland and Labrador, for petroleum resource management. With respect to the onshore, the Government of Newfoundland and Labrador has sole management authority.

The C-NLOPB issues land rights in three different classes; exploration licenses, significant discovery licenses and production licenses. As of December 31, 2009 the C-NLOPB had 38 exploration licenses, 48 significant discovery licenses and 8 production licenses on record. During 2009 successful work expenditure bids totaling in excess of \$47 million were received on four additional offshore parcels. Exploration licenses will be issued on these land parcels early in 2010 when all relevant terms and conditions are met. Also, at year end, Statoil had an application for a Declaration of Significant Discovery posted with the C-NLOPB which could result in another significant discovery license being issued.

With respect to the onshore, the Government of Newfoundland Labrador issues land rights in two classes; exploration permits and production leases. As of December 31, 2009 there were 9 exploration permits and one production lease on record. The exploration permits were issued in three general areas in western Newfoundland; Flat Bay, Deer Lake, and Parsons Pond. A total of 288,500 hectares are held under permit in all three areas. The production lease has been issued to PDI Production Inc at the Garden Hill South site located on the Port au Port Peninsula in western Newfoundland. Details on the activity at the Garden Hill Site are described on page 22 in Section 3 of this report. A breakdown of the onshore and offshore license/lease locations and the respective interest holders' representative is provided in Appendix A.

Legend Mesozoic Basins Upper Paleozoic Basins Lower Paleozoic Basins **Exploration Licence Exploration Permit** Significant Discovery Licence HOPEDALE Production Licence BASIN Production Lease 2009 Calls for Bids (Closed) Boundaries Oil and Gas Gas LABRADOR Happy Valley-Goose Bay ST. ANTHONY BASIN ORPHAN BASIN ANTICOST BASIN JEANNE D'ARC BASIN FLEMISH MARITIMES BASIN LAURENTIAN Atlantic Ocean

Figure #2 - Sedimentary Basins of Newfoundland and Labrador

As of December 31, 2009 there was a total of 649,619 kilometers and 1,432,834 kilometers of 2D and 3D seismic data respectively collected offshore. An additional 1056 kilometers of 2D seismic data has been obtained onshore. In 2009 ExxonMobil completed a controlled-source electromagnetic survey in the Orphan Basin which resulted in 1829 line kilometers of data. Onshore, the Province of Newfoundland and Labrador completed a high resolution aeromagnetic survey which resulted in 62,890 kilometers of line data collected. This data has been processed and made available to the public for review and further analysis.

In 2009 a total of 12 new wells were spudded and/or completed including 3 exploration and 9 development wells. This brings the total number of wells drilled offshore to 351. A total of 49 significant discovery licenses have been issued by the C-NLOPB in 24 areas including 5 on the Labrador Shelf and 19 on the east coast Grand Banks. For offshore Labrador, the total discovered recoverable resource (C-NLOPB estimate expressed at a 50% probability of occurrence) is 4.24 trillion cubic feet of natural gas and 123 million barrels of natural gas liquids. For the northeast Grand Banks region, total discovered recoverable resource is estimated by the C-NLOPB at 2.905 billion barrels of oil, 6.6 trillion cubic feet of natural gas and 356 million barrels of natural gas liquids (Table #1 - page 2).

Strong interest in exploration continued in 2009 with the receipt of successful work expenditure bids on four offshore parcels of land. The value of work expenditure bids received was in excess of \$47 million which raised the total outstanding work expenditure commitments for offshore exploration to in excess of \$870 million at year end. As a result of the rig sharing agreement for the semi-submersible drilling rig, Henry Goodrich, as well as the arrival of the modern drillship, Stena Carron, three new exploration wells were spudded/completed in 2009. Details on the status of each of these wells are outlined in Section 3 of this report - Regional Activity Update.

It is expected that the Labrador Shelf and the southern portion of the Grand Banks will see significant exploration work throughout 2010. Husky Energy, Chevron Canada and Invest-can Energy have all filed project descriptions to conduct 2-D and 3-D seismic programs in the Labrador sea area whereas ConocoPhillips and Husky are planning seismic work in the Laurentian and Sydney Basins respectively. This combined with the fact that the Henry Goodrich will remain on contract throughout 2010 and, the expectation that the Stena Carron will drill another well in the Orphan Basin in 2010, bodes well for a continued high level of exploration activity in 2010.

## **Producing Projects Summary**



**Hibernia GBS** 

#### Hibernia

The Hibernia field, discovered in 1979, is located about 315 kilometres east southeast of St. John's, NL in 80 metres of water. A fixed production platform, consisting of a gravity-based structure (GBS) and topsides drilling and production facilities are being utilized to produce the field. The GBS and one of the five topside super modules were constructed at a purpose built site in Bull Arm, NL. The four other super modules were fabricated in Korea and Italy before being transported to Bull Arm for fi-

nal assembly. The platform is 224 metres tall, weighs 1.2 million tonnes and can store 1.3 million barrels of oil. Shipments of oil from Hibernia are offloaded at the purpose built transshipment facility at Whiffen Head, Placentia Bay, NL.

First oil occurred from the Hibernia field on November 17th, 1997, at 1:40 p.m. and the first tanker load of crude oil was off-loaded in late December, 1997. Hibernia field development

was based on original recoverable oil reserve estimates of 520 million barrels from the Hibernia and Ben Nevis/Avalon reservoirs at an average annual oil production rate (APR) of 110,000 barrels of oil per day (bopd). The latest C-NLOPB recoverable reserve estimates for Hibernia includes 1.244 billion barrels of oil, 1.796 tcf of natural gas, and 202 million barrels of natural

Hibernia Ownership		
Exxon-Mobil	33.125%	
Chevron	26.875%	
Suncor	20%	
Canadian Hibernia Holding Corp.	8.50%	
Murphy Oil	6.50%	
Statoil ASA	5%	

gas liquids. The current approved annual production rate is 220,000 barrels of oil per day.

During 2009 five wells were spud and/or completed bringing the total number of development wells being utilized at the Hibernia field to 62. They include 34 oil producers, 22 water injectors and 6 gas injectors. Hibernia produced 45.9 million barrels of oil during 2009 giving an average daily production of 125,622 bopd. Cumulative oil production to December 31, 2009, was 666.6 million barrels.

In June, 2009 it was announced that the Hibernia project had reached payout; the time at which all development costs have been recovered. As a result of this milestone, the Province of Newfoundland and Labrador is now receiving a royalty rate of 30% of net revenues for oil

extracted from the main part of the Hibernia field.

The Hibernia well construction team has established itself as a world leader in extended reach directional drilling. Development wells are being directionally drilled from two rigs on the GBS into the Hibernia Sandstone which lies at a depth of about 3,800 metres and the Ben Nevis/Avalon Sandstone at about 2,400 metres. In 2004 the B-16 36 well intercepted the Hibernia Sands at a depth of 3,960 metres with a horizontal displacement of 7,232 metres, establishing a world record at that time for horizontal displacement at such a depth. In 2005, Hibernia drilled and completed a dual injection well, Hibernia B-16 50, which penetrated two targets through two different reservoirs. More recently in July 2009, the B-16 56 well was re-entered with plans to drill an oil producer to the A block feature having a planned total depth of 10,136 metres. As of December 31, 2009 the well was suspended.

Figure #4 on page 8 details the scope of the field development in terms of well locations and is indicative of the creative technical solutions that are being developed to optimize resource recovery at the Hibernia field.

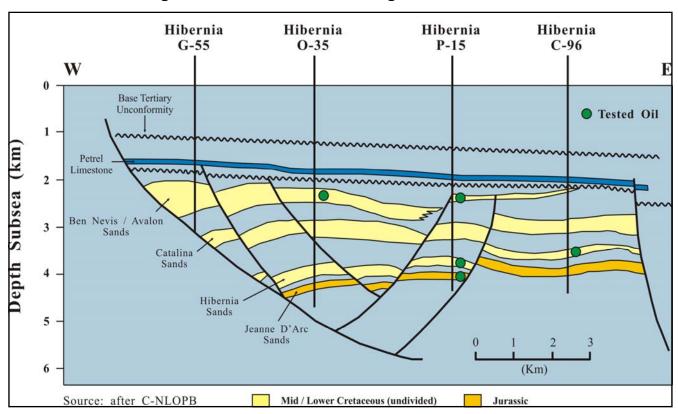


Figure #3 - Hibernia Field Geological Cross Section

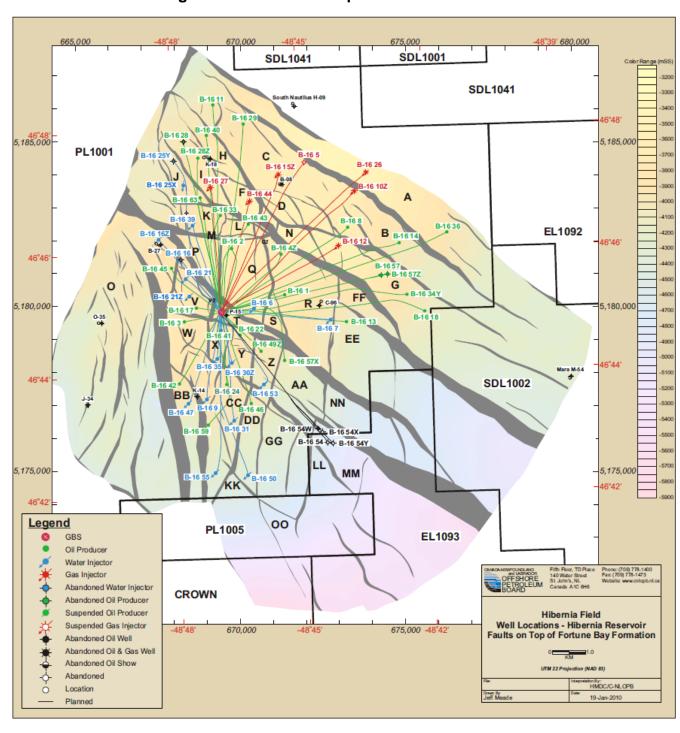


Figure #4 - Structure Map of Hibernia Reservoir

#### Terra Nova

The Terra Nova field was discovered by Petro-Canada in 1984 about 35 km southeast of Hibernia, in 90 metres of water. The Terra Nova K-08 discovery well flow-tested 10,000 barrels of oil per day from the Jurassic Jeanne d'Arc Sands. Five successful delineation wells tested at rates ranging from 5,000 to 25,000 bopd.

On August 4th, 2001, the Terra Nova Floating Production Storage and Offloading (FPSO) vessel arrived at the field and first-oil flowed on January 20th, 2002. The Terra Nova FPSO was the first of its kind to be used in



**Terra Nova FPSO** 

North America and included the largest disconnectable turret mooring system in the world. It is double hulled, with oil cargo tanks capable of holding up to 960,000 barrels of oil.

The underwater portion of the production system is protected from the environment as glory holes were excavated in the seabed to protect the subsea templates from iceberg scour (See Figure #6, page 11).

Terra Nova Ownership		
Suncor	29%	
Exxon-Mobil	22%	
Husky Oil	17.50%	
Statoil ASA	15%	
Murphy Oil	12%	
Mosbacher Operating	3.50%	
Chevron Canada	1%	

Geologically, the field in the Jeanne d'Arc reservoir consists of three fault-defined blocks designated as the Graben, East Flank and Far East blocks. In 2009 the C-NLOPB increased the recoverable reserve estimate for the project to 419 million barrels of oil, 53 bcf gas and 4 million barrels of gas liquids. The approved annual production rate is 180,000 barrels of oil per day. During 2009 one water injection well was re-entered and sidetracked (G-90 4Z) bringing the total number of development wells drilled to 27. This consists of 15 oil producers, 9 water injectors and 3 gas injectors.

The field averaged 79,534 bopd during 2009 with production for the year of 29.0 million barrels. Cumulative field production to the end of 2009 was 286.5 million barrels. Production during 2009 was slightly lower than projected as a result of a gear box failure on one of the facility's main power generators which resulted in lower than planned gas injection volumes. The problem has since been corrected and production rates returned back to normal levels in the latter part of the year.

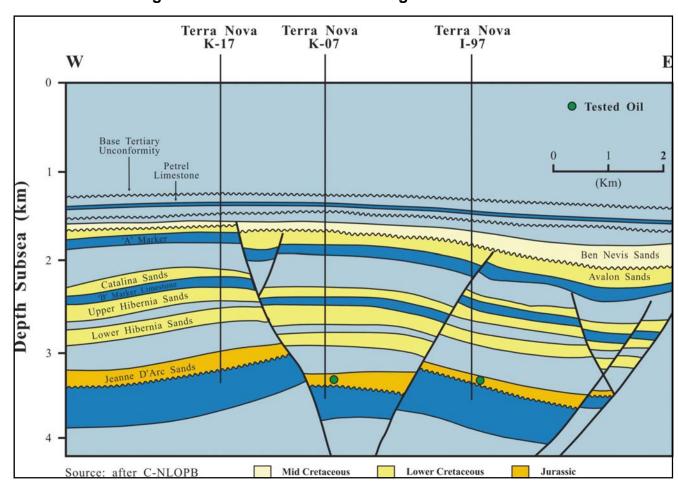
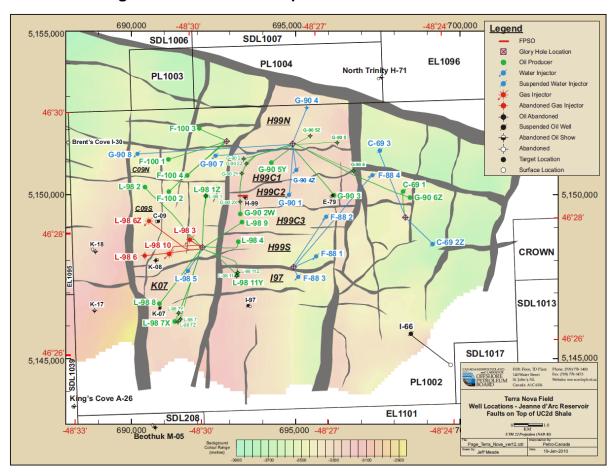


Figure #5 - Terra Nova Field Geological Cross Section

Figure #6 - Terra Nova Floating Production Storage and Offloading Facility



Figure #7 - Structure Map of Jeanne d'Arc Reservoir



#### **White Rose**

Discovered in 1984 by Husky Energy, the White Rose field is located in 120 metres of water within the Jeanne d'Arc Basin, approximately 350 km southeast of St. John's, NL. In 1984, the White Rose N-22 discovery well tested at 900 bopd, 25 million cubic feet per day of natural gas and 840 bopd of condensate.

White Rose Ownership		
Husky Energy	72.50%	
Suncor	27.50%	

During 1987-88, the White Rose E-09 delineation well encountered 94 metres of net oil pay and tested at 5,000 bopd and 4 million cubic feet per day of natural gas. In addition, the *J-49* delineation well flowed oil at 3,000 bopd and gas at 10 million cubic feet per day while the *L-61* delineation well tested gas at 24 million cubic feet per day and condensate at 436 bopd.

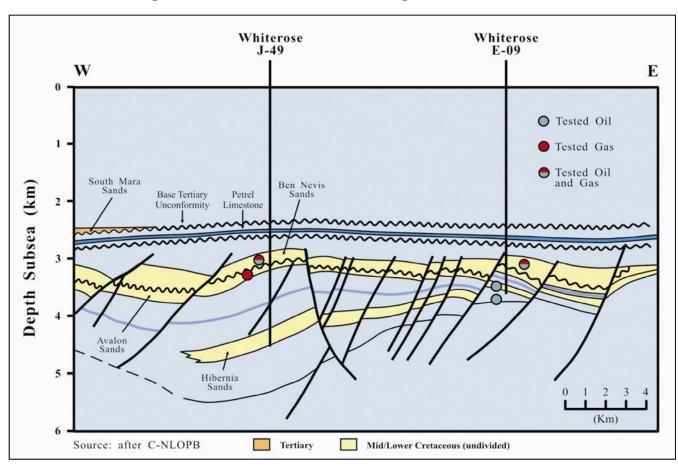


Figure #8 - White Rose Field Geological Cross Section

On January 15th, 2001, Husky submitted a development plan application proposing White Rose development by FPSO. On March 28th, 2002, Husky and its partner Petro-Canada announced their decision to proceed with the project.



Sea Rose FPSO

The field, consisting of one principal reservoir, the Ben Nevis/Avalon, is being developed using the Sea Rose FPSO which is similar to the Terra Nova FPSO vessel. It has a storage capacity of 940,000 barrels oil and a production rate of 137,000 bopd. The ice strengthened double hull was completed in South Korea and final fabrication, installation and commissioning of topsides was completed at the Cow Head Fabrication Facility in Marystown, NL. Commissioning was completed on the Sea Rose on November 12th, 2005.

The latest C-NLOPB resource estimates for the field include 305 million barrels of oil, 3.02 tcf of natural gas and 96 million barrels of natural gas liquids. These estimates include the main White Rose field (South Avalon Pool), the South White Rose Extension, and the West White Rose and North Avalon Pools. These estimates however do not include an additional 68 million barrels of oil and 315 million cubic feet of natural gas located in the North Amethyst field which are reported separately by the C-NLOPB.

In 2009 one additional well was drilled at the White Rose field bringing the total number of wells to 21. This includes 8 oil production wells, 10 water injectors and 3 gas injectors. The White Rose field produced 22.8 million barrels of oil in 2009 for an average daily production of 62,457 bopd. Cumulative field production to the end of December 31, 2009 was 137.1 million barrels of oil. There was a planned reduction in production at the White Rose field in 2009 as additional downtime was required to tie in the North Amethyst satellite fields as described on page 18 of this report.

Trave E-87 725,000 730,000 举 720,00948'06 EL1090 46°56 SDL1029 Legend SDL1031 5,200,000 5,200,000 Glary Hale Loc Oll Producer EL1091 Abandoned Oil Produce Abandoned Oil Well SDL1029 SDL1028 CROWN 5,195,000 5,195,000 SDL1030 SDL1027 SDL1029 SDL1025 46°50' 46°50 5,190,000 5,190,000 A-90 SDL1026 φ. 46°48' SDL1045 SDL1024 SDL1025 \O-28X White Rose E-28 PL1006 5,185,000 PL1007 SDL1024 SDL1020 North Amethyst E-17 46°46° SDL1019 46°46" B-07 10Z CROWN North Amethyst B-07 3 Field G-25 1 North Amethyst K-15 \* SDL1044 SDL1018 CROWN 4 5,180,000 5,180,000 PL1008 46°44 White Rose - North Amethyst Fields Well Locations - Ben Nevis/Avalon Reservoir 46°42' Faults on Top of Ben Nevis/Avalon PL1008 46°42' 5,175,000 5,175,000 UTM 22 Projection (NAD 83) Trepassey J-91 EL1055 725,000-48'03' -48°09' 720,000 730,000

Figure #9 - Structure Map of White Rose Reservoir

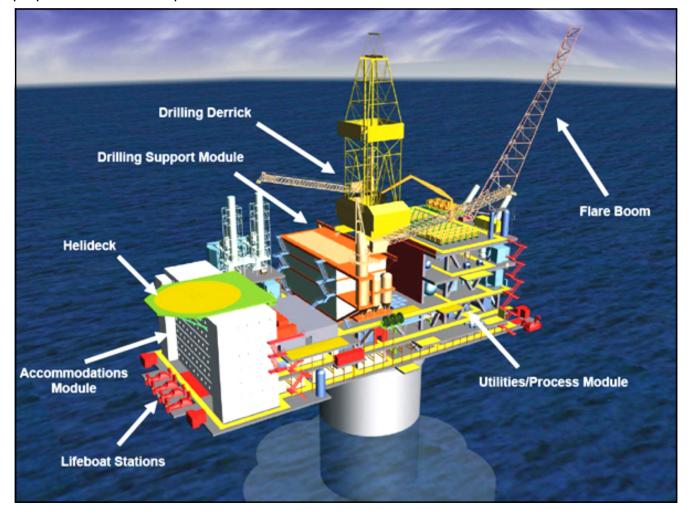
## **Projects Under Development**

#### **Hebron / Ben Nevis**

On August 20, 2008, the Government of Newfoundland and Labrador signed a formal agreement with the co-venture partners to develop the Hebron offshore development project. As part of the agreement, the Province purchased a 4.9 percent equity ownership in the project through Nalcor Energy - Oil and Gas, a subsidiary of the Province's wholly

Hebron/Ben Nevis		
Chevron Canada	26.7%	
ExxonMobil	36%	
Suncor	22.7%	
Statoil ASA	9.7%	
Nalcor Energy	4.9%	

owned energy corporation, at a cost of \$110 million. It was also agreed that Nalcor will pay a proportionate share of the project development costs, and in return, would receive a similar proportionate share of production.



**Hebron Development Concept** 

Initial development in the Hebron project area will consist of producing oil reserves from the Hebron field only, and the injection of surplus gas into the West Ben Nevis field. Because of the close proximity of the Ben Nevis and West Ben Nevis fields, development of reserves from within these fields is anticipated, although likely at a later date.

Hebron is located in the Jeanne d'Arc Basin, 350 kilometres southeast of St. John's. It is approximately eight kilometres north of Terra Nova, approximately 31 kilometres southeast of the Hibernia development, and approximately 46 kilometres southwest from White Rose. The water depth at Hebron ranges from 88 to 102 metres.

The Mobil et al Hebron I-13 discovery well, drilled in 1981 in about 92 metres of water, recovered hydrocarbons from five intervals with a combined flow rate of 9,070 bopd. The Ben Nevis field (discovered in 1980) and West Ben Nevis field (discovered in 1984) are located in fault blocks that lie to the northeast and adjacent to Hebron.

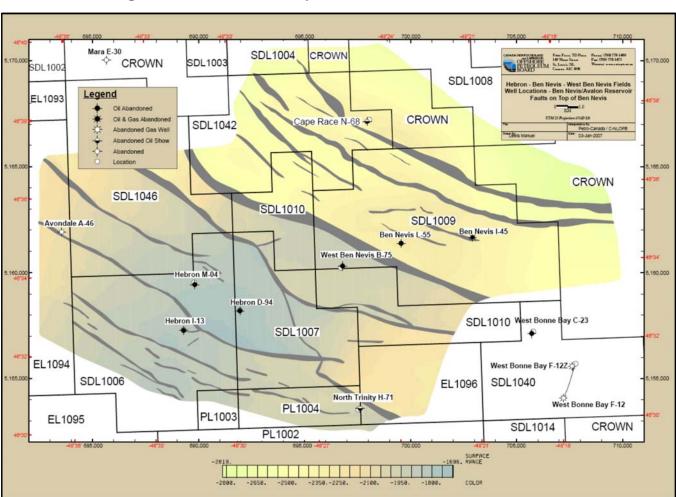


Figure #10 - Structure Map of Avalon/Ben Nevis Sandstone

During 1999, the Hebron D-94 delineation well encountered 86 metres of net oil pay in a 92 metre interval within the Ben Nevis Sandstone. A representative flow test from the 1,842 to 1,908 metre interval recovered 21 degree API oil at a rate of 3,500 barrels per day. A second delineation well, Chevron et al Ben Nevis L-55, tested 1,150 bopd of 30 degree API oil from a 71.3 metre pay interval. An additional delineation well, Hebron M-04, drilled in the spring of 2000 tested 2,250 bopd and 1.6 million cubic feet per day of natural gas from the Jeanne d'Arc Sandstone.

The C-NLOPB reserve estimates for the Hebron discovery is 581 million barrels of recoverable oil. Estimates for the Ben Nevis and West Ben Nevis discoveries include an additional 150 million barrels of oil, 429 bcf of natural gas and 30 million barrels of natural gas liquids.

The Hebron field will be developed using a Gravity Based Structure (GBS) similar to, but smaller than, the Hibernia GBS. Construction and fabrication of the GBS is expected to begin at the Bull Arm construction site in 2012. First oil is expected in 2017 with peak production of approximately 150,000 barrels a day.

ExxonMobil, the designated operator of Hebron, announced in 2009 that four groups have been short listed to bid on the design of the topsides of the production platform. They include the following:

- 1. Fluor Enterprises Inc, Amec Paragon Inc., and SNC-Lavalin Inc.,
- 2. Kellogg Brown & Root LLC and Hatch Ltd.,
- 3. Mustang, IMV-PA, Technip Canada Ltd.; and
- 4. Worley Parsons Canada Services Ltd.

It is expected that ExxonMobil and its partners will make a decision on the successful contractor in 2010.

Also in 2009 ExxonMobil and its partners announced that it will not be undertaking a predrilling program prior to commissioning the GBS because it was deemed uneconomical, and had significant execution and scheduling risks. As part of the original development agreement the Hebron proponents committed to locating the fabrication work associated with the pre-drilling template in the Province. With the cancellation of this strategy the proponents have agreed to replace a similar amount of fabrication work to be completed in the Province.

#### White Rose Extensions

The White Rose Extensions project includes the development of several satellite fields around the White Rose field including the North Amethyst, West White Rose, and South White Rose fields. In April 2008 Husky Energy Inc. received approval from the C-NLOPB regarding the North Amethyst Tie-Back Project near the White Rose oil field. An application to develop the South White Rose Extension tie-back received government approval in September 2007, and evaluation of the resource potential at the West White Rose Extension continues.

In 2008 the co-venture partners; Husky Energy, Petro-Canada (now Suncor Energy), and the province through Nalcor Energy – Oil and Gas, signed a development agreement which applies to lands surrounding the original White Rose development.

White Rose Extensions Ownership		
Husky Energy	68.875%	
Suncor	26.125%	
Nalcor Energy	5.0%	

Northern Drill Centre

West White
Rose Drill
Centre

Central Drill
Centre

Southern Drill
Centre

North Amethyst
Drill
Centre
Rose
Extension

Figure #11 - Concept of White Rose Extension

As part of this agreement, Nalcor Energy – Oil and Gas purchased a 5% equity stake in the new project at a cost of \$30 million, subject to confirmation of reserve estimates. The terms of the original White Rose development remain unchanged.

A project team based in St. John's continues to advance engineering, design and future development for all three tie-ins. Husky and co-venture partners plan to develop these through a series of subsea tie-backs to the Sea Rose FPSO (as shown in Figure #11, page 18).

The North Amethyst oil field is the first of the three satellite oil pools to be developed adjacent to the White Rose oil field in the Jeanne d'Arc Basin. Construction and installation of the majority of the subsea components for the project were completed in 2009. Also, modifications were completed on the Sea Rose FPSO during its 2009 maintenance program to accommodate the subsea tiebacks. Two development wells required for production from the satellite field commenced batch drilling operations in 2009 utilizing the GSF Grand Banks drilling rig prior to the rig sailing to Bull Arm, NL, for a major refit. Husky continued batch drilling operations using the Henry Goodrich prior to mobilizing to drill an exploration well. The total estimated cost for the development of the North Amethyst project is \$1.9 billion and first oil is expected in first half of 2010.

The North Amethyst field was identified by exploratory drilling in 2006 and the C-NLOPB reports recoverable reserves of 68 million barrels of oil. In 2009 Husky Energy announced that additional resources were discovered at North Amethyst, totaling approximately 60 million barrels original oil in place, and it is expected that this can be developed from the current infrastructure being installed. Note that the C-NLOPB have not completed an analysis of the new data and therefore have not yet updated North Amethyst's total reserve estimate.

The C-NLOPB total reserve estimate for all White Rose satellite fields is approximately 150 million barrels of oil and the total project has an estimated capital cost of \$3.5 billion.

## **Hibernia South Extension (HSE)**

Additional drilling around the original Hibernia discovery in 2005 and 2006 confirmed significant upside reserves in the southern portion of the field. Based on this, the C-NLOPB has assigned reserve estimate of approximately 220 million barrels of recoverable oil for this area. Note that these reserves are included in the total recoverable reserve estimate of 1.244 billion barrels mentioned previously for the Hibernia project.

On June 16, 2009 the Province announced that it had signed a Memorandum of Understanding (MOU) with the Hibernia partners for the development of the southern portion of the Hibernia field. Subsequently, in August of 2009 Hibernia Management and Development Corporation filed a Hibernia Development Plan Amendment application with the C-NLOPB to develop the "AA" blocks, which received approval in September, 2009 (Figure #4, page 8). Production from the "AA" fault block, which the C-NLOPB estimates to contain recoverable reserves of approximately 50 million barrels, is expected to occur from wells drilled directly from the Hibernia platform.



Hibernia Rig with supply vessel

During 2009 one of these development wells, oil producer B-16 57X was completed and drilling commenced on the water injection well B-16 37Z. Drilling of the remaining oil producer/water injector pair is scheduled to commence in Q3 2010. Initial oil production from this area occurred in November, 2009. As part of the agreement oil produced from the "AA" blocks will be immediately subject to a higher tier royalty rate of 42.5% of net revenues.



Transshipment (shuttle) tanker

The MOU also covers development of the Hibernia South area which the C-NLOPB estimates to contain approximately 170 million barrels of oil. Development of this portion of the southern extension is expected to be completed through a subsea tieback to the Hibernia platform, in combination with platform development.

Further, the MOU contains provisions that the provincial government, through Nalcor Energy – Oil and Gas, will acquire a 10% interest in this portion of the new development at a cost of \$30 million. Nalcor Energy - Oil and Gas will also pay a proportionate share of the development costs and receive a similar proportionate share of project production. In addition to the equity stake, the MOU also includes stipulations for higher royalty rates than the original Hibernia development. A super royalty is included and is incremental to the royalty rates of 30% and 42.5% and will be paid out in two steps, an additional 2.5% when oil is greater than USD \$50 WTI and another 5% when oil reaches USD \$70 WTI, which brings the total royalty rate to 50%.

#### **Garden Hill South**

Garden Hill South is located onshore western Newfoundland on the Port au Port Peninsula. PDI Production Inc (PDIP), a subsidiary of Enegi Oil Plc, is sole owner and operator of the development under a production lease issued by the Province of Newfoundland and Labrador.

Activity at the Garden Hill site commenced back in September, 1994 when Hunt/Pan Canadian drilled Port au Port (PAP) #1 well (Figure #13, page 23). The well encountered two hydrocarbon bearing intervals within Aguathuna Formation dolostones, with flow rates, respectively, at 1,528 and 1,742 barrels per day of 51 degree API oil, and, 2.6 and 2.3 million cubic feet per day of natural gas, plus associated water.

An extended test conducted over a nine day period on one of the intervals produced a total of 5,012 barrels of oil and 9.2 million cubic feet of gas. Further development and evaluation of the site in 2008 resulted in PDIP abandoning PAP # 1 Sidetrack # 2 well and drilling PAP # 1 Sidetrack # 3 well utilizing Nabors #C45 drill rig. This well which was completed late in 2008 is a horizontal sidetrack that entered into the Aguathuna formation. Total production at

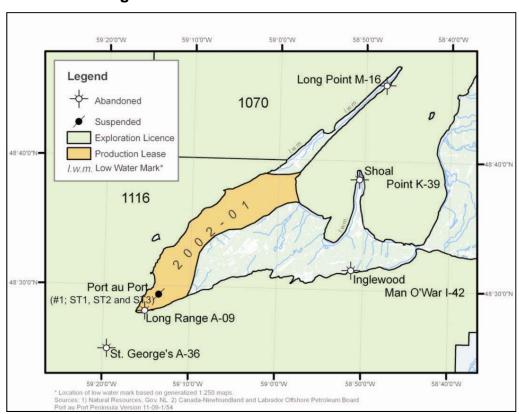


Figure #12 - Well Locations Port au Port

the field prior to the well being shut in 2008 was approximately 25,000 barrels of 51 degree API oil. In January, 2009 PAP #1 Sidetrack #3 was brought back on line for clean up and flow testing. A total of 6119 barrels of oil and 16.8 million cubic feet of gas were produced prior to the well being shut in after a decline in well pressure. At the time of shut-in, long term commercial production was deemed sub-economic by PDIP.

In November, 2009 the well was brought back on line again as well pressure had substantially recovered. An extended testing operation is ongoing as of December 31, 2009 to determine optimum flow rates for the well to maximize production. During the various flow testing in 2009 a further 2383 barrels of oil and 13.1 million cubic feet of natural gas were produced.

In December, 2009 the company announced that it had entered into a farm-out arrangement with Dragon Lance Management Corporation (DLMC), an Alberta based drilling management company. Under the arrangement DLMC will pay 100% of the cost, up to \$2.5 million, to further develop and operate PAP #1 Sidetrack #3. In return DLMC will earn a 30% working interest in this well only at the Garden Hill site.

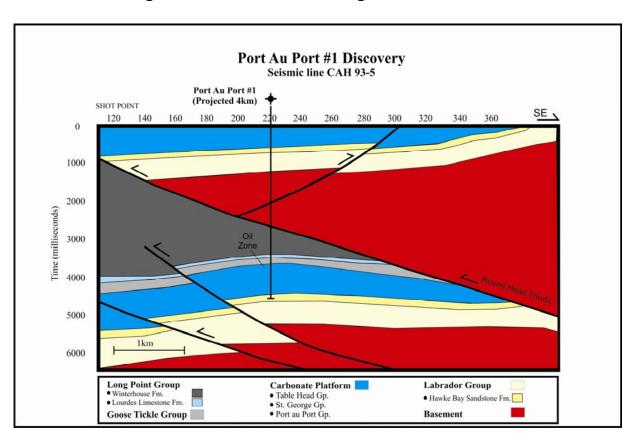


Figure #13 Port au Port Geological Cross Section

## **Regional Activity Update**

#### **East Coast Offshore**

#### **Resource Opportunity - 2009 Call for Bids**

There was one Call for Bids (NL09-01) completed for a parcel of land located in the Jeanne d'Arc Basin in 2009 by the C-NLOPB. The parcel, totaling 9558 hectares, was located adjacent to the White Rose production license. The successful bidder, in the amount of \$36.8 million, was Husky Oil Operations Limited at 72.5% ownership and Suncor Energy Inc at 27.5%. Being the operators of the adjacent White Rose project, the players strengthened

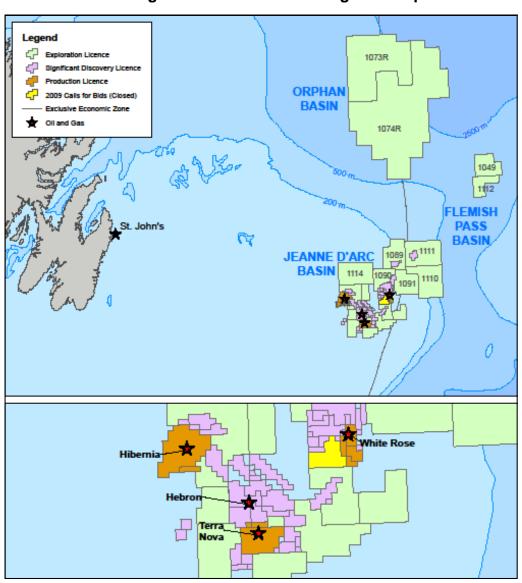


Figure #14 - East Coast Regional Map

their holdings in this area of the Jeanne d'Arc basin. Note that the Call for Bids was evaluated based on the total work expenditure commitment submitted by each bidder.

#### **Exploration Activity - Drilling Programs**

As a result of the rig sharing agreement for use of the semi-submersible rig, the Henry Goodrich, several exploration wells were completed in the Jeanne d'Arc and Flemish Pass Basins in 2009.

Statoil Canada spudded the Mizzen O-16 exploration well on exploration license EL 1049 in the Flemish Pass Basin in December, 2008. The well, located approximately 500 km east northeast of St. John's, was drilled in a water depth of approximately 1100 meters. The well was completed on March 20, 2009 to a total depth of 3756 meters. Statoil has reported that hydrocarbons were discovered and an application for a Declaration of Significant Discovery has been filed with the C-NLOPB.

In July of 2009 the Henry Goodrich spudded the Ballicatters M-96 exploration well for Suncor Energy on their exploration license EL 1113 in the Jeanne d'Arc Basin. The well was designed to test two separate prospects on adjacent exploration licenses held in the area. Drilling operation on the Ballicatters M-96 well concluded in October and, as it is classified as a "tighthole", no information on the results have been released as at December 31, 2009.

#### **Geoscience Programs**

In August, 2009 Electromagnetic Geoservices ASA (EMGS) completed a controlled source electromagnetic survey in the Orphan Basin (ELs 1073R and 1074R) for ExxonMobil Canada. The survey collected 1829 line kilometers of data and was conducted to evaluate prospects in anticipation of the co-venture partners; ExxonMobil, Imperial Oil, Chevron and Shell continuing their exploratory drilling program in the basin in 2010. The modern drillship, Stena Carron, is on contract to Chevron and currently drilling in the Laurentian Basin and it is anticipated that it will mobilize to the Orphan Basin in 2010 to drill a second exploration well for the co-venture partners.

In October, 2009 Fugro Jacques Geosurveys utilized the MV Anticosti to conduct a well site survey in the Jeanne d'Arc Basin on behalf of Husky Oil Operations. As well site surveys are performed in advance of drilling operations it is anticipated that Husky will be drilling in this basin in 2010, however, details have not yet been released.

#### **South Coast Offshore**

#### **Resource Opportunity – Call for Bids**

The C-NLOPB completed Calls for Bids (NL09-02) on two parcels of land in the Laurentian Basin in 2009. The land area for parcel #1 totaled 290,070 hectares whereas parcel #2 was smaller at 73,931 hectares. The successful bidder on both parcels was a partnership of ConocoPhillips Canada Resources Corporation and BHP Billiton Petroleum (Laurentian) Corporation. With parcel #1 the successful bid was \$8,000,210 and the co-venture ownership position was 55% for ConocoPhillips and 45% for BHP. The successful bid for parcel #2 was \$1,000,001 and the ownership position was 64.0091% for ConocoPhillips and 35.9909% for BHP Billiton. The group also holds four exploration licenses (ELs 1081R, 1082R, 1086R and 1087R) on adjacent land in the Laurentian Basin.

#### **Exploration Activity - Drilling Programs**

In November, 2009 ConocoPhillips, using the drill ship Stena Carron, spudded a deepwater well, East Wolverine G-37, in the Laurentian Basin. The well was the first well that Conoco-Phillips operated in waters off Newfoundland and Labrador. The Stena Carron is an ultra-deepwater drill ship built for drilling in water depths of up to 3,000 meters. The East Wolverine well will target a prospect in the basin on the east side of the French baquette, the territorial waters of St. Pierre-Miquelon, in water depths of approximately 2,000 meters.

#### **Geoscience Programs**

In August, 2009 Husky Energy filed environmental assessment documents with the C-NLOPB to conduct 2-D and 3-D seismic surveys on land in the Sydney Basin around their exploration license (EL 1115). In 2010 Husky Energy plans to undertake a 2-D seismic survey and have indicated that further 2D and 3D surveys may occur at various times between 2010 and 2018. The rights to explore on these lands were acquired by Husky in 2009 as part of the 2008 Call for Bids process.

Also, in October, 2009 ConocoPhillips Canada Resources Limited filed project descriptions with C-NLOPB to conduct 2-D and 3-D seismic surveys on its exploration acreage in the Laurentian Basin. ConocoPhillips proposes to conduct a 3-D seismic survey in this area in 2010 while other 2-D and 3-D surveys could be conducted at other times between 2011 and 2013. The acreage to be covered includes the four previously held exploration licenses as well as the two new parcels obtained in the 2009 Call for Bids process.

Legend SYDNEY BASIN 1115 St. Pierre & Miquelon 1082R 1086R 1087R 1081R Parcel #1 LAURENTIAN Parcel #2 **BASIN** 

Figure #15 - South Coast Regional Map

#### **West Coast Offshore and Onshore**

#### Offshore Resource Opportunity – Call for Bids

In November, 2009 the C-NLOPB announced that Ptarmigan Energy Incorporated was the successful bidder in Call for Bids NL09-03 on a parcel of land in the Anticosti Basin offshore Western Newfoundland. The parcel has a total area of 140,210 hectares and the successful bid was \$1,200,000.

#### Offshore Exploration Activity – Geoscience Programs

NWest Energy Inc., a locally based oil and gas exploration company, holds the rights to four exploration licenses (ELs 1097, 1098, 1103 and 1104) offshore western Newfoundland totaling approximately 659,000 hectares. Late in 2008 the company completed two exploration (E3D) seismic programs covering an area of approximately 598 square kilometers. The programs targeted structures in the southern and central area of the license area. Note that due to weather conditions the total intended coverage in the central area was not completed in its entirety.

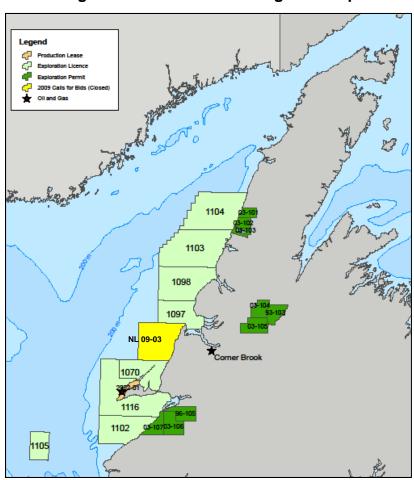


Figure #16 - West Coast Regional Map

The company retained the services of GEOSEIS Inc., a Calgary based geoscience consulting and technology services company, to assist with the interpretation and analysis of the data acquired. In August, 2009 the company reported that GEOSEIS confirmed the presence of a structure of interest and have identified two alternate well locations for consideration. Also, as the central area seismic program was suspended NWest confirmed that GEOSEIS was not able to evaluate and comment on the other structures.

Based on the positive report by GEOSEIS, NWest have indicated that they will be immediately seeking a partner to farm into this prospect.

#### Offshore Activity – Operational Changes

Late in 2009, the co-venture partners in exploration license EL 1070; Canadian Imperial Venture Corporation (CIVC), PDI Production Inc. (PDIP) and Shoal Point Energy (SPE), announced operational and interest rights changes in the license. The exploration license is an offshore license comprising approximately 103,000 hectares and is located in water depths of less than 100 meters. The partners have identified two primary targets within the license area. The first, referred to as the St. Georges Group play, is a conventional structural play approximately 40 kilometers to the southeast of PDIP's Garden Hill South operation mentioned previously on page 22 of this report. The second, referred to as the Green Point Formation, is an unconventional shallow shale gas/oil play.

The co-venture partners have indicated that an interest swap agreement was signed in 2009 such that PDIP will transfer 100% of its interest in the Green Point Formation play to CIVC and SPE. Similarly CIVC and SPE will in turn transfer 100% of their interest in the St. George's Group play to PDIP. The parties reported that this agreement will allow all involved to pursue planned developments more effectively.

Subsequent to this agreement CIVC and SPE announced that they have entered into a strategic arrangement with McLaren Resources Inc., a Toronto based international petroleum exploration company, to jointly pursue exploration and production opportunities in the Green Point Formation play. Part of this arrangement is a farm-out opportunity giving McLaren the right, on a well by well basis, to participate in a three well, onshore to offshore exploration program in 2010. McLaren has agreed to pay 32% of the cost of each well to earn a 16% working interest on specific blocks of land that each well is drilled upon. Current ownership of the land rights in the Green Point Formation play is 61.5% for SPE and 38.5% for CIVC, with SPE being the designated operator.

#### **Onshore Exploration Activity – Drilling Programs**

#### Bay St. George Area

Vulcan Minerals Inc., a local diversified junior exploration company, is the primary lease holder in three onshore exploration permits (96-105, 03-106 and 03-107) in the Bay St. George area covering approximately 95,500 hectares (Figure #16, page 28). In 2007 the company completed an extensive seismic program whereby approximately 60 kilometers of line data was surveyed. This data was acquired to further delineate the Hurricane Deeps target located in the Bay St. George Basin.

In addition to its eight previously drilled onshore shallow wells and a single test hole, in February, 2009 Vulcan drilled two shallow core holes in the Flat Bay oil deposit area to gather reservoir engineering data. The wells were successful in encountering petroleum in the targeted reservoir.

In 2008 the company announced that it had entered into a farm-in agreement with Investcan Energy Corporation for a 50% working interest in the three onshore permits. In order to earn the 50% interest Investcan agreed to incur \$15 million in exploration expenditures in a three, deep well drilling program.

The first well, Robinsons #1, was completed on October 15, 2009 and reached a total depth of 3560 meters. It was the deepest well ever drilled in the basin and Vulcan has reported encountering natural gas shows in several sandstones enterbedded with shales and siltstones over a gross interval of 1290 meters. An evaluation of the well results by Vulcan indicated that the gas bearing zones exhibited low permeability and would require hydraulic fracturing in order to test flow rates.

On November 23, 2009 the company completed a second well, Red Brook #2, which is approximately 10 kilometers west of Robinsons #1, to a total depth of 1965 meters. Vulcan has indicated that the well encountered several natural gas bearing intervals, based on mud logging results, as well as oil shows in the form of fluorescence on drill cuttings. The company announced plans to complete a full geophysical logging program followed by drill-stem testing to fully evaluate the potential.

The third well is planned in 2010 once all data has been analyzed.

#### **Parsons Pond**

In August, 2009 Nalcor Energy - Oil and Gas, the provincially owned energy corporation, announced that it had acquired an average 67% working interest in three onshore exploration permits (03-101, 03-102, 03-103) in Parsons Pond on the northern peninsula of the western region of the Province, covering approximately 42,600 hectares. Nalcor acquired its working interest from Leprechaun Resources Ltd. and is now the operator for the permits. Nalcor also announced that it would be undertaking a three well drilling program commencing in early 2010.

The cost of the program is estimated to be approximately \$20 million and work, including the submission of regulatory approvals, posting of expressions of interest, etc. is ongoing as of December 31, 2009.

## Onshore Exploration Activity – Exploration Programs

The Department of Natural Resources and Nalcor Energy - Oil and Gas released the results of its high resolution aeromagnetic surveys covering parts of Western Newfoundland in the vicinity of Stephenville, Deer Lake, and Port au Choix. The survey collected 62,890 line kilometers of data and is available to the general public by contacting the Department or accessing the geofiles at http://gis.geosurv.gov.nl.ca/minesen/geofiles/.

These surveys were acquired over the winter of 2008/2009 at a cost of approximately \$600,000. Funding of the program was allocated from the Petroleum Exploration Enhancement Program (PEEP), which is a \$5 million initiative announced in 2007 as part of the Provincial Energy Plan, Focusing our Energy.

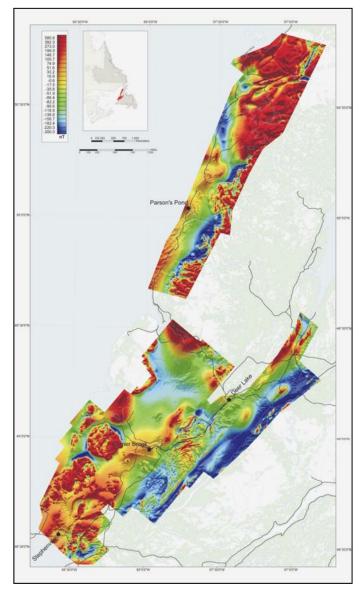


Figure #17
Aeromagnetic Survey
West Coast Newfoundland

#### **Labrador Offshore**

#### **Exploration Activity - Geoscience Programs**

In January, 2009 Husky Energy filed project descriptions with the C-NLOPB to undertake 2-D and 3-D seismic surveys on its recently acquired exploration acreage (ELs 1106 and 1108) on the Labrador Shelf. Original plans called for completion of a 2-D seismic survey in the summer of 2009 however this has been delayed to the summer of 2010. The documents also outline that other 2-D or 3-D surveys may occur at various times between 2010 and 2017.

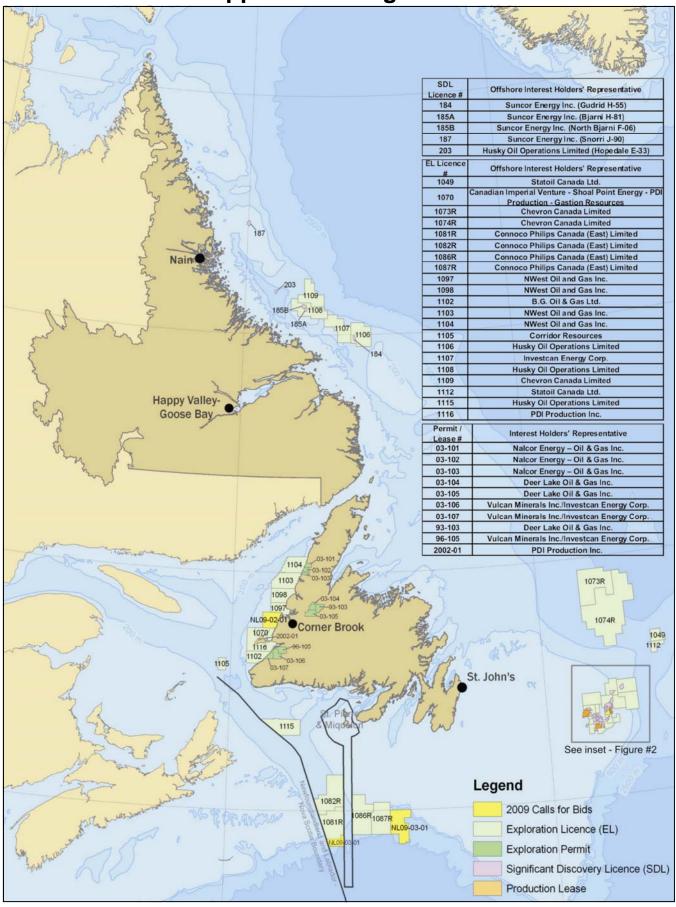
Chevron Canada Resources filed project descriptions with the C-NLOPB in October, 2009 to conduct 2-D and 3-D seismic surveys on and around exploration license EL-1109 offshore Labrador. Chevron has indicated that it plans to conduct a 2-D seismic survey in 2010, or as soon as possible thereafter. The documents also state that Chevron may also conduct a 3-D seismic survey in 2011-2017.

Also in October, 2009, Investcan Energy Corporation filed documents proposing to conduct 2D and 3D seismic surveys on exploration license EL-1107 and also around other significant discovery licenses (SDLs) in the area. The proposed project is a 2-D and 3-D seismic program over EL1107, SDL Hopedale and SDL Snorri between June to November in 2010 followed by a 3-D program over just EL1107 between June to November 2011.

187 SDL 187 Snorri 105 bcf gas 2 million bbls NGLs SDL 208 Hopedale 105 bcf gas 2 million bbls NGLs SDL 185B North Bjarni 2247 bcf gas 82 million bbls NGLs 1109 SDL 185A Bjarni 863 bcf gas 31 million bbls NGLs 1108 1107 1106 **SDL 187 Gudrid**• 924 bcf gas 6 million bbls NGLs Legend Exploration Licence 3 Significant Discovery Licence

Figure #18 - Labrador Regional Map

## Appendix A - Figure #1



## **Appendix A - Figure #2**

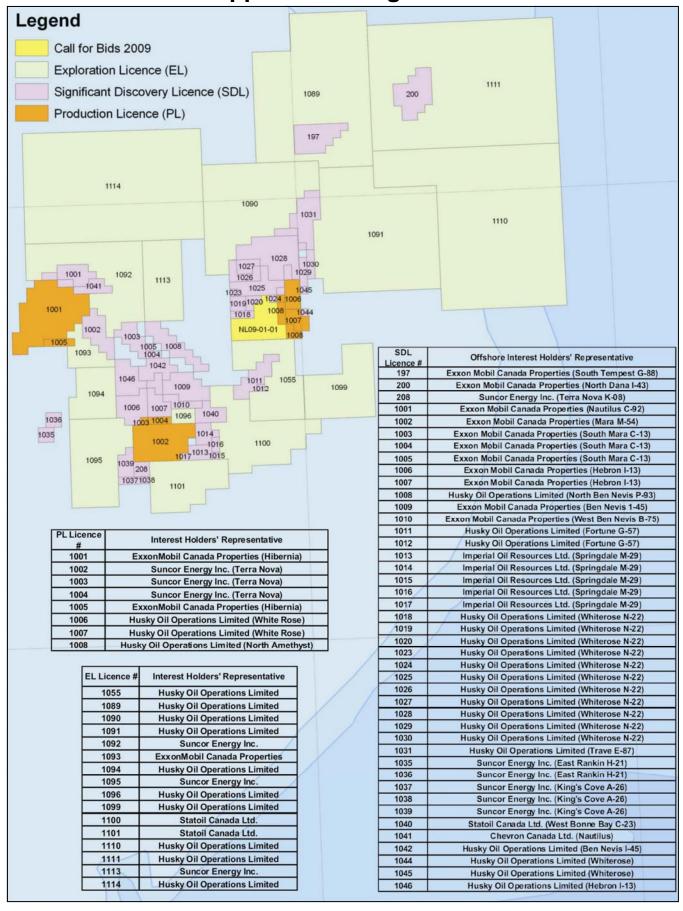


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