CANADA-NEWFOUNDLAND & LABRADOR
C-NLOPB
OFFSHORE PETROLEUM BOARD

50 years of Oil exploration and development in NL offshore

Presentation to
Student Society of Petroleum Engineers

March 28, 2017

Jeff O'Keefe
Manager Resource Management
Chief Conservation Officer

Agenda

- Overview of C-NLOPB and role of Resource Management
- Jeanne D'Arc Basin
- History of NL offshore oil exploration
- Development of NL offshore projects
  - Hibernia
  - Terra Nova
  - White Rose / North Amethyst
  - Hebron
- Outlook to the future in the NL offshore

Safety Moment - Working in the harshest environment in the world demands the highest regard for safety

Everything we do at the C-NLOPB is seen through the lens of the Ocean Ranger, the Universal Helicopter crash of 1985 and Cougar 491


Ocean Ranger, 1982
84 lost lives


Universal Crash, 1985
6 lives lost


Cougar 491, 2009
17 lost lives


Terra Nova spill, 2004
1000 barrels of crude


Cougar Near Miss, 2011, descent halted 38 ft from water


Collision, 2011
Maersk Detector and *GSF Grand Banks*


Hibernia spill, 2013
6000 litres from the offloading facility

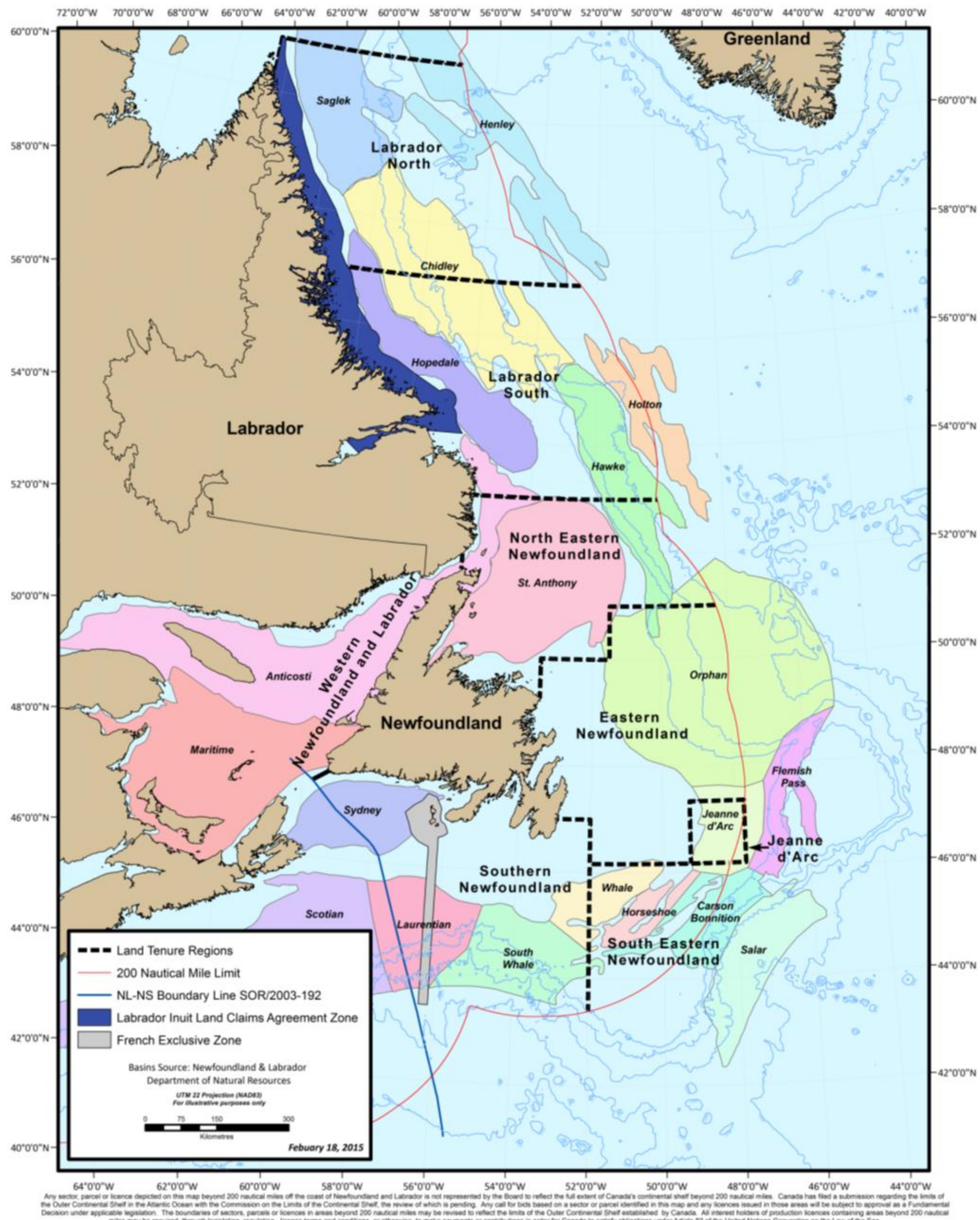

Person Overboard, 2015
West Hercules

C-NLOPB

Background on C-NLOPB

Introduction

- Established by Atlantic Accord in 1985
- We are the regulatory agency responsible for the oversight of all petroleum related activities in the Canada-Newfoundland and Labrador Offshore Area
- We report to Parliament and the House of Assembly through the Federal and Provincial Ministers of Natural Resources
- Pillars:
    - Health & Worker Safety
    - Environmental Protection
    - Exploration
    - Industrial Benefits
    - **Resource Management**



Expert Capabilities

85 employees, includes technical expertise:

- Safety Officers
- Environmental Compliance Officers
- Environmental Assessment Officer
- Reservoir Engineers
- Certification Engineers
- Well Operations Engineers
- Industrial Benefits Engineers
- Reservoir Geologists
- Exploration Geologists
- Operations Geologist
- Development Geologist
- Exploration Geophysicists
- Petrophysics Specialist
- Petroleum Technologists
- Measurement Analysts

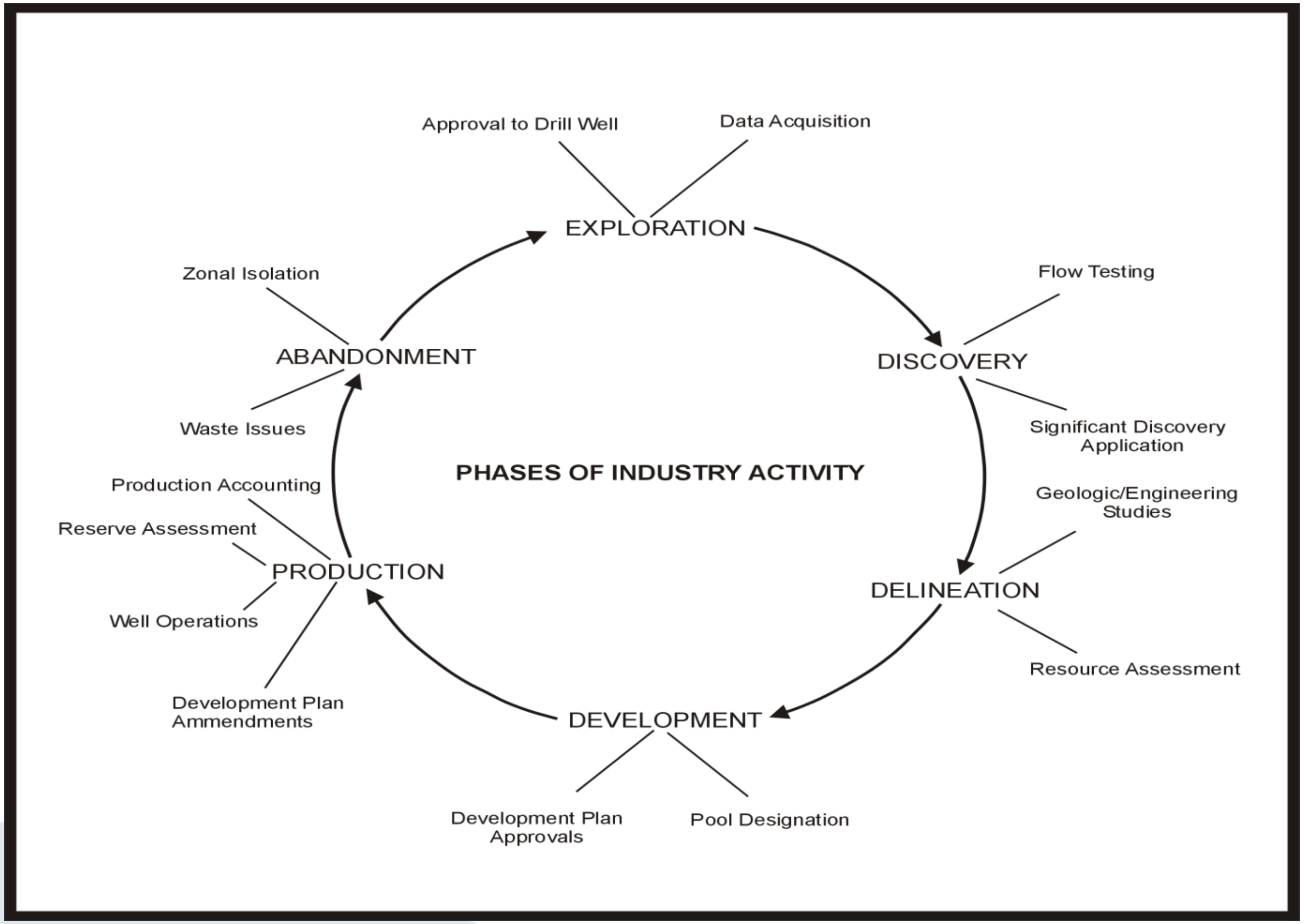
And other professionals:

- Lawyers, Public Relations, Human Resources, Information Technology, Information Management, Industrial Benefits and Accounting

Resource Management and Conservation

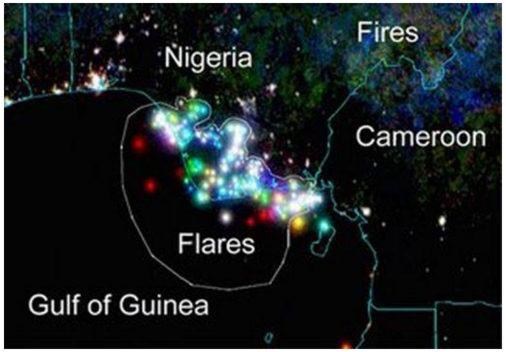
Role:

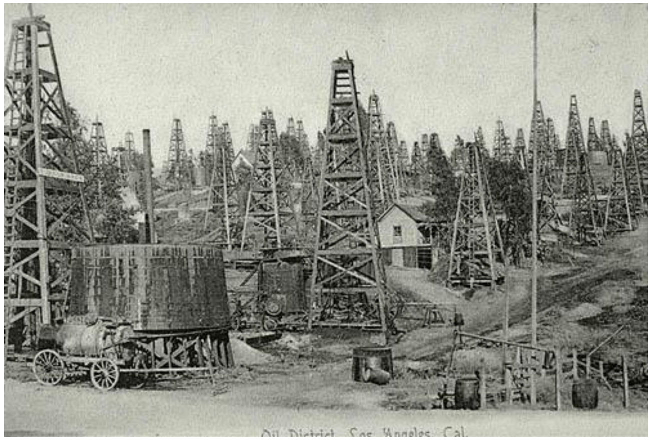
The role of the Board with respect to resource management is to ensure that the economic recovery of hydrocarbons is maximized and that **waste** is prevented.

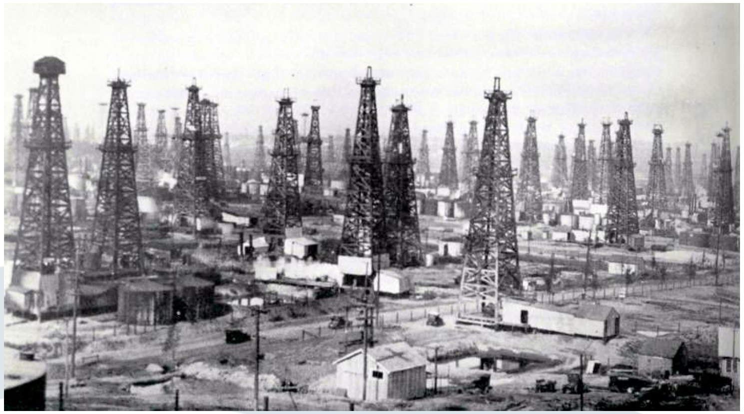


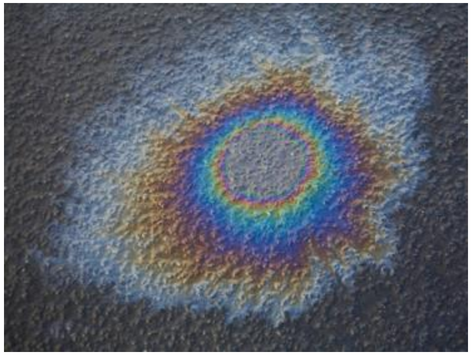
C-NLOPB

Examples of Waste





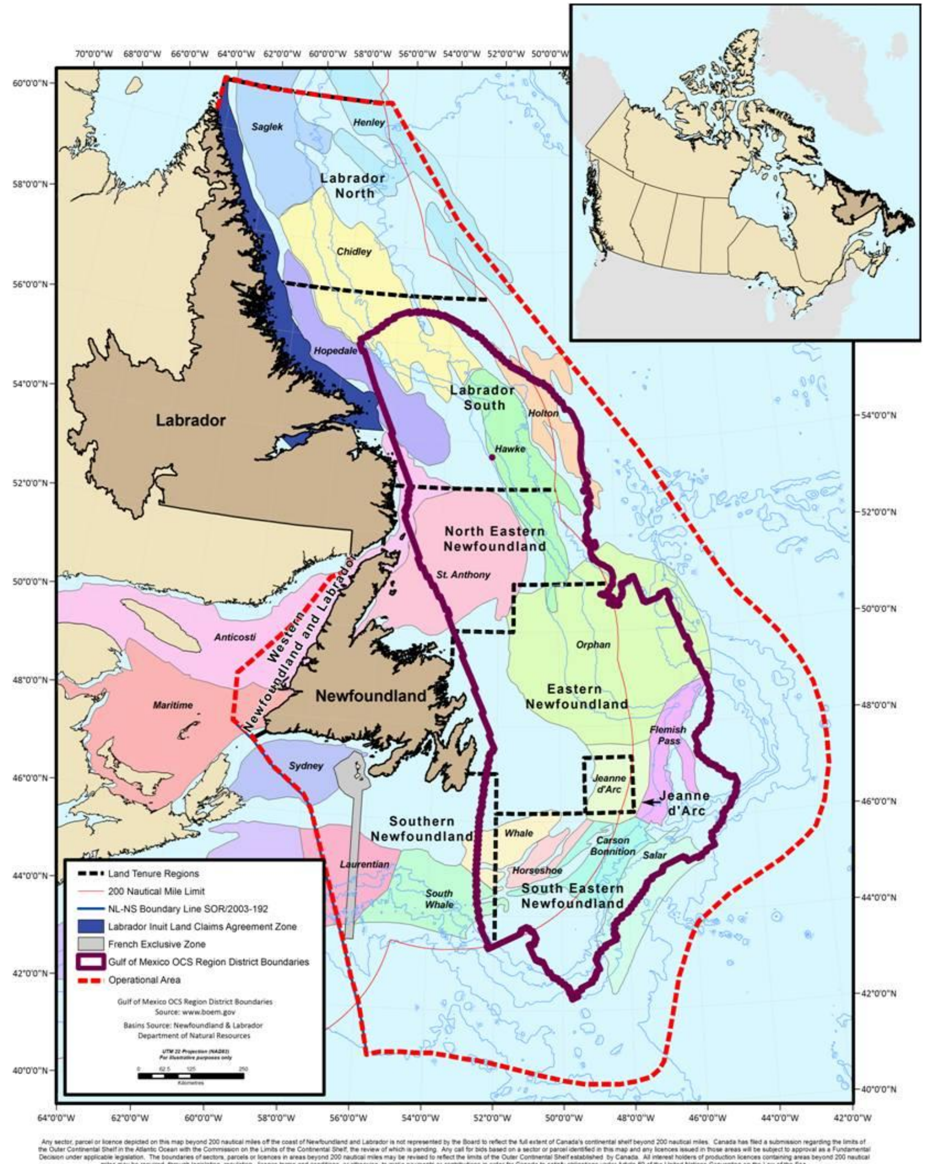


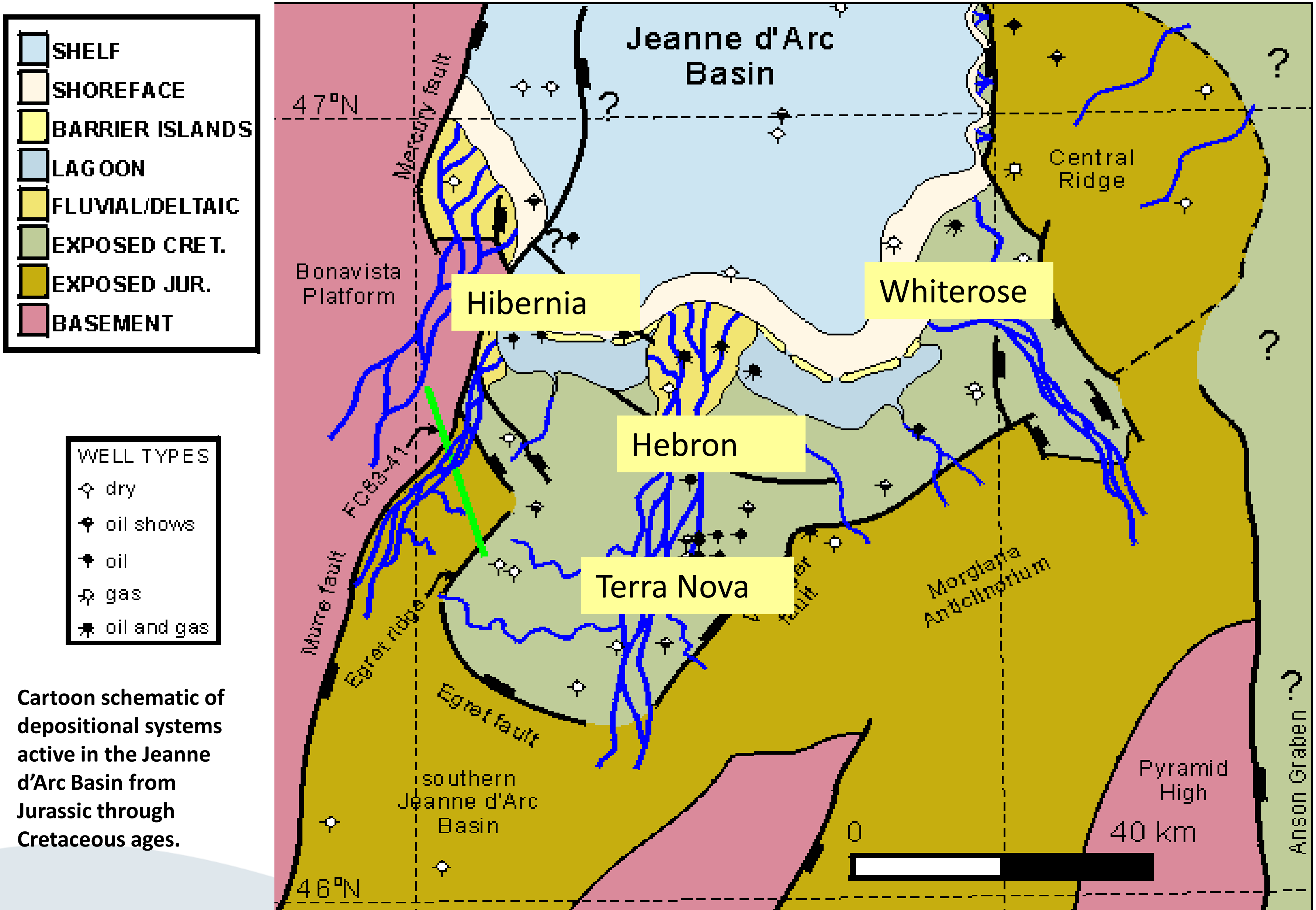


Pictures from SPE website www.spe.org
and http://www.worldbank.org/en/programs/gasflaringreduction#5

Canada-Newfoundland and Labrador Offshore Area

- C-NLOPB offshore area covers over 1.8 million km²
- Larger area than the US Gulf of Mexico (1.6 million km²) and the Norwegian Continental Shelf (1.5 million km²)
- Substantial new discoveries in the Flemish Pass Basin
- Extensive new leads and play concepts are emerging from recent multi-client seismic data acquisition



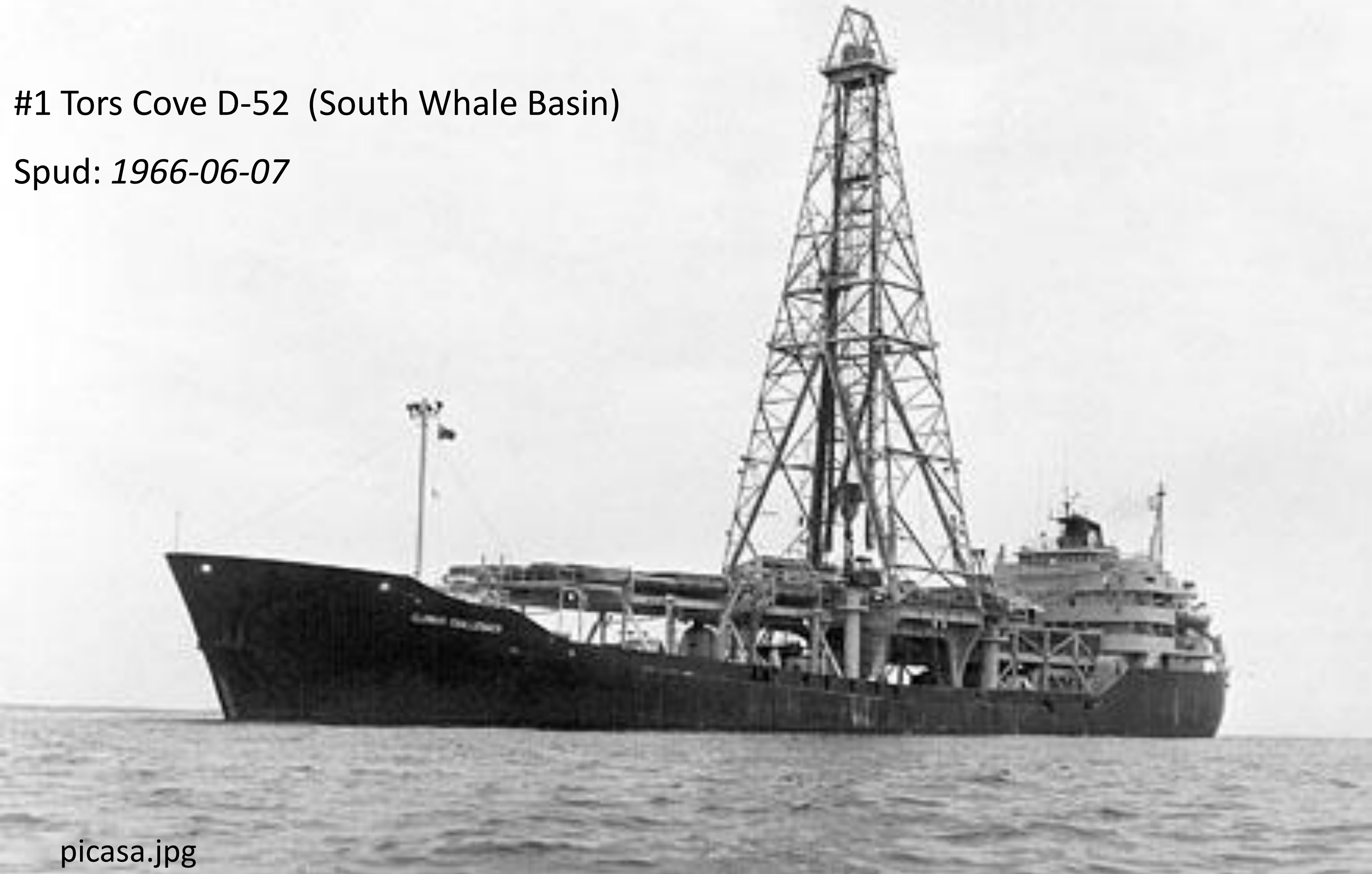


Cartoon schematic of depositional systems active in the Jeanne d'Arc Basin from Jurassic through Cretaceous ages.

Drillship *Glomar Sirte* 1966 (50 years ago)

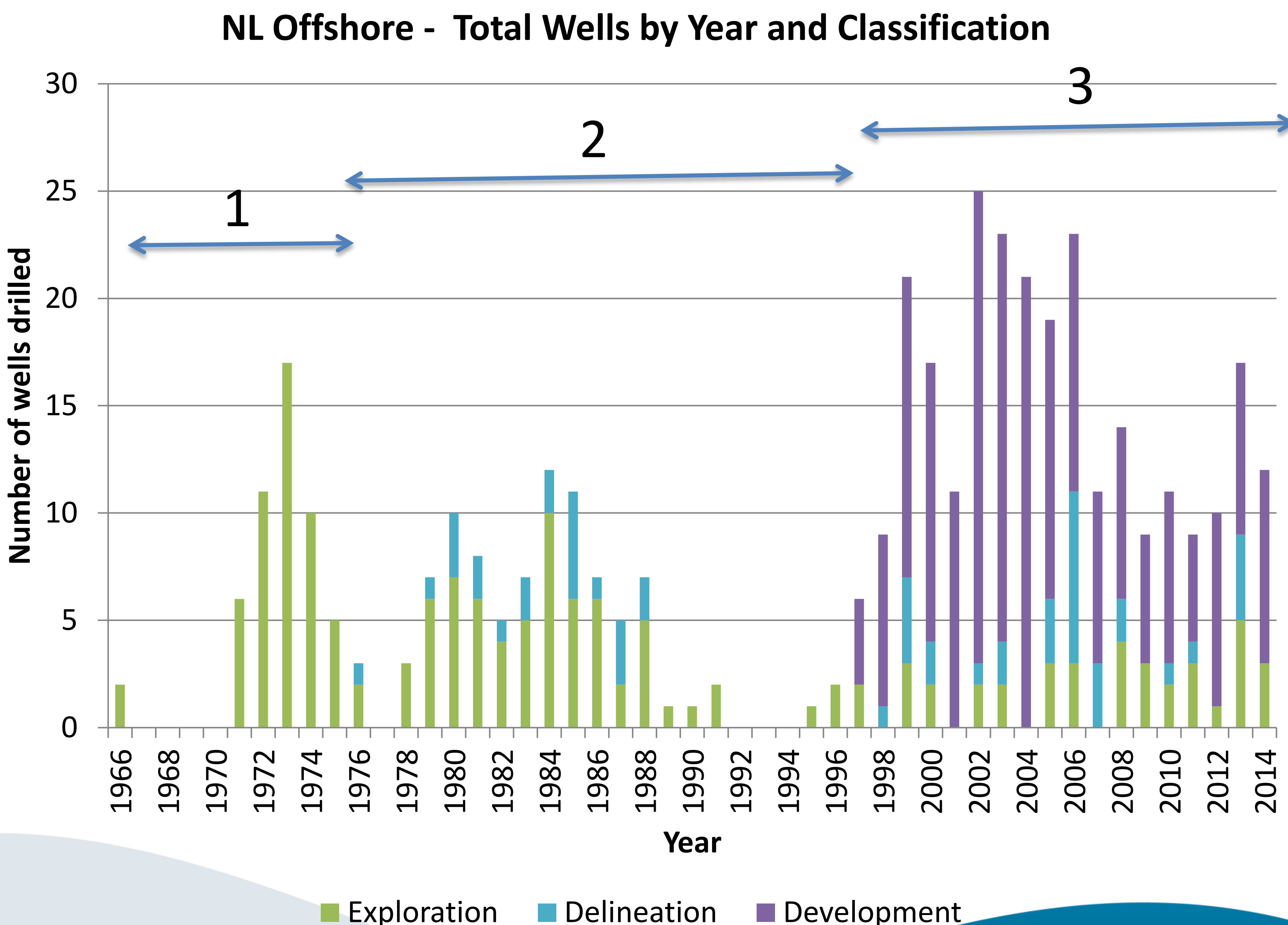
#1 Tors Cove D-52 (South Whale Basin)

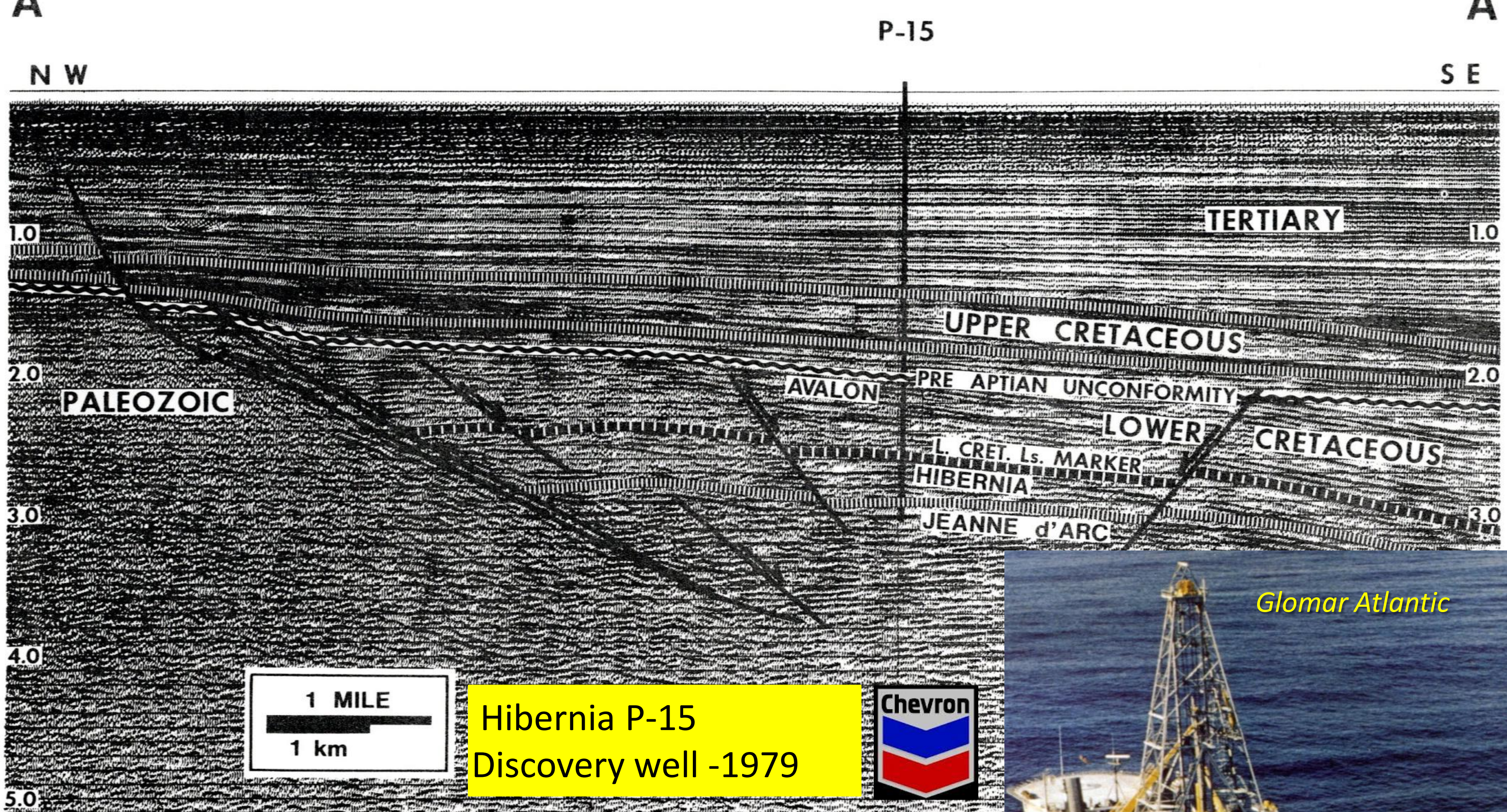
Spud: *1966-06-07*



picasa.jpg

C-NLOPB

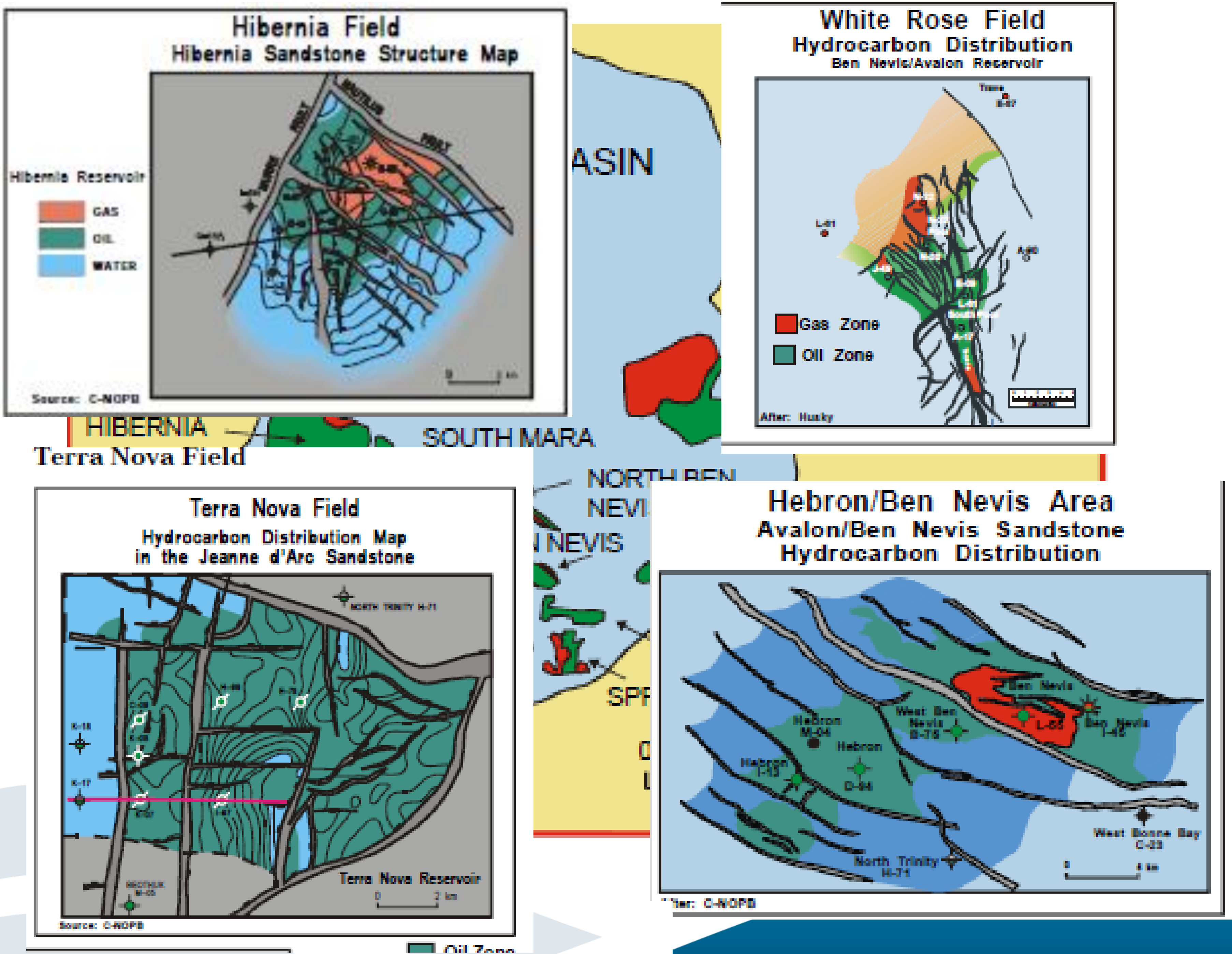

NL Offshore - Total Wells by Year and Classification
Number of wells drilled
Year
1
2
3
0
5
10
15
20
25
30
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
Exploration
Delineation
Development
C-NLOPB



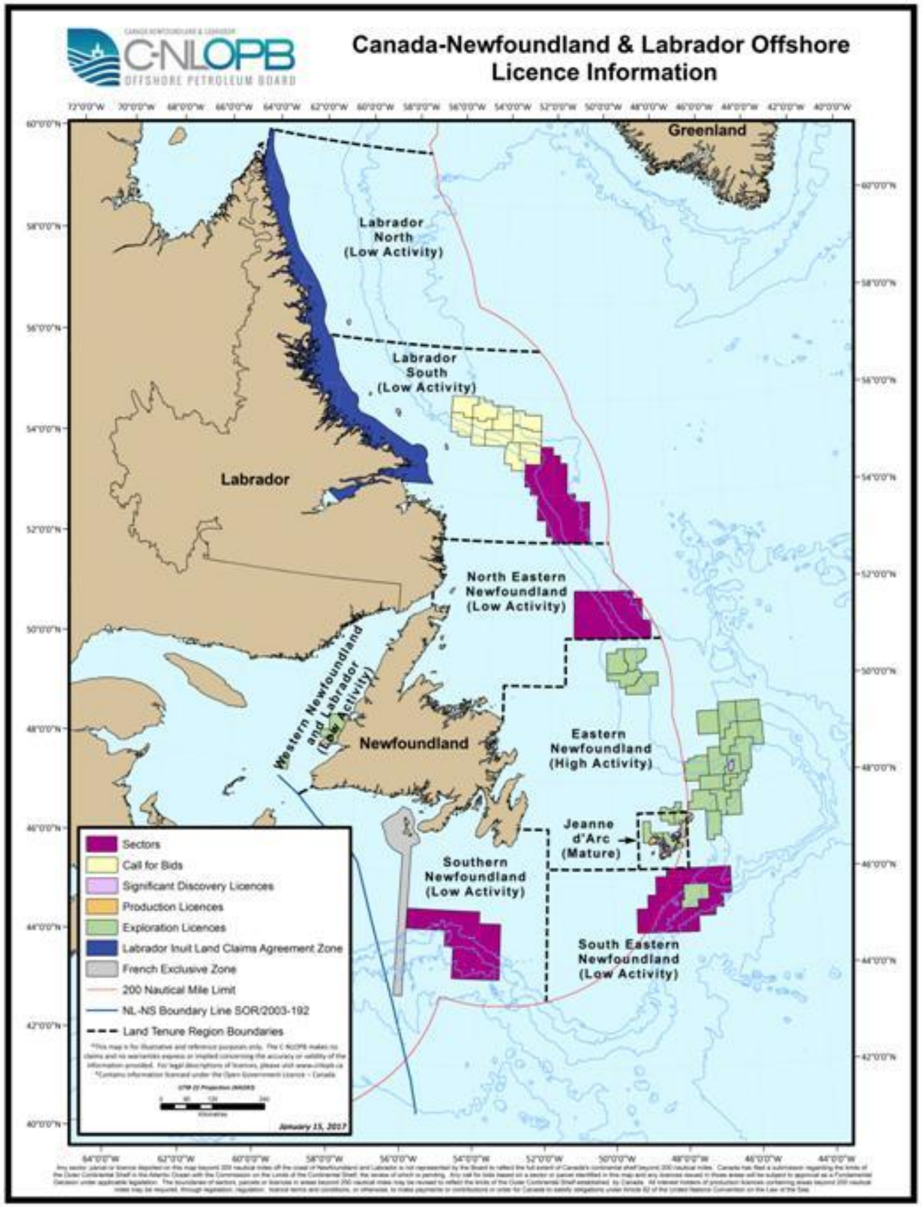
Hibernia P-15
Discovery well -1979

Fig. 8—Migrated time seismic section passing through the Chevron et al Hibernia P-15 discovery well. Se
location of line. (Line provided courtesy Mobil Oil Canada, Ltd.)

AAPG Memoir 32; Arthur et al.,1982



Hibernia Field
Hibernia Sandstone Structure Map
Hibernia Reservoir
GAS
OIL
WATER
Source: C-NOPB
White Rose Field
Hydrocarbon Distribution
Ben Nevis/Avalon Reservoir
Gas Zone
Oil Zone
After: Husky
ASIN
HIBERNIA
SOUTH MARA
NORTH BEN
NEVIS
NEVIS
Terra Nova Field
Terra Nova Field
Hydrocarbon Distribution Map
in the Jeanne d'Arc Sandstone
NORTH TRINITY H-71
Terra Nova Reservoir
0 2 km
Source: C-NOPB
Oil Zone
Hebron/Ben Nevis Area
Avalon/Ben Nevis Sandstone
Hydrocarbon Distribution
Ben Nevis
L-55
Ben Nevis I-45
West Ben Nevis B-75
Hebron M-04
Hebron
Hebron I-13
D-94
West Bonne Bay C-23
North Trinity H-71
0 4 km
fter: C-NOPB



Canada-Newfoundland and Labrador Offshore Area

29 Exploration Licences (ELs)

56 Significant Discovery Licences (SDLs)

11 Production Licences (PLs)

Increased activity beyond 200 miles

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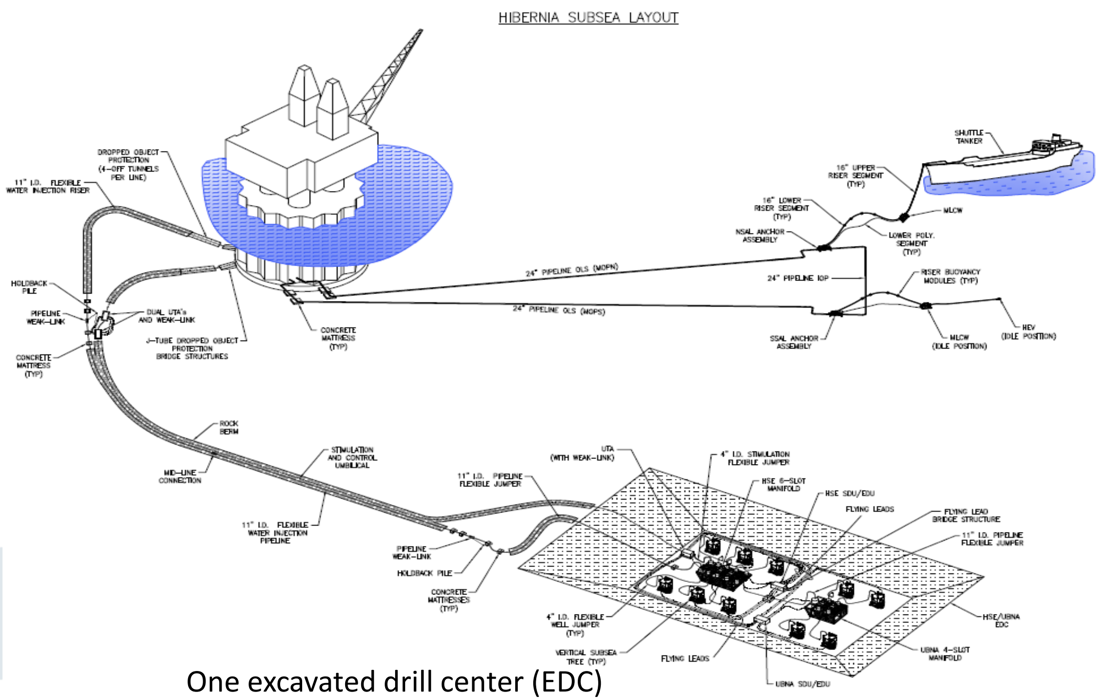
Hibernia

- Field Discovered in 1979
- 315 km southeast of St. John’s in 80 m of water
- Development Cost: $5.8 billion
- First Oil – November 11, 1997
- Operated by HMDC

Source: HMDC



One excavated drill center (EDC)
tied back to the Hibernia Platform.

GBS Structure

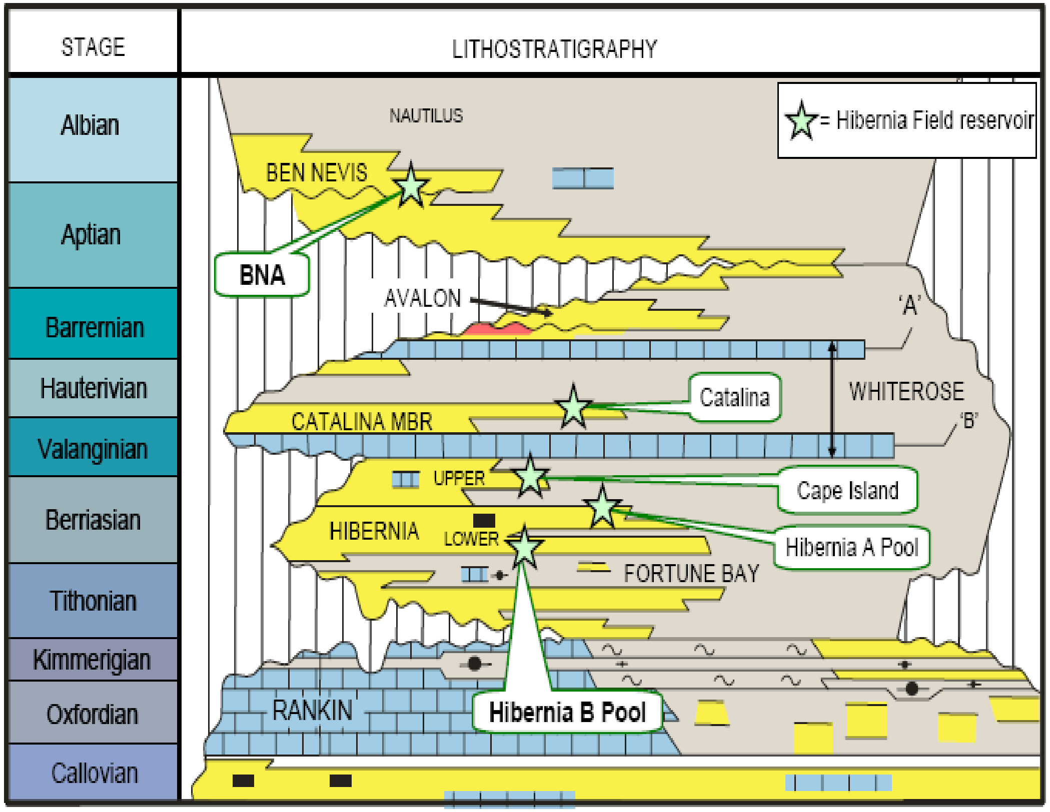
- 224 m high
- 85 m of ice resistant cassion
- 26 m of four shafts above the ice wall
- 113 m of production facilities

- Weighs 1.2 million tonnes
- Has two drilling derricks

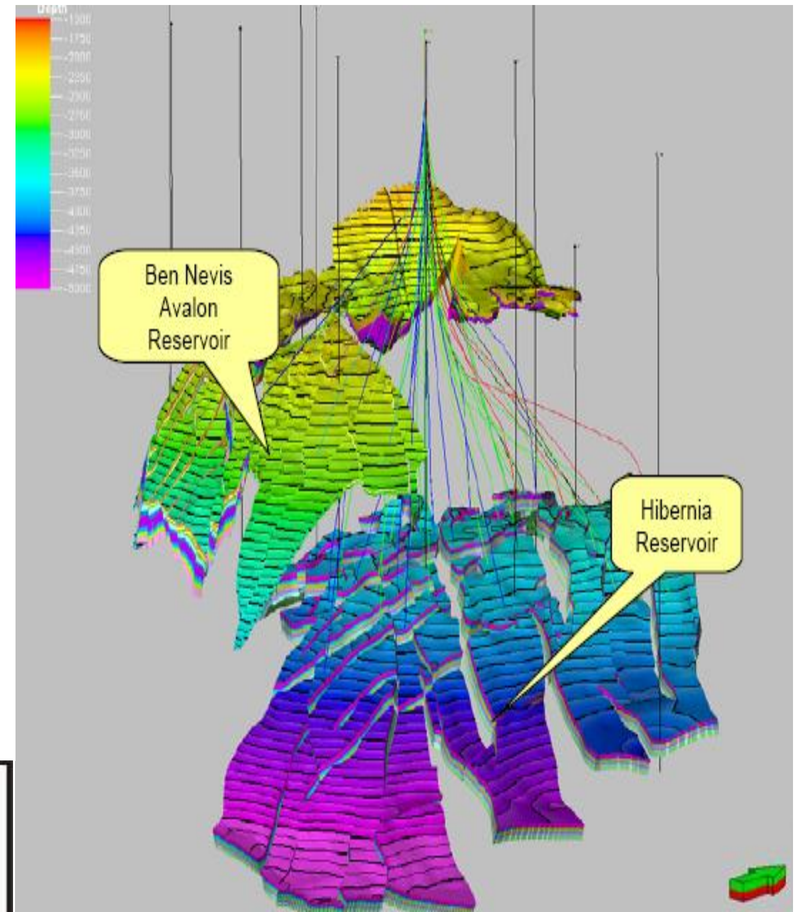
- Design capacity = 240,000 bbls oil/day

- Offshore personal 788 (266 average on platform)

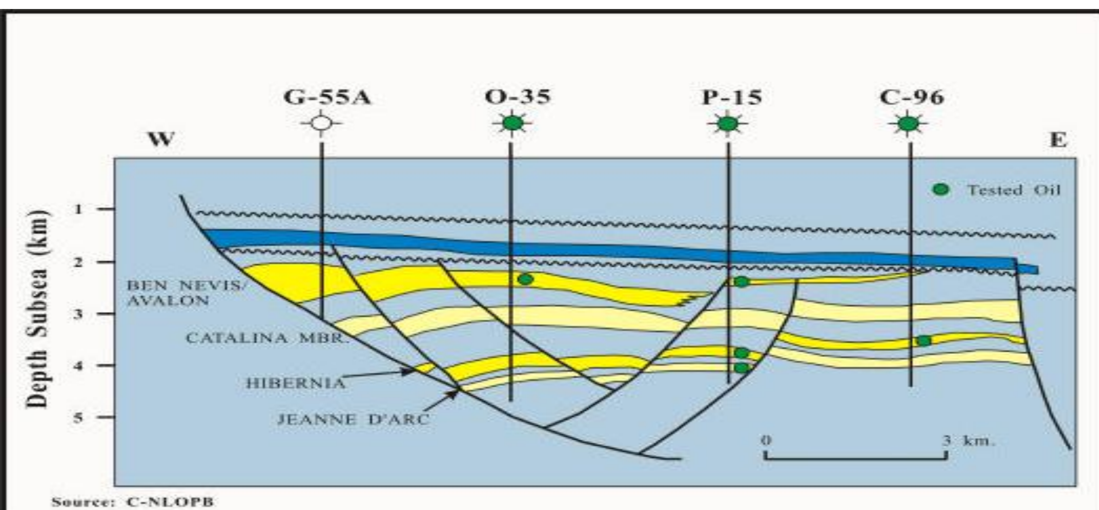
Figure 1.3-1: Stratigraphic Column Illustrating Hibernia Field Reservoirs



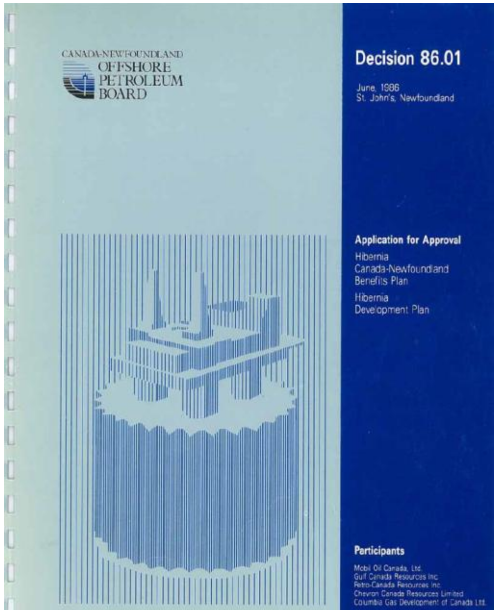
Source: HMDC
Development Plan amendment 2010



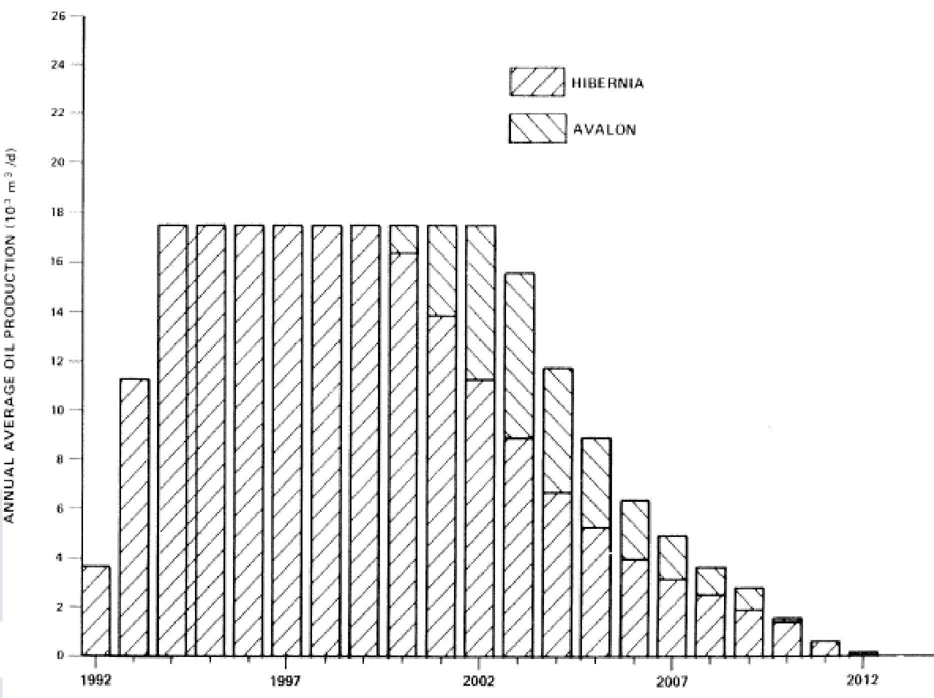
Source CNLOPB



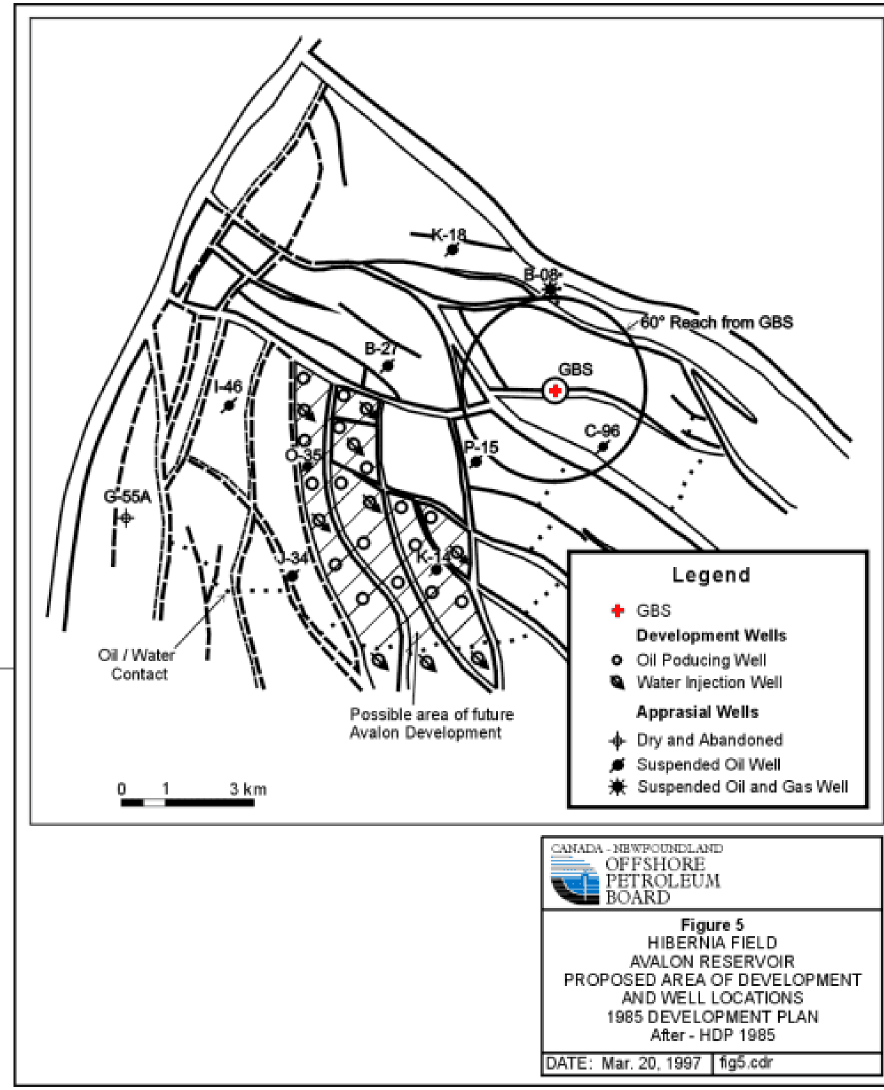
C-NLOPB



Oil Production Forecast



ource: HDP, Figure 3.6-1



Source: CNOPB Decision 86.01

Hibernia Development Plan Amendment 1997

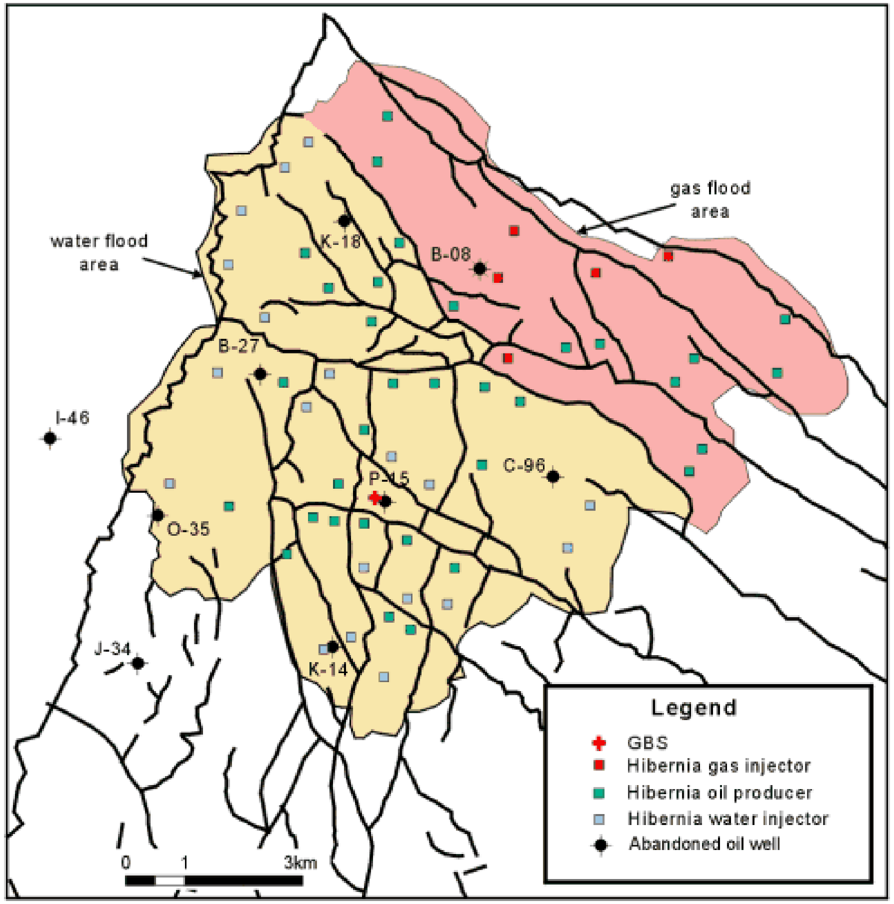


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Figure 7
HIBERNIA FIELD
HIBERNIA FORMATION
PROPOSED WELL LOCATIONS
1996 DEVELOPMENT PLAN AMENDMENT
After HMDC - 1996

DATE: Mar. 20, 1997 | fig7.cdr

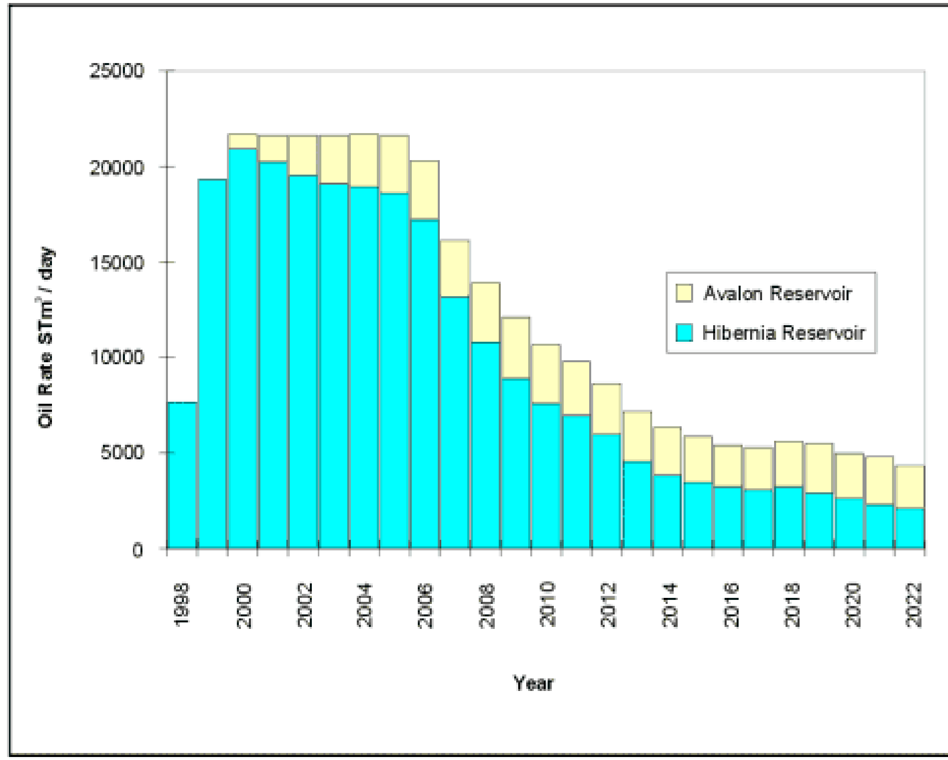

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Figure 9

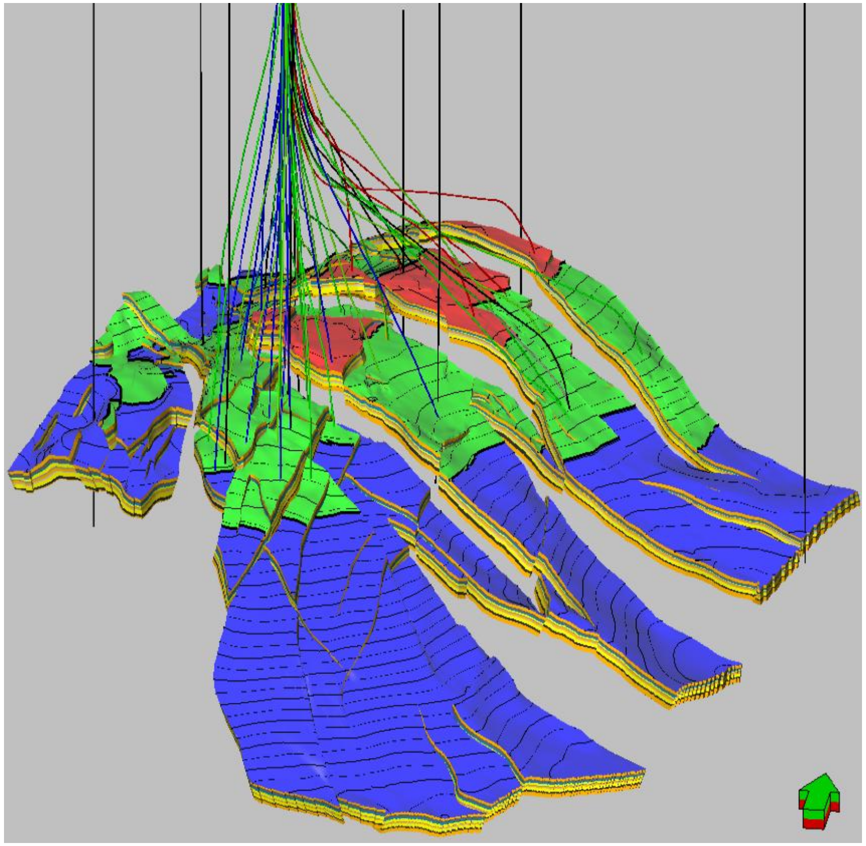
Oil Production Forecast
After HMDC - 1996

DATE: Mar. 20, 1997 | fig9.cdr

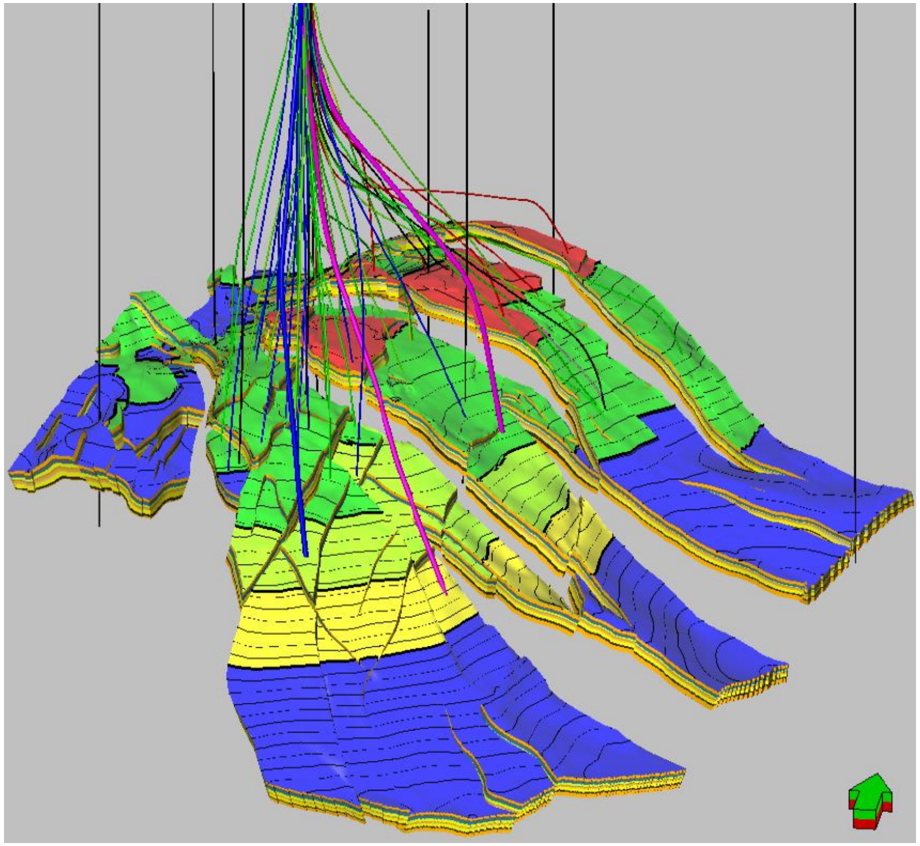
Source: CNOPB Decision 97.01

Hibernia Reservoir Evolution

Interpreted and Encountered Oil Water Contacts (1979 – 2004)



Interpreted Oil Water Contact Recent drilling and Upside Potential 2006

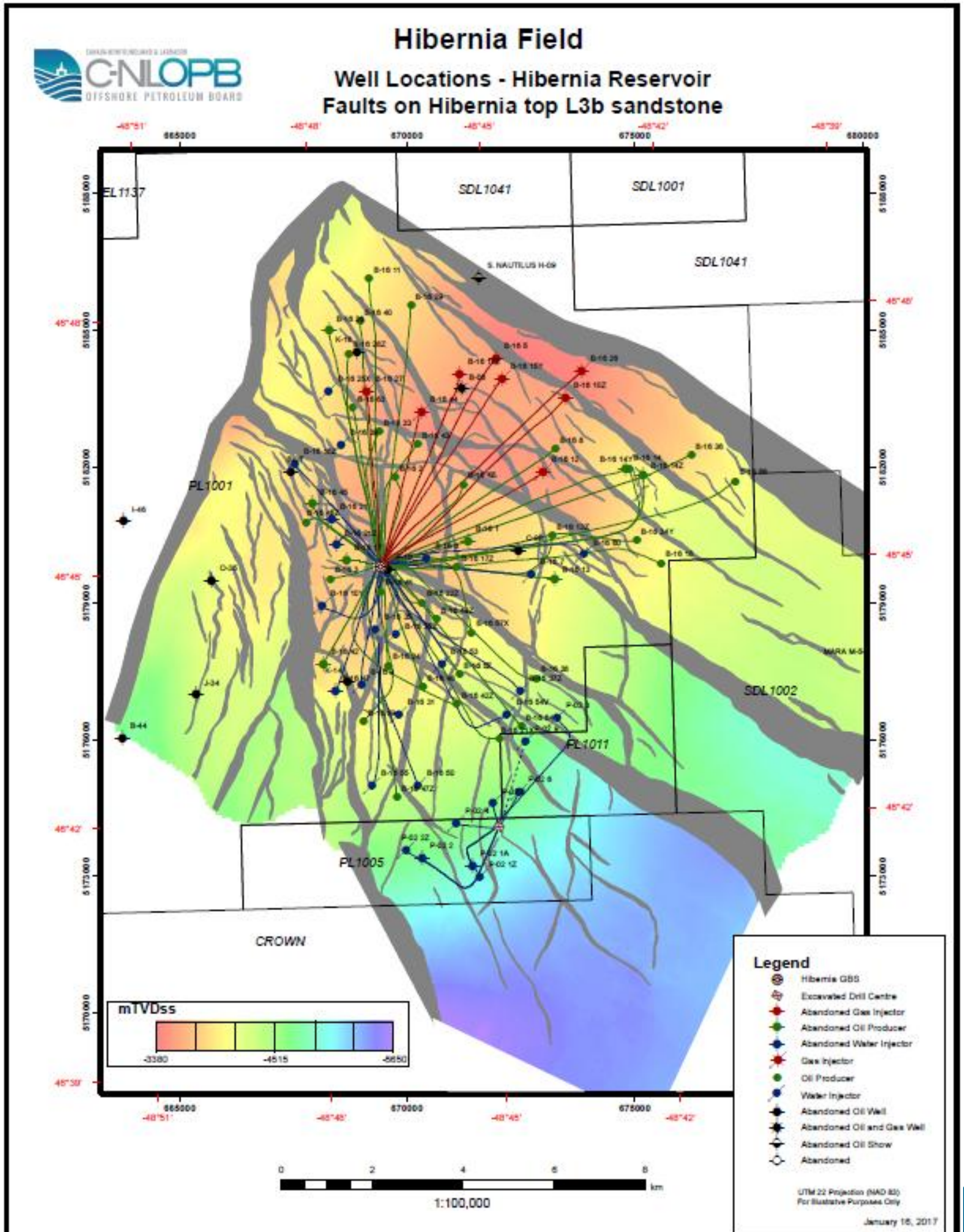


Understanding of oil water contacts has evolved over the last few years

•**Recently completed analysis of reservoir connectivity and extent**

– Reservoir sands are continuous and laterally extensive across entire field

Source: HMDC
Development plan amendment 2010



Hibernia Field

39	oil producers
5	gas injectors
19	water injectors (7 dual water injectors)
7	subsea water injectors
70	wells

Reserves

Proven – 233.7 Million m^3 (1,470 Million bbl)

Proven & Probable – 261.45 Million m^3 (1,644 Million bbl)

Proven, Probable & Possible – 310.04 Million m^3 (1,950 Million bbl)

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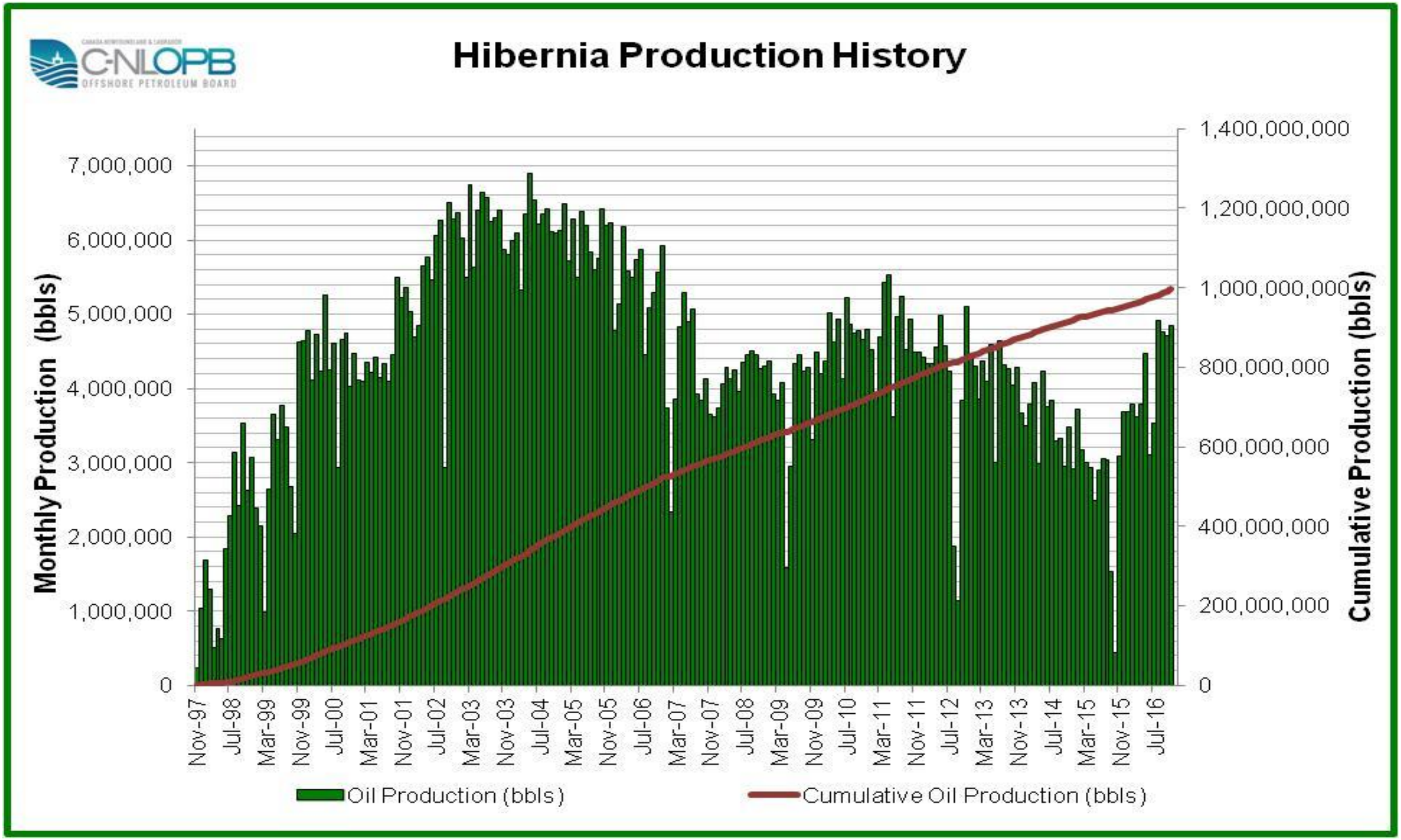


2015 Production: 33.04 MMbbl
2016 Production: 49.78 MMbbl

Cumulative Production: 1,001.5 MMbbl

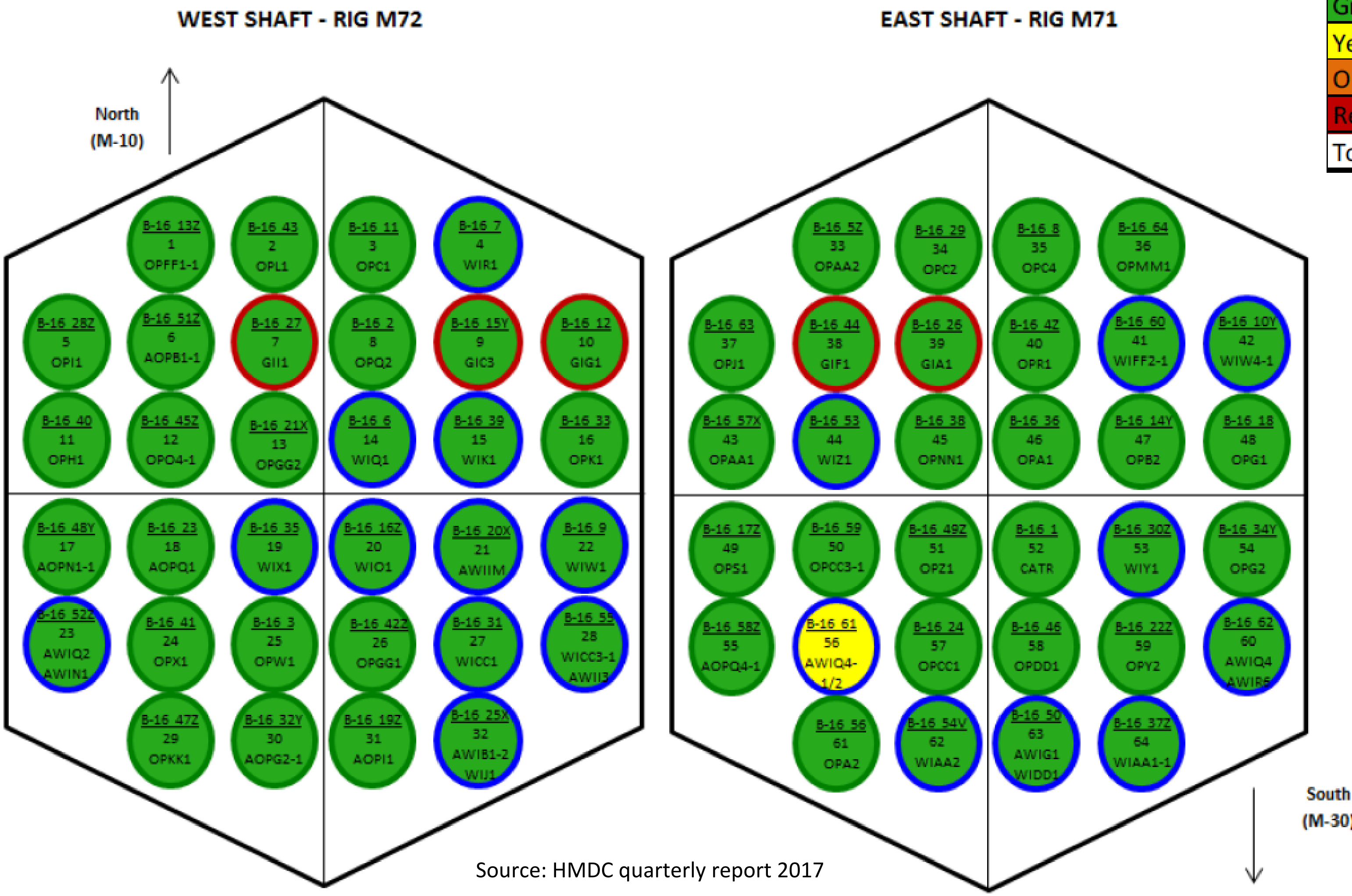
Well Integrity Category – Platform

Legend

- One barrier failure and the other is degraded/not verified, or leak to surface.
- One barrier failure and the other is intact, or a single failure may lead to leak to surface.
- One barrier degraded, the other is intact
- Healthy well - no or minor issue

- Gas Injector
- Water Injector
- Oil Producer

	Oil Producer	Water Injector	Gas Injector	Total
Green	39	19	5	63
Yellow	0	1	0	1
Orange	0	0	0	0
Red	0	0	0	0
Total	39	20	5	64



Source: HMDC quarterly report 2017

Hibernia Field Break Down

7 Regions in the Field

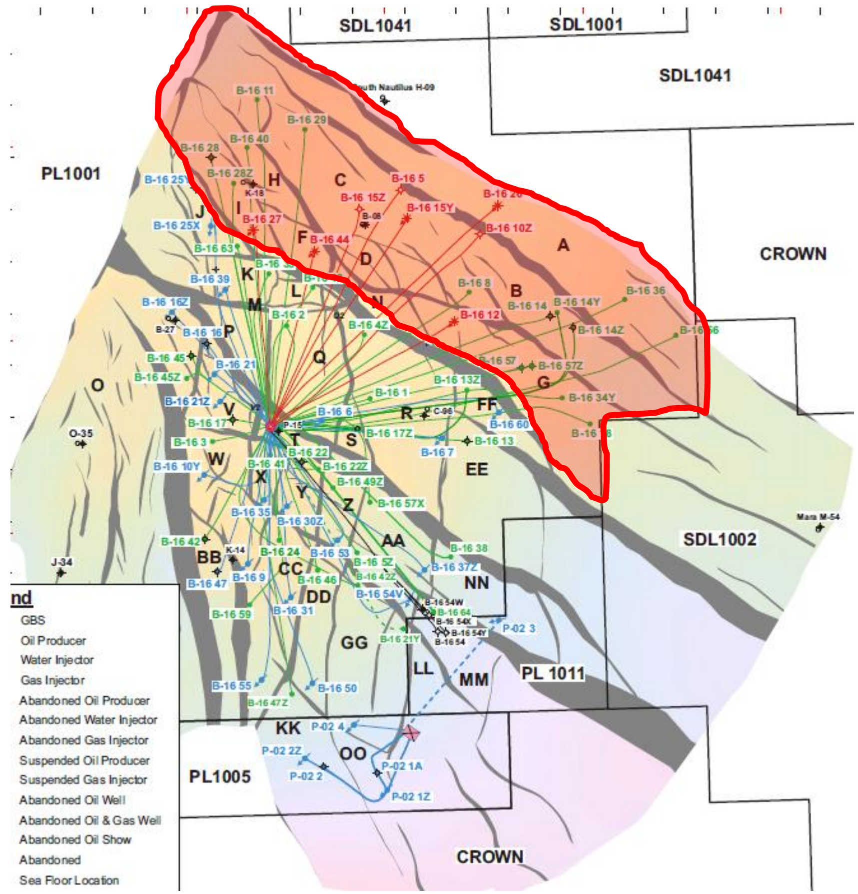
- Gas Flood
- Water Flood
- AA Block
- Hibernia Southern Extension (HSE)
- Ben Nevis – Avalon (BNA)
- Unit BNA
- Catalina

Hibernia Gas Flood Region

- 7 blocks
- 11 Producers
- 5 Gas Injectors

- 11.58 MMbbls in 2016 (23% of field production)
- 2.56 Bm^3 of gas was re-injected in 2016

- Major 2016 contributions
  - B-16 56 (A Block)
  - B-16 14Y (B Block)
  - B-16 29 (C Block)



2017 Production Forecast:
10.83 MMbbls (29,700 bbls/d)

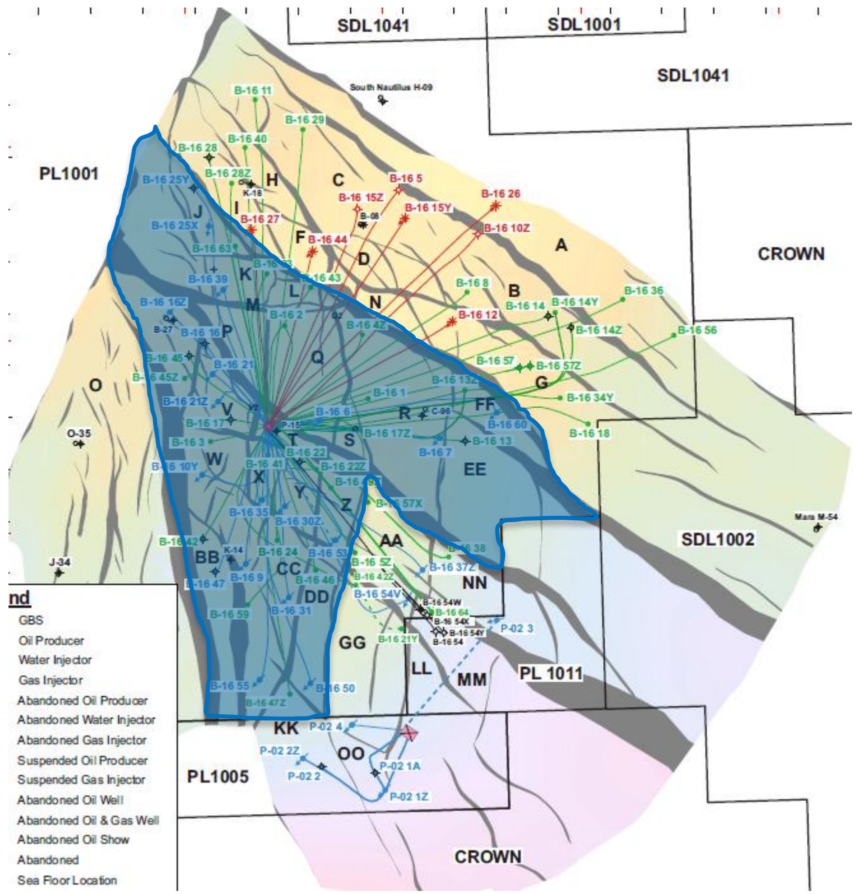
Hibernia Water Flood Region

- 15 blocks (Excluding the AA Block)
- 15 Producers
- 14 Water Injectors (3 Dual)

- 10.57 MMbbls in 2016 (21% of field production)
- 43.42 MMbbls of water was injected in 2016 (51% of field water injection)

- Major 2016 contributions
  - B-16 46 (DD Block)
  - B-16 3 (W Block)

- # wells have WC above 50%
- # wells have WC above 80%
- # wells have WC above 90%



2017 Production Forecast:
6.22 MMbbls (17,000 bbls/d)

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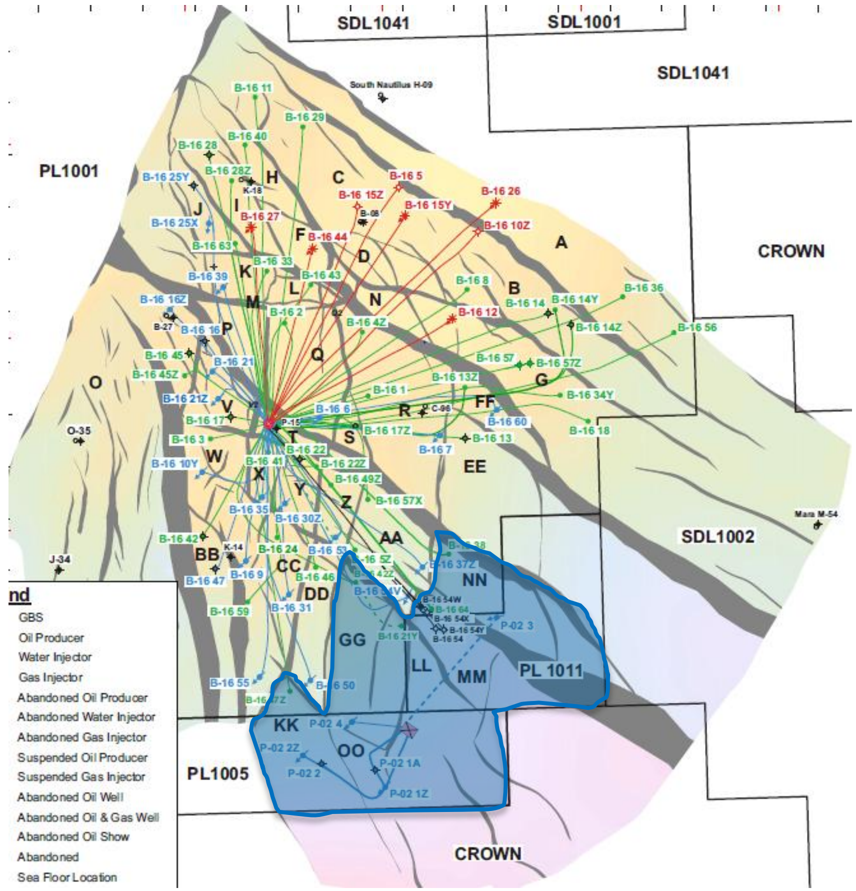
Hibernia Southern Extension (HSE)

- 6 blocks
- 5 Producers
- 7 Water Injectors

•19.11 MMbbls in 2016 (38% of field production)

- 26.11 MMbbls of water was injected in 2016 (31% of field water injection)

- Major 2016 contributions
    - B-16 42Z (GG Block)
    - B-16 47Z (KK Block)
    - B-16 21X (GG2Block)



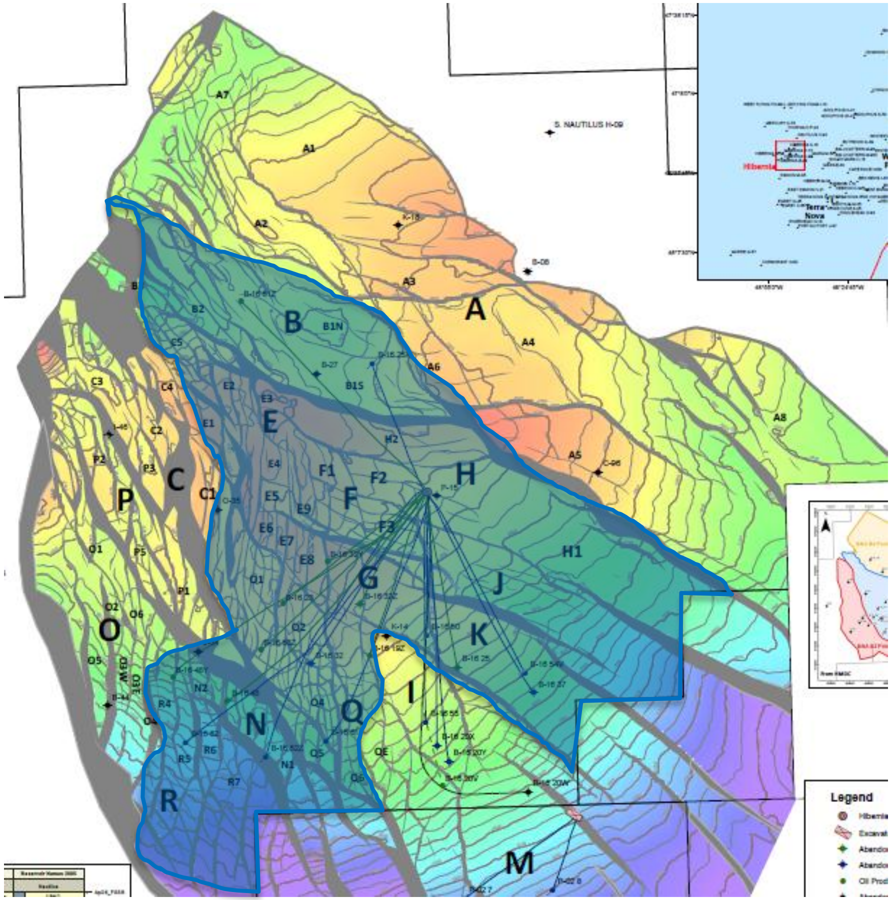
2017 Production Forecast:
21.07 MMbbls (57,700 bbls/d)

Ben Nevis – Avalon (BNA)

- 6 blocks
- 6 Producers
- 8 Water Injectors (5 Dual)

- 5.67 MMbbls in 2016 (11% of field production)
- 11.17 MMbbls of water was injected in 2016 (13% of field water injection)

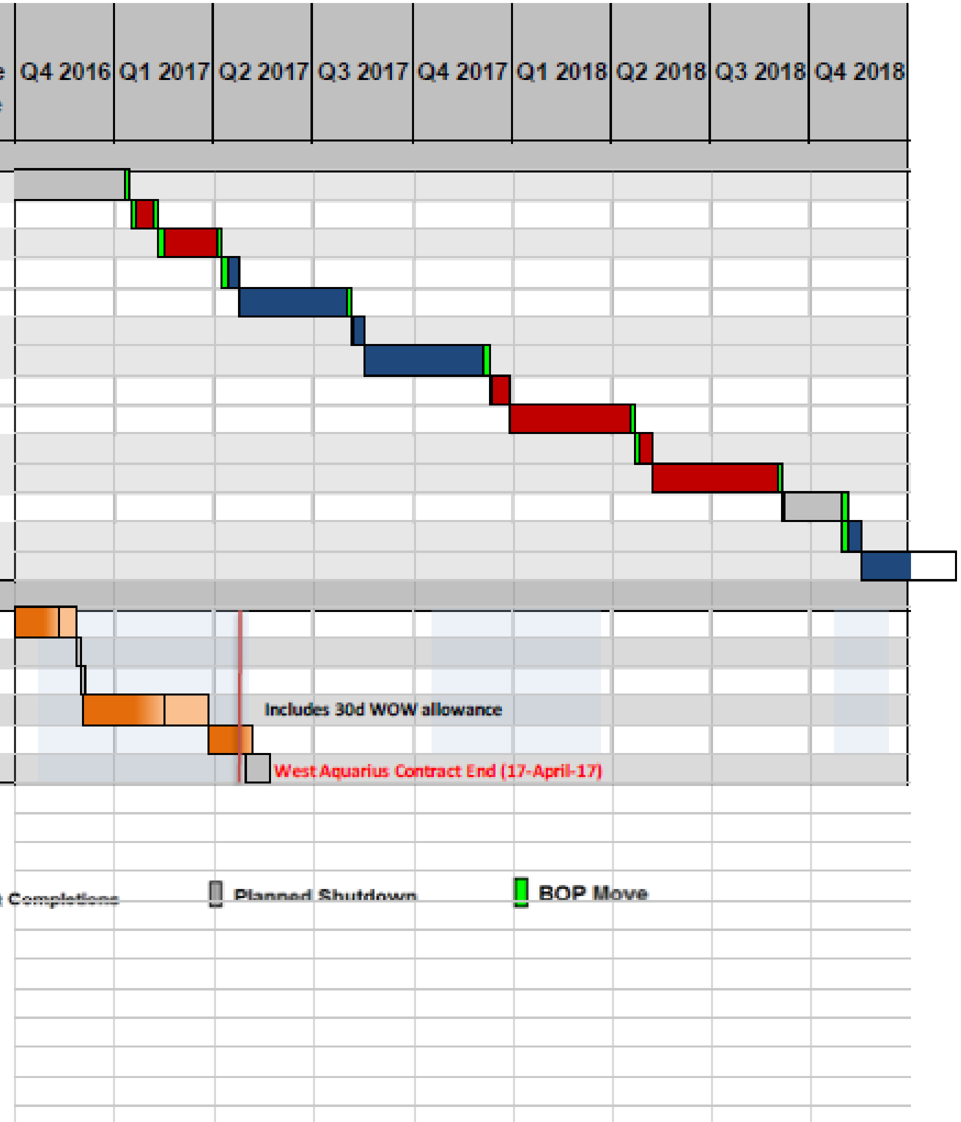
- Major 2016 contributions
  - B-16 48Y (N/R3 Block)
  - B-16 23 (Q2 Block)
  - B-16 32Y (G Block)



2017 Production Forecast:
4.62 MMbbls (12,700 bbls/d)

Drilling Schedule – Rev. 125

	Fully Funded	Slot #	MD (m)	Funding Basis (d)	Funding Basis Start Date	Vision (d)	Vision / Aggressive Start Date
HIBERNIA							
Drilling Upgrades	Yes	-	-	255	5-May-16	255	5-May-16
B-16 31Z WAGCC1	Yes	W27	5886	25	15-Jan-17	12	15-Jan-17
B-16 20V AOPQE	Yes	W21	6674	58	9-Feb-17	39	27-Jan-17
B-16 53 Aband	Yes	E44	-	14	8-Apr-17	9	7-Mar-17
B-16 53Z AOPIM-2	Yes	E44	7535	103	22-Apr-17	63	16-Mar-17
B-16 49Z Aband	Yes	E51	-	12	3-Aug-17	8	18-May-17
B-16 49Y OPD2	Yes	E51	6672	115	15-Aug-17	73	26-May-17
B-16 41 Aband	No	W24	-	18	8-Dec-17	12	7-Aug-17
B-16 41Z AOPQ5	No	W24	6300	116	26-Dec-17	78	19-Aug-17
B-16 35 Aband	No	W19	-	18	21-Apr-18	12	4-Nov-17
B-16 35Z AWIQ4/Q5	No	W19	6400	117	9-May-18	78	16-Nov-17
Shutdown	No	-	-	56	3-Sep-18	56	3-Feb-18
B-16 22Z Aband	No	E59	-	18	29-Oct-18	12	31-Mar-18
B-16 22Y AOPQ1 LBN1	No	E59	4800	91	16-Nov-18	61	12-Apr-18
MODU							
WILL1 (D&C)	Yes	6	5068	56	30-Sep-16	56	30-Sep-16
WIGG2 (L2 Perfs)	Yes	-	-	4	25-Nov-16	4	25-Nov-16
WIGG1-2 (Add Perfs)	Yes	-	-	3	29-Nov-16	4	29-Nov-16
WIMM-1 (D&C)	Yes	9	5150	115	2-Dec-16	67	2-Dec-16
AWIQE (WO)	No	-	-	35	27-Mar-17	15	7-Feb-17
Demob	Yes	-	-	20	1-May-17	15	22-Feb-17



M71 Rig | M72 Rig | WAQ Drilling | WAQ Completions | Planned Shutdown | BOP Move

Source: HMDC quarterly report 2017

Looking forward at Hibernia

- **Change in focus in original production areas**
  - Hibernia South region
  - Ben Nevis Avalon reservoir

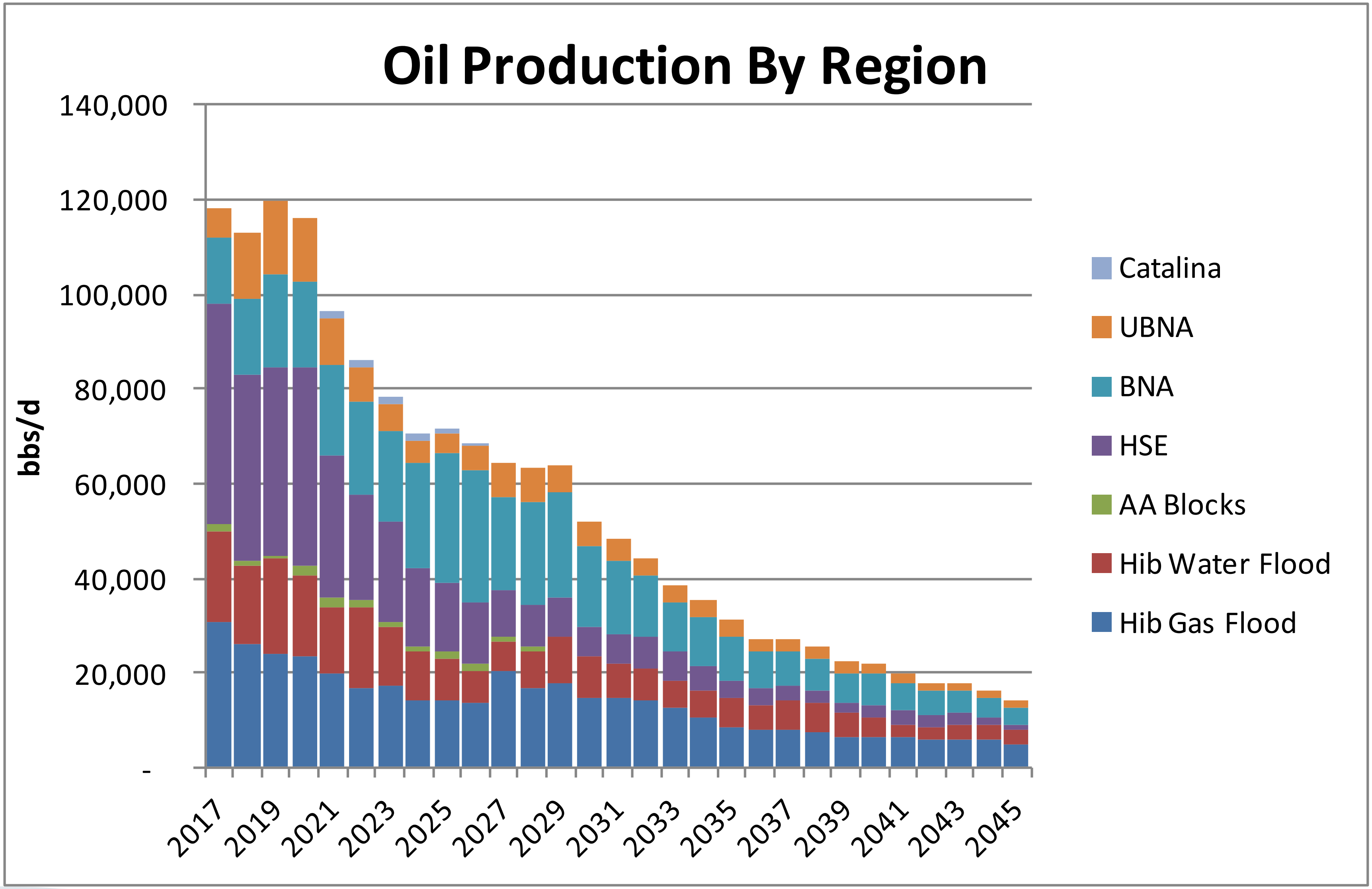
- **20 year old facility which is build for 50 years**
  - Rig started up after a 6 month upgrade

- **Optimization of drilling and production operations**
  - Use of new technology (multilaterals, artificial lift) for BNA reservoir

- **Other opportunities**

  Enhanced Oil Recovery
  Infill drilling opportunities
  Catalina reservoir

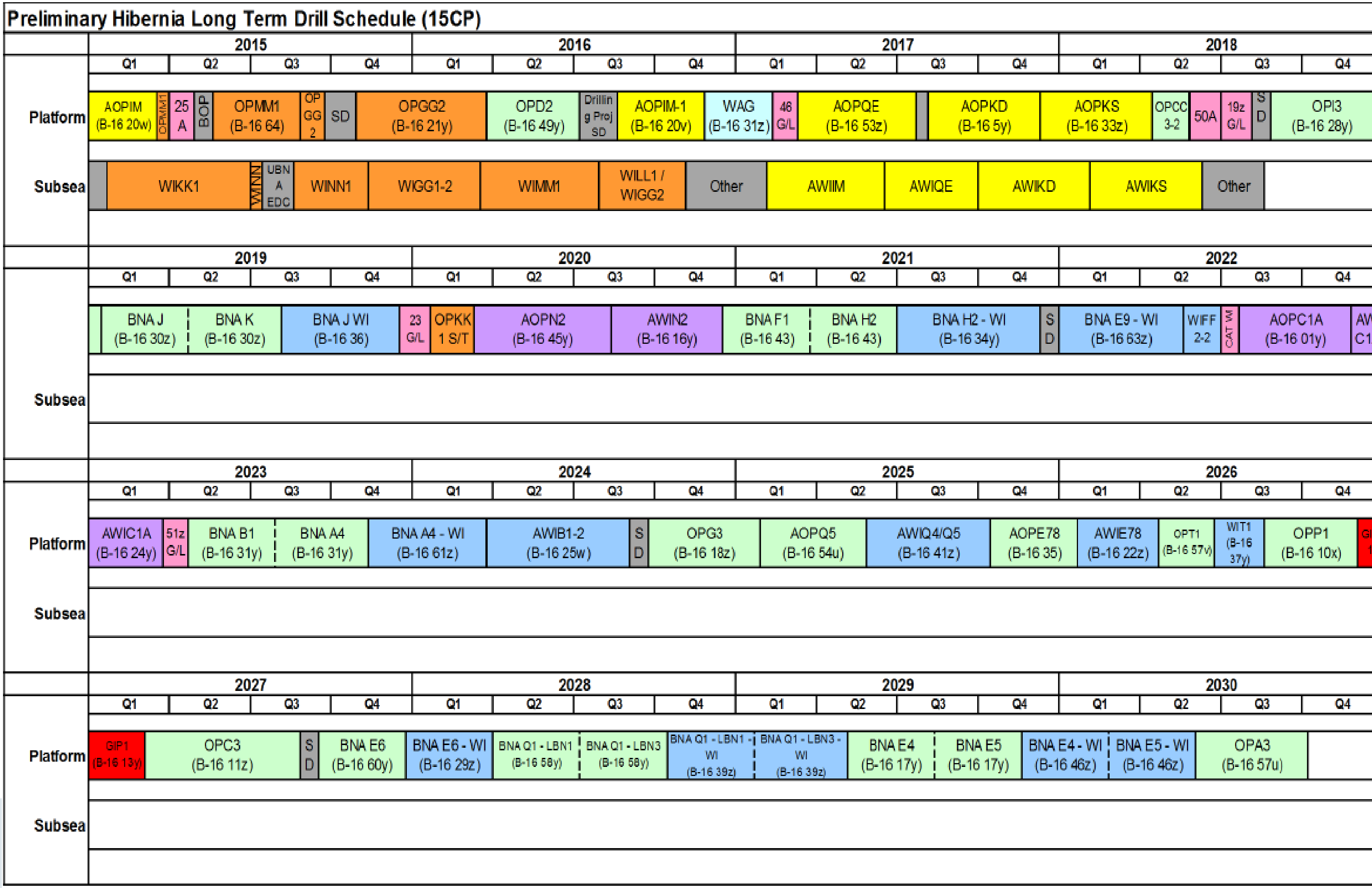
C-NLOPB



Source: HMDC modified by CNLOPB

C-NLOPB

Long-term Rig Schedule (Preliminary CP15)

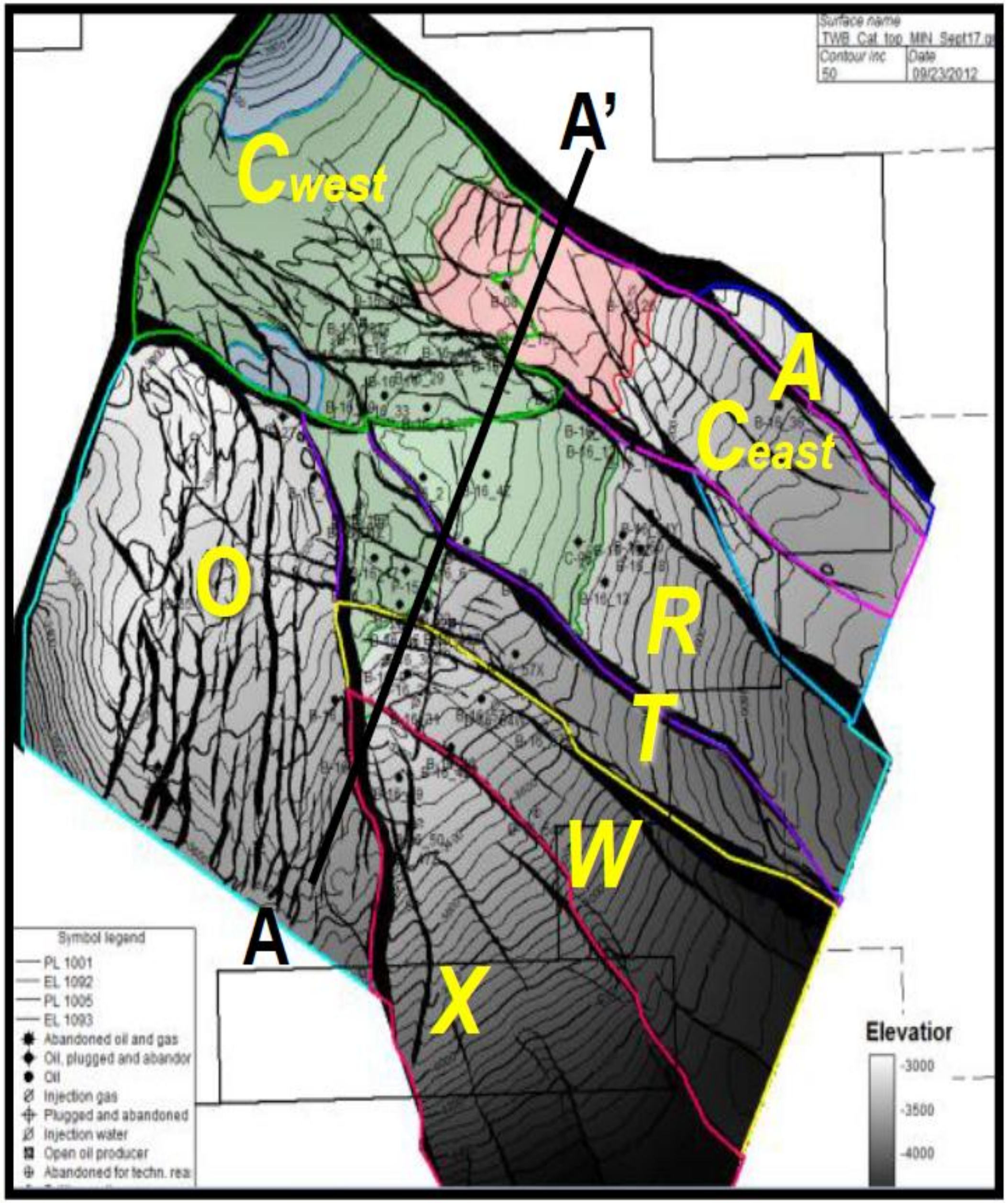


Source: HMDC annual report 2015

Catalina

- 8 blocks
- 1 Producer
- B-16 1 – Catalina R Block

- 0.10 MMbbls in 2016 (0.2% of field production)



Source: HMDC annual report 2015

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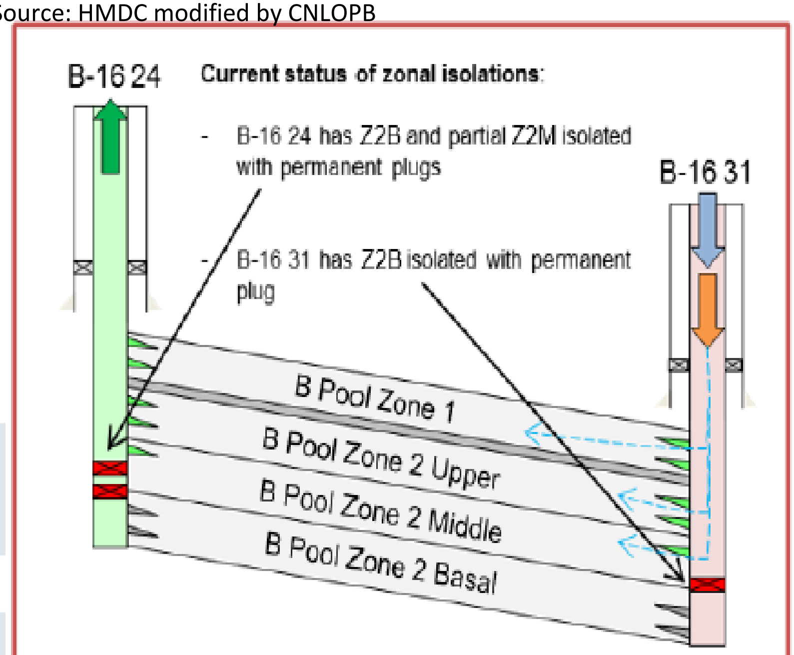
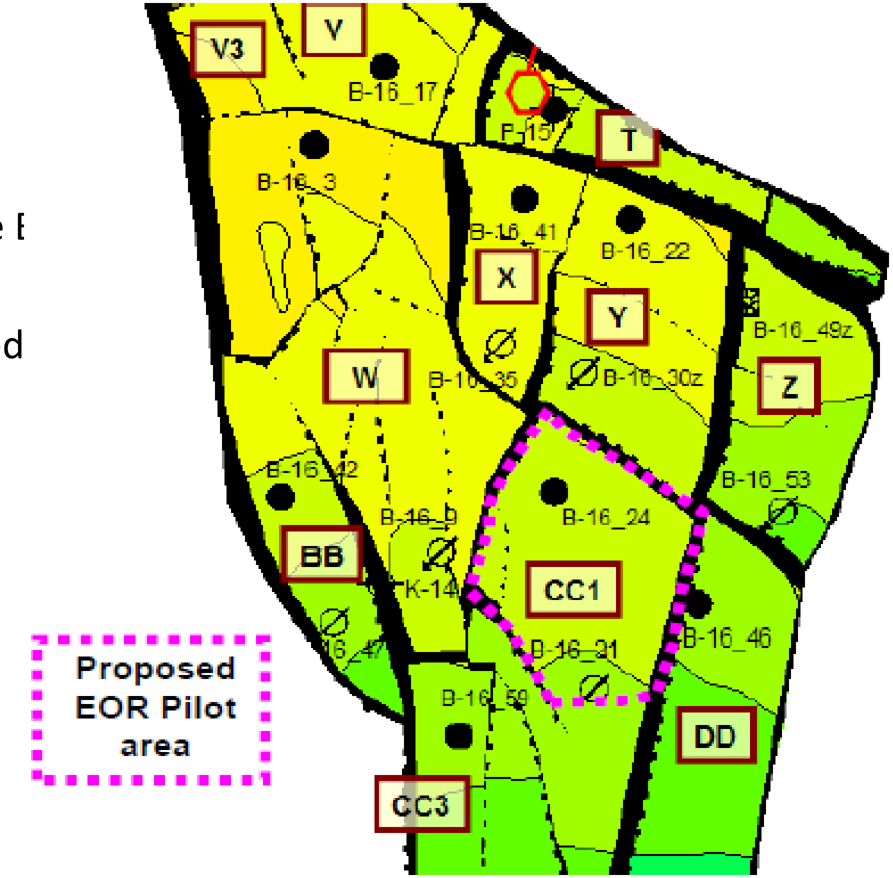
CC1 Block WAG Injection Pilot

- Contains the B-16 24 producer (2001) and the B
16 31 injector (2002).
- Currently operating at 90% water cut. Produced 34.4 MBO to date (51.7% recovery)
- Chosen as the best candidate as it:
  - Is late in waterflood life
  - Contains unswept attic oil
  - Is moderate size

Source: HMDC modified by CNLOPB





Source: HMDC modified by CNLOPB

- Simulation predicts 7 MBO incremental compared to continued waterflood
- 6 months of gas injection followed by 6 months of water injection (1 cycle).

Hibernia Summary

- Production and ultimate recovery has exceeded early development approvals

- Hibernia is a world class “ super giant “ reservoir

- Other opportunities
    - Reservoirs such as Ben Nevis Avalon, Catalina
    - Enhanced oil recovery
    - Satellite tie backs
    - Gas Commercialization

Terra Nova

- Field Discovered in 1984
- 350 km southeast of St. John's in 95m of water
- Development Cost: $2.8 billion
- First Oil – January 20, 2002
- Operated by Suncor Energy

<u>Terra Nova FPSO</u>

- First of its kind to be used in North America
- 292 m long, 45 m wide and 18 stories tall
- 960,000 bbls of oil storage capacity
- Largest disconnect turret mooring system
- Double hulled and 3,000 tonnes of extra
- steel for ice protection
- Design capacity = 180,000 bbls oil/day
- Offshore personal 318

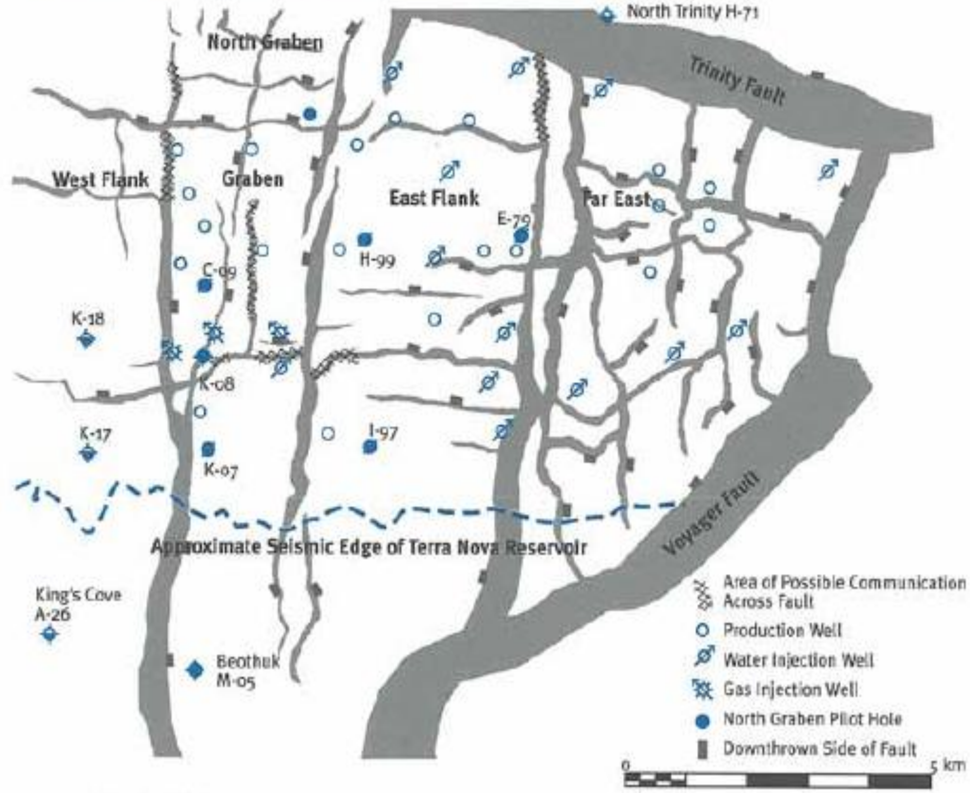
Source: Suncor

Source: Suncor

C-NLOPB

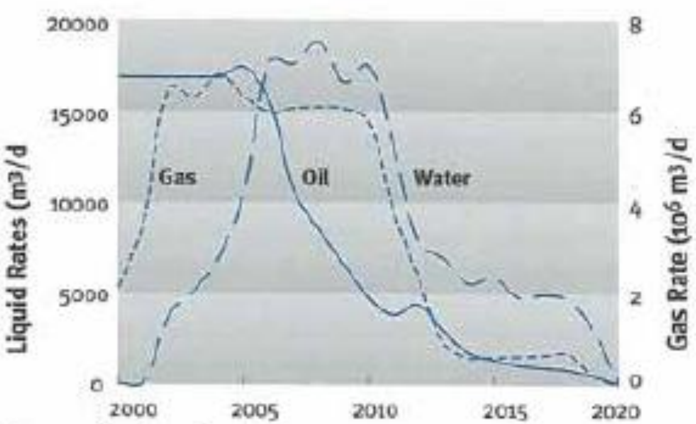
Source: CNOPB

FIGURE 4.4 **Proposed Graben, East Flank and Far East Development Well Locations**



Source: after Petro-Canada, 1997

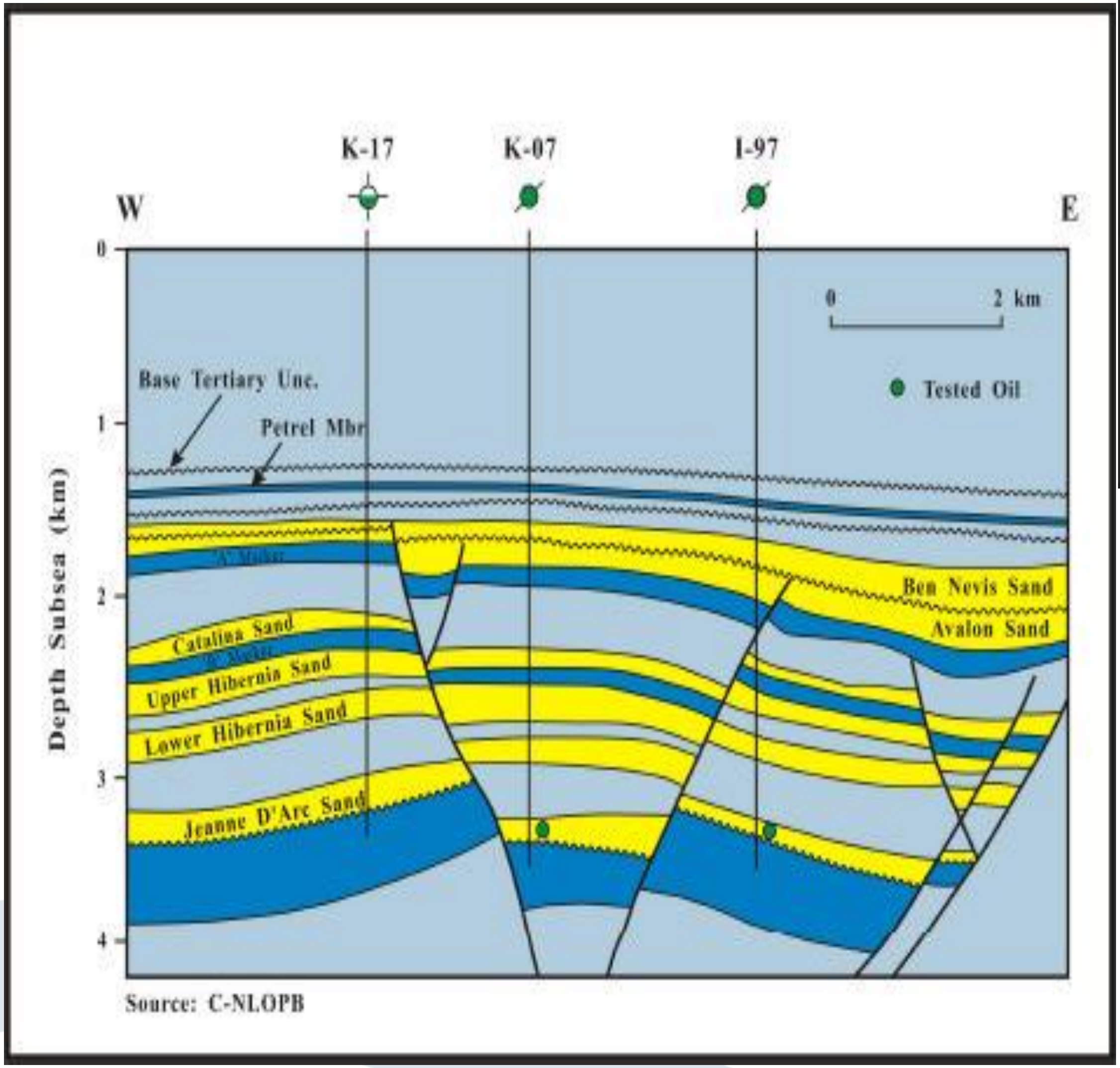
FIGURE 4.5
Reference Case Production Profiles

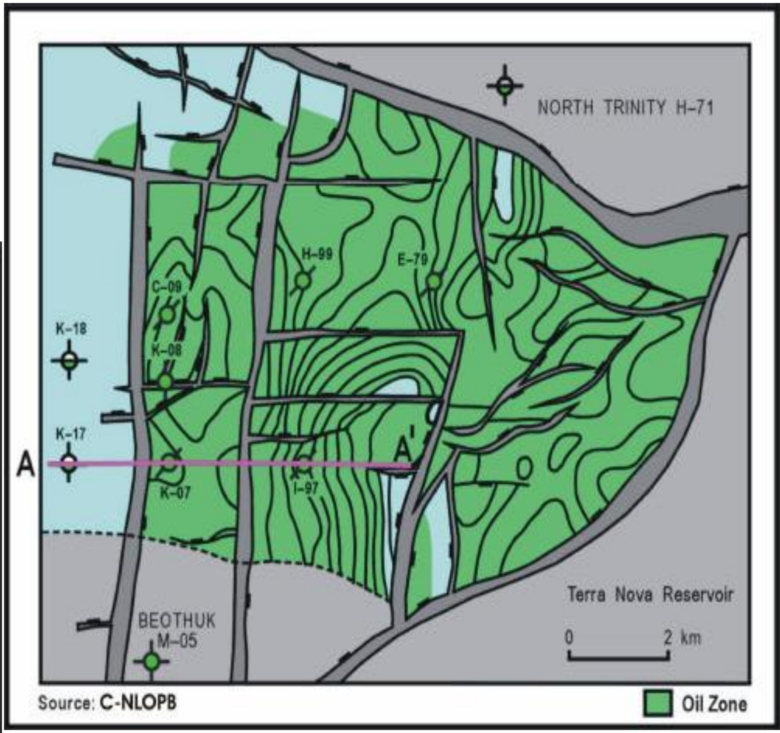


Source: after Petro-Canada, 1997

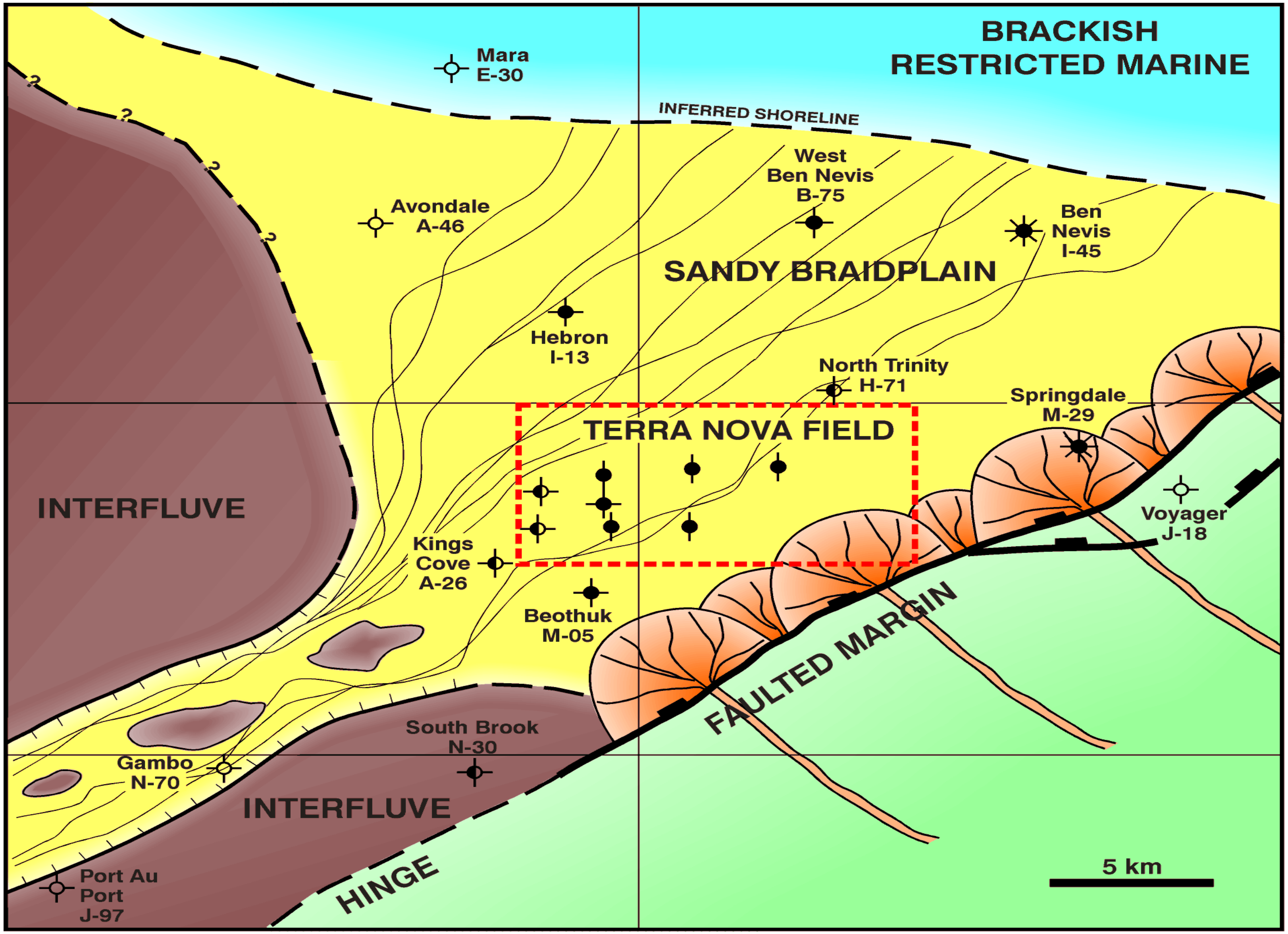
C-NLOPB

Terra Nova Field –
Geological Cross Section





Structure Map of Jeanne d'Arc Sandstone (Newfoundland and Labrador Oil and Gas Report, 2005)



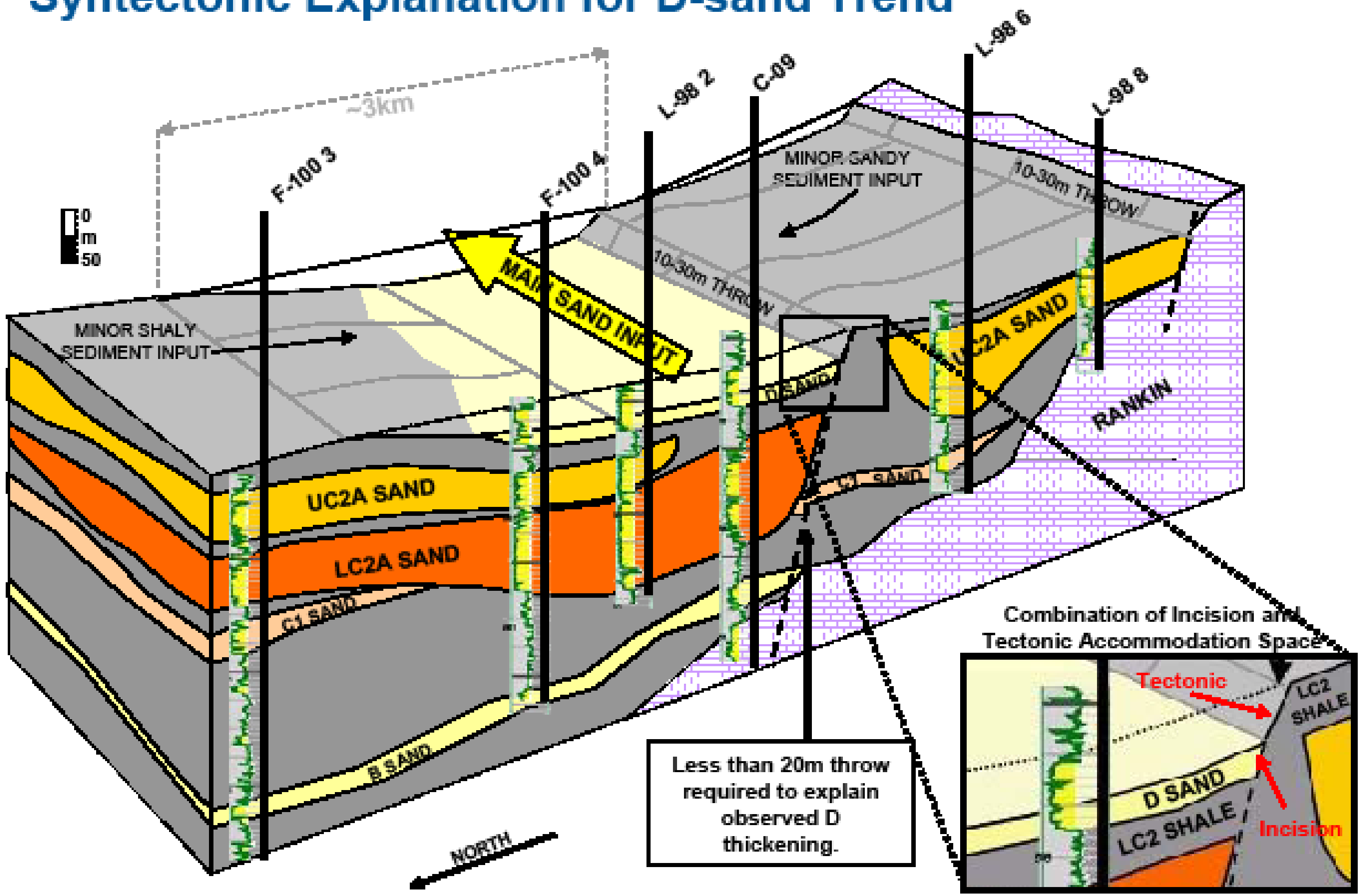
Cartoon schematic of Environment of Deposition for the Terra Nova Field.
Jeanne d'Arc reservoir.

Source: Suncor, modified by CNLOPB

Mountainous 'highlands' shedding sediments in alluvial fans and unto unconfined fluvial (river) systems in a fluvial braidplain. This is representative of one EOD that was active during the Jurassic Era in the vicinity of the Terra Nova Field.

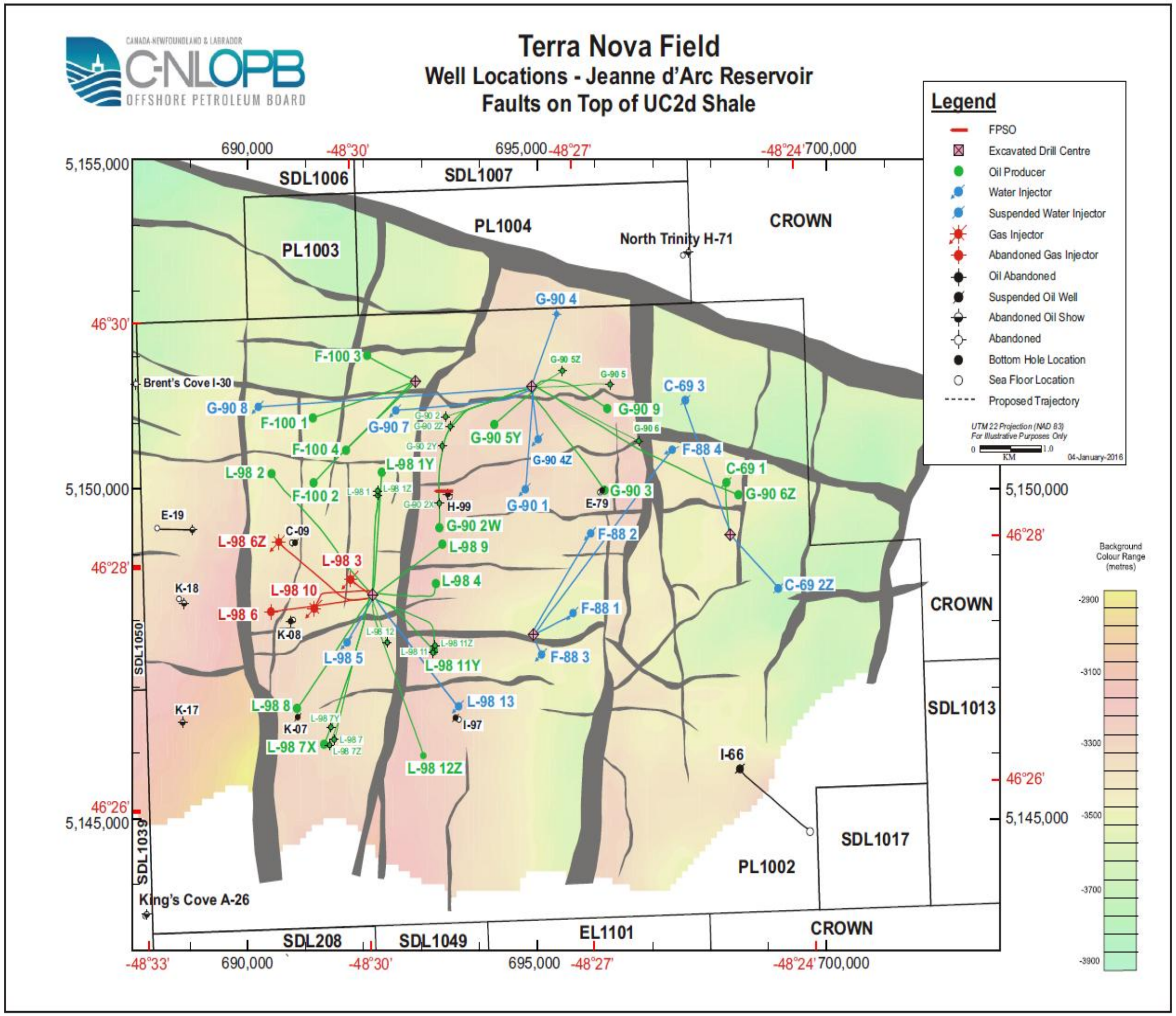
Source: Suncor, modified by CNLOPB

Syntectonic Explanation for D-sand Trend



13 **Operator** designation of Sand Zonation in Terra Nova Field

Source: Suncor, modified by CNLOPB



Terra Nova Field

17	oil producers
10	water injectors
3	gas injectors
30	wells

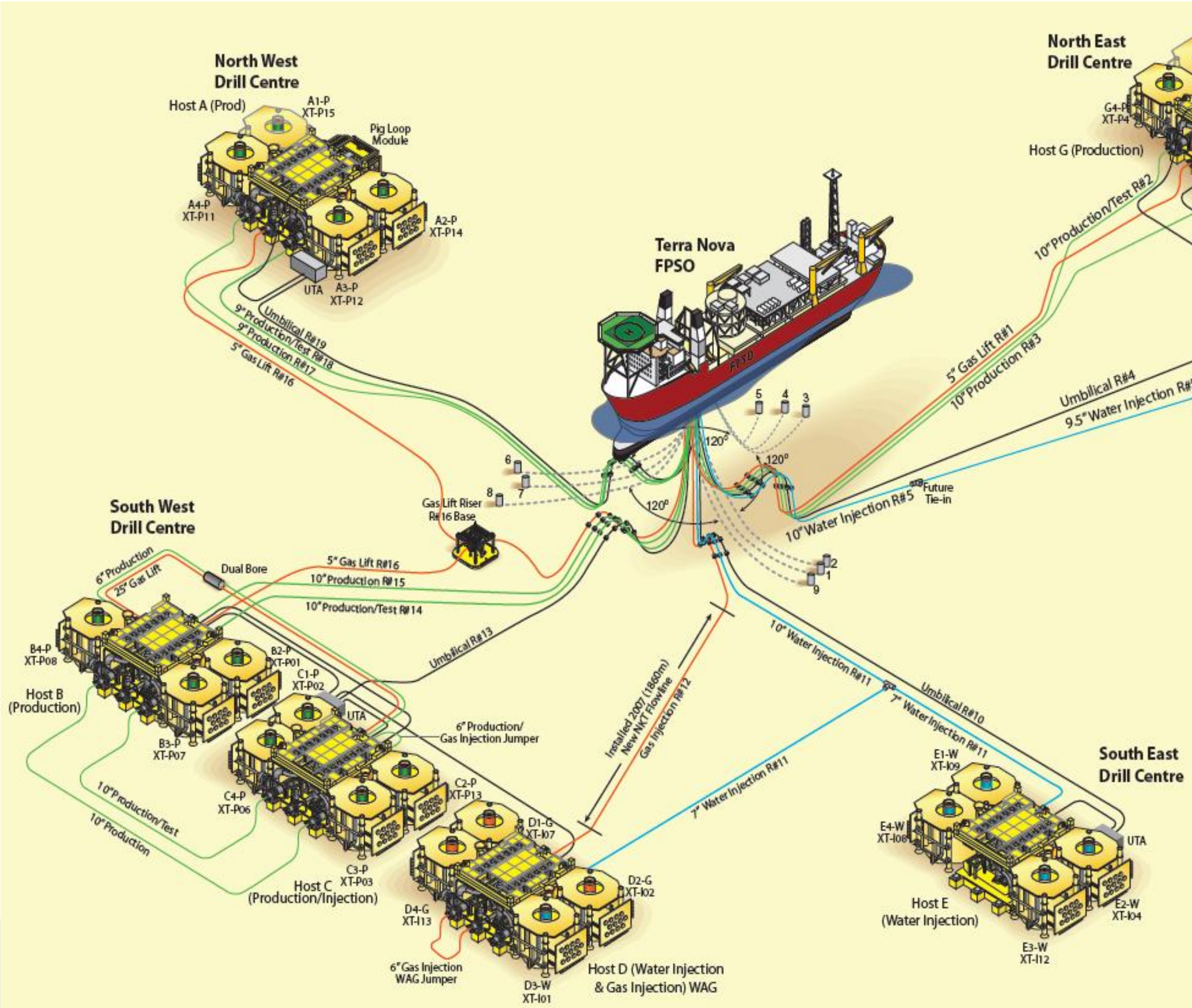
Reserves

Proven – 73 Million m^3
(459 Million bbl)

Proven & Probable – 80.5 Million m^3
(506 Million bbl)

Proven, Probable & Possible –
85.9 Million m^3
(540 Million bbl)

Terra Nova Field Drill Centers



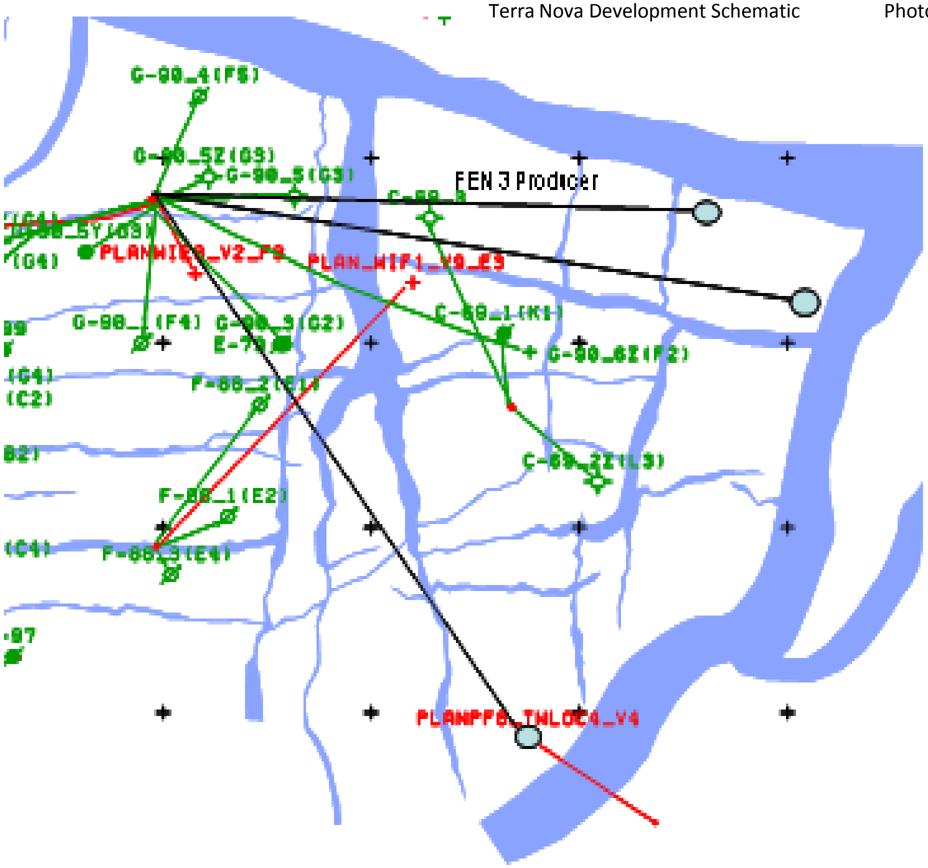
- 4 drill centers
    - 17 Oil Producers
    - 10 Water injectors
    - 3 Gas injectors

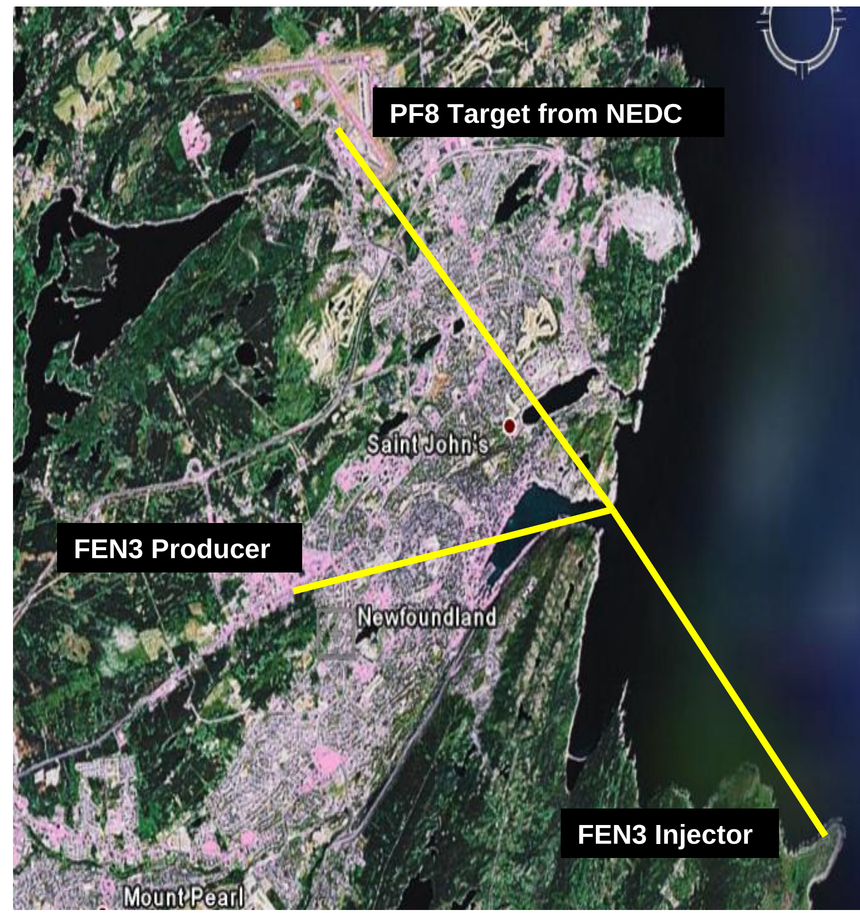
Source: Suncor, modified by CNLOPB

Terra Nova Proxy Wells and locations

Terra Nova Development Schematic

Photo Credit, Petro-Canada

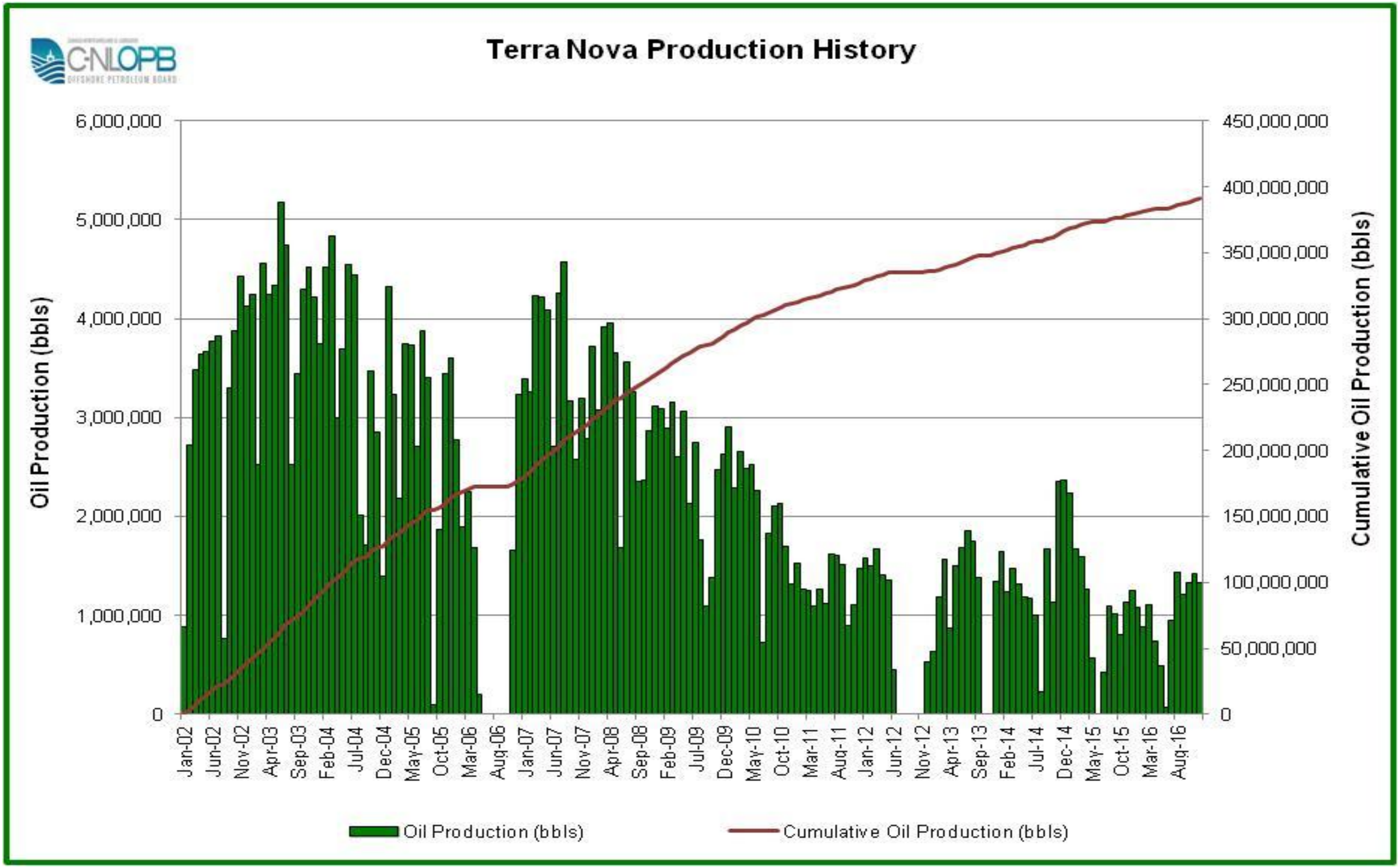




Source: Suncor 2008

Drilling wells from NEDC equivalent displacement to:

- Producer – Signal Hill to Avalon Mall (5400m)
- Injector - Signal Hill to Cape Spear (6300m)
- PF8 Twin – Signal Hill to St. John's airport (7000m)



2015 Production: 13.06 MMbbl

2016 Production: 12.05 MMbbl

Cumulative Production: 391.3 MMbbl

2015 Production Review & 2016 Forecast

<u>5 Regions in the Field</u>

- Graben C09S Gas Flood
- Graben C09N Water Flood
- Graben K07 Water Flood
- East Flank
- Far East

C-NLOPB

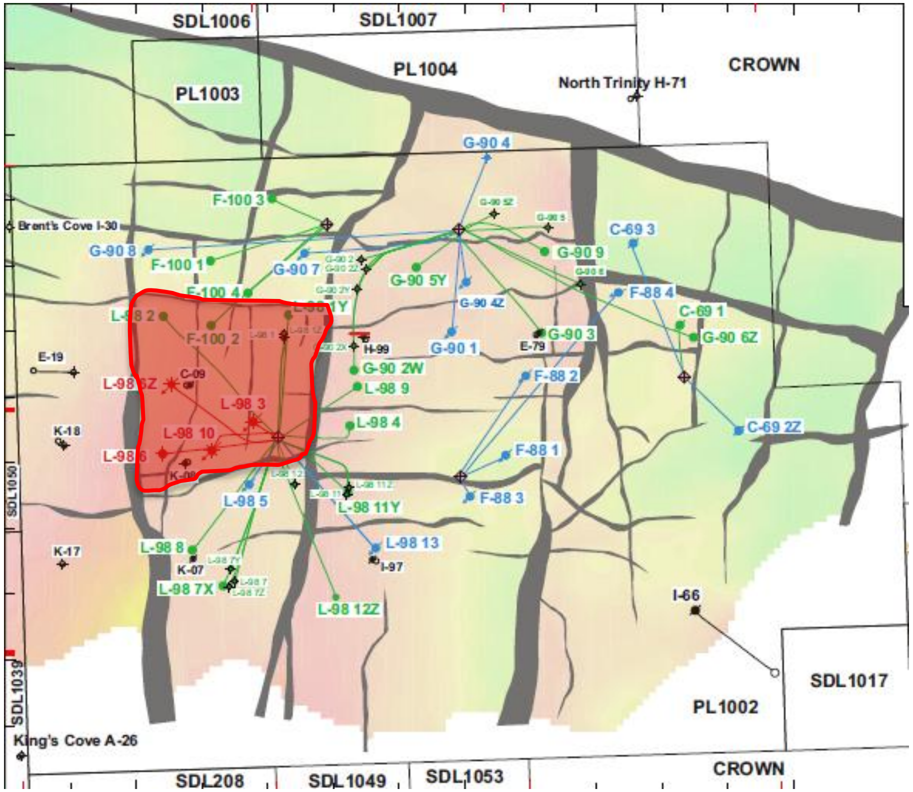
Graben C09S Gas Flood Region

- 3 Producers
- 3 Gas Injectors

- 5.67 MMbbls in 2016 (47% of field production)
- 1.3 Bm^3 of gas was re-injected in 2016

- Region's 3 producers are highest in the field
  - L-98 1Y
  - L-98 2
  - F-100 2 (Highest in field)

- Some Gasflood producers have GOR over 2000 (field average of 335)



2017 Production Forecast:
5.45 MMbbls (15,000 bbls/d)

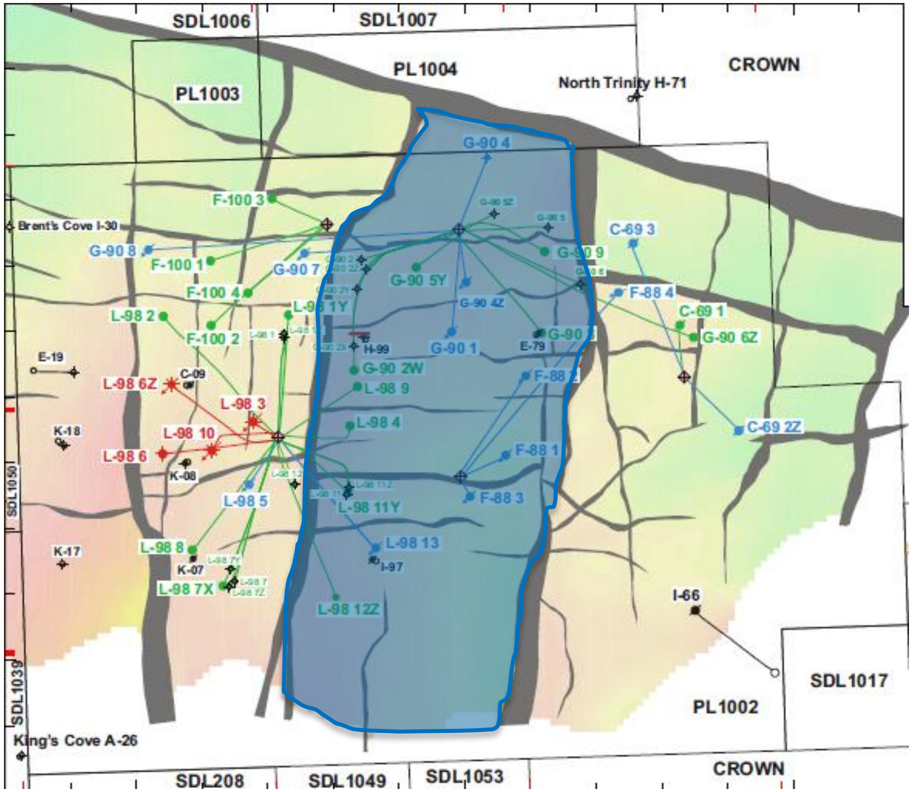
C-NLOPB

East Flank Water Flood Region

- 8 Producers
- 6 Water Injectors

- 4.64 MMbbls in 2016 (39% of field production)
- 27.2 MMbbls of water was injected in 2016

- Region's highest producer is L-98 4



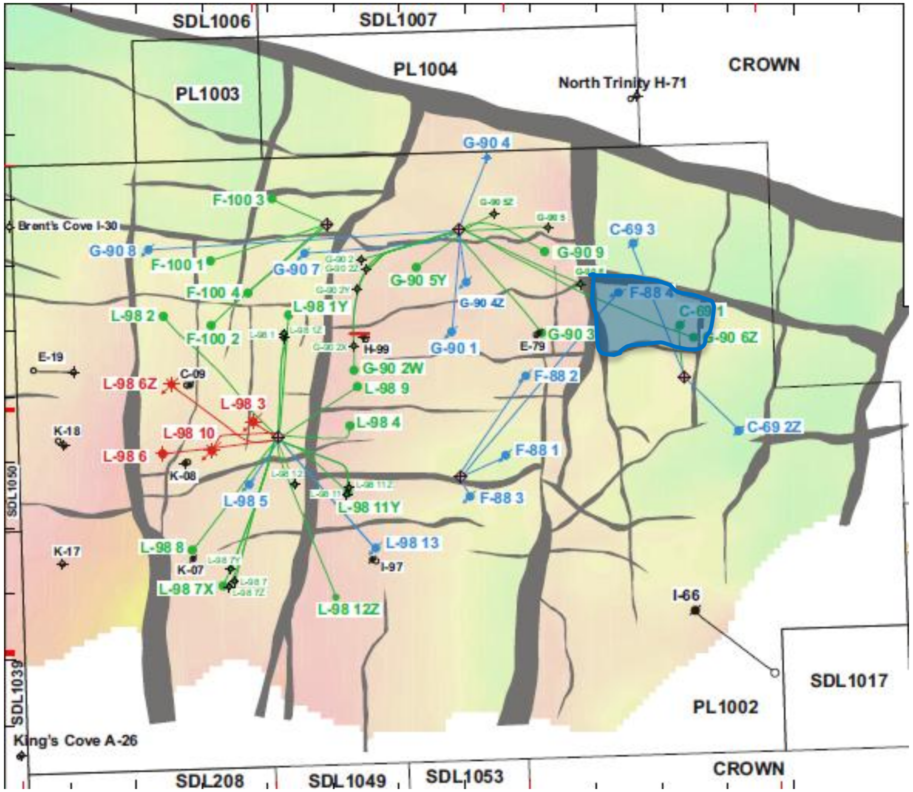
2017 Production Forecast:
3.47 MMbbls (9,500 bbls/d)

C-NLOPB

Far East Water Flood Region

- 1 Producers
- 1 Water Injector

- 0.54 MMbbls in 2016 (4% of field production)
- 5.9 MMbbls of water was injected in 2016



2017 Production Forecast:
3.47 MMbbls (9,500 bbls/d)

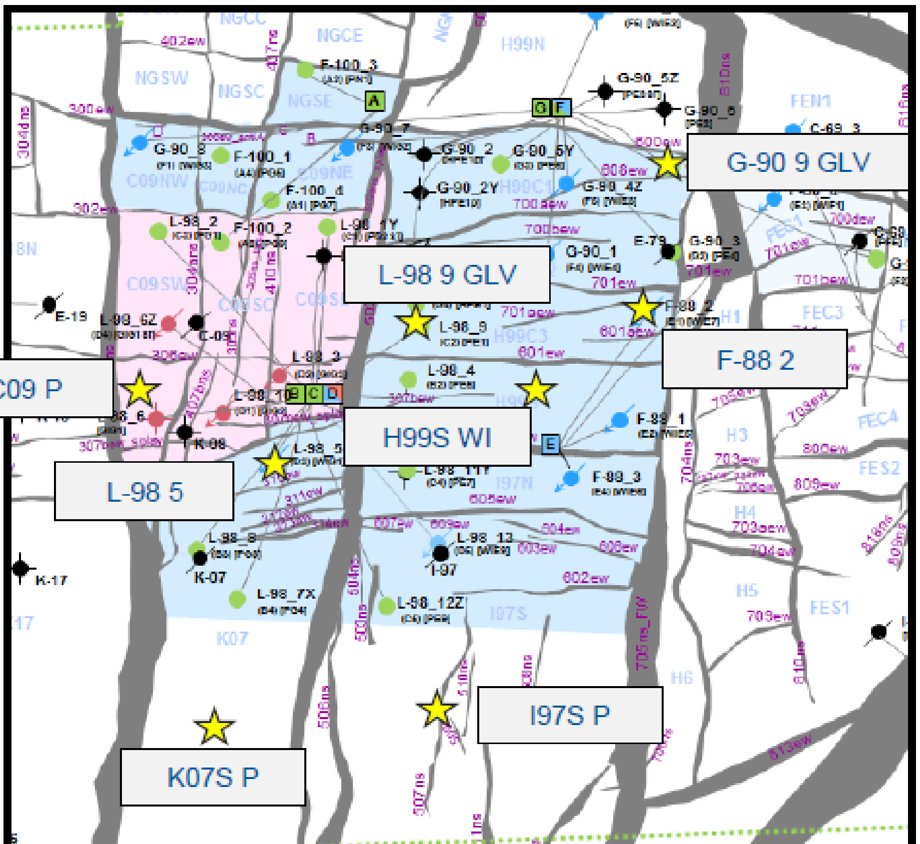
TNEX Phase 1 Drilling Campaign Rigline Schedule

Drilling start planned by July 2017

2017							2018							
Q3			Q4				Q1		Q2			Q3		Q4
E1 (Plug)	H99S Inj (E2) Abdn	H99S Inj drill	H99S Inj (E2) Comp.	K07S	I97S	K07S Prod. SWDC Expansion Drill	I97S Prod. SWDC Expansion Drill	L-98 5 (D3) Work Over	K07S Prod. Comp.	I97S Prod Comp.	L-98 9 GLV	Addition of C09S producer (reclaim from NWDC)	G-90 9 GLV	Integrity Inj

Phase 1 - Firm Development Drilling Opportunities

Source: Suncor,



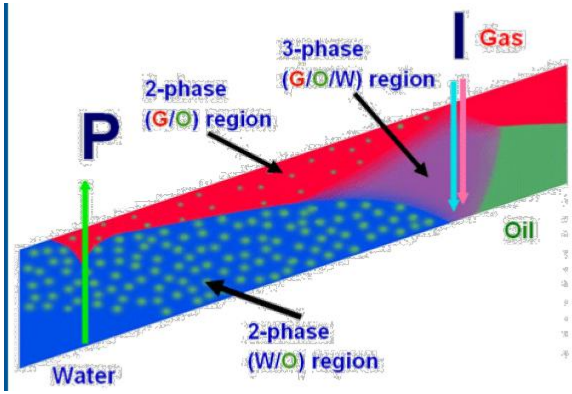
C-NLOPB

Terra Nova Longer Term Outlook

- **Terra Nova Extension Phase I**
  - MODU Campaign commencing July 2017.
  - Intervention/Workover candidates
  - Additional New Well Opportunities (Far East blocks)

Source: Suncor

- **Enhance Oil Recovery opportunities**
  - Water Alternating Gas (WAG)



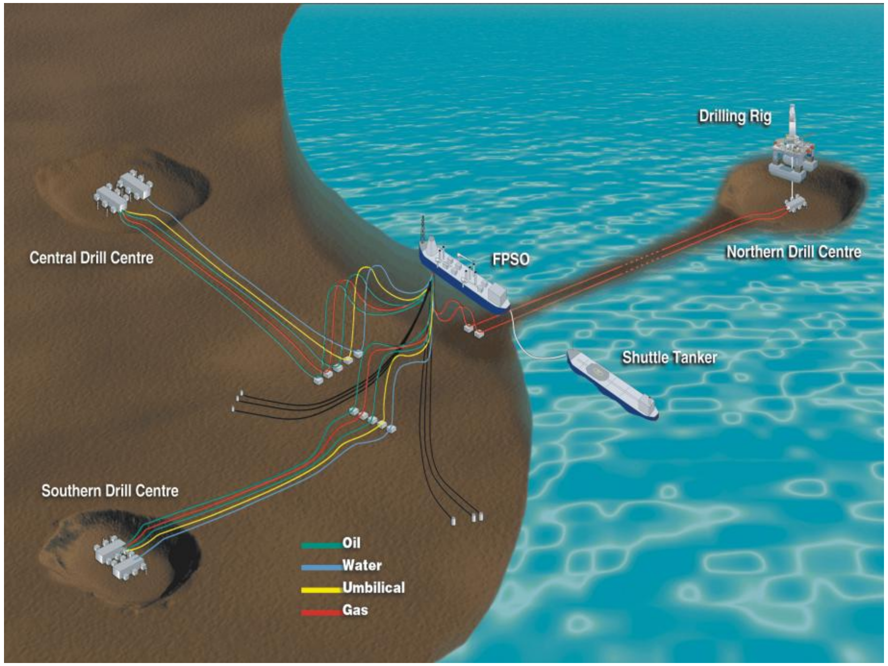
- **Possible Extension Life of Asset beyond 2022**

White Rose

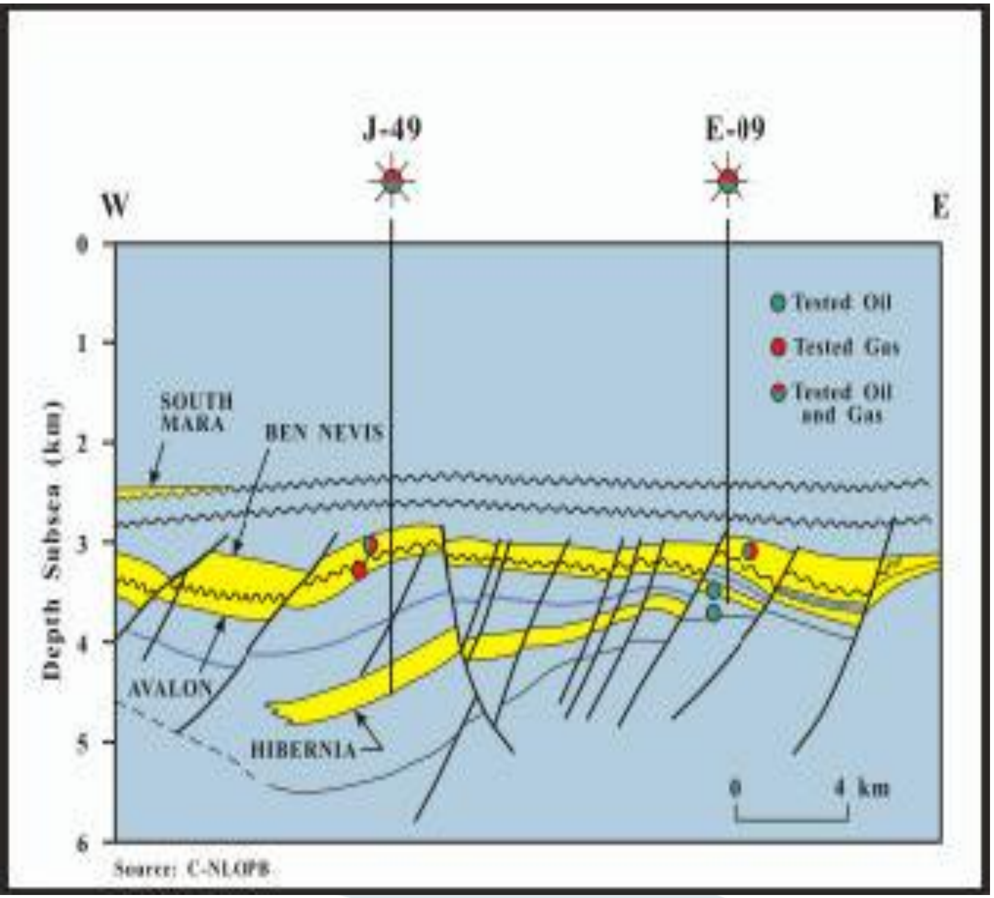
- Field Discovered in 1984
- 350 km southeast of St. John's in 110 m of water
- Development Costs: $2.3 billion
- First Oil – November 2005
- Operated by Husky Energy

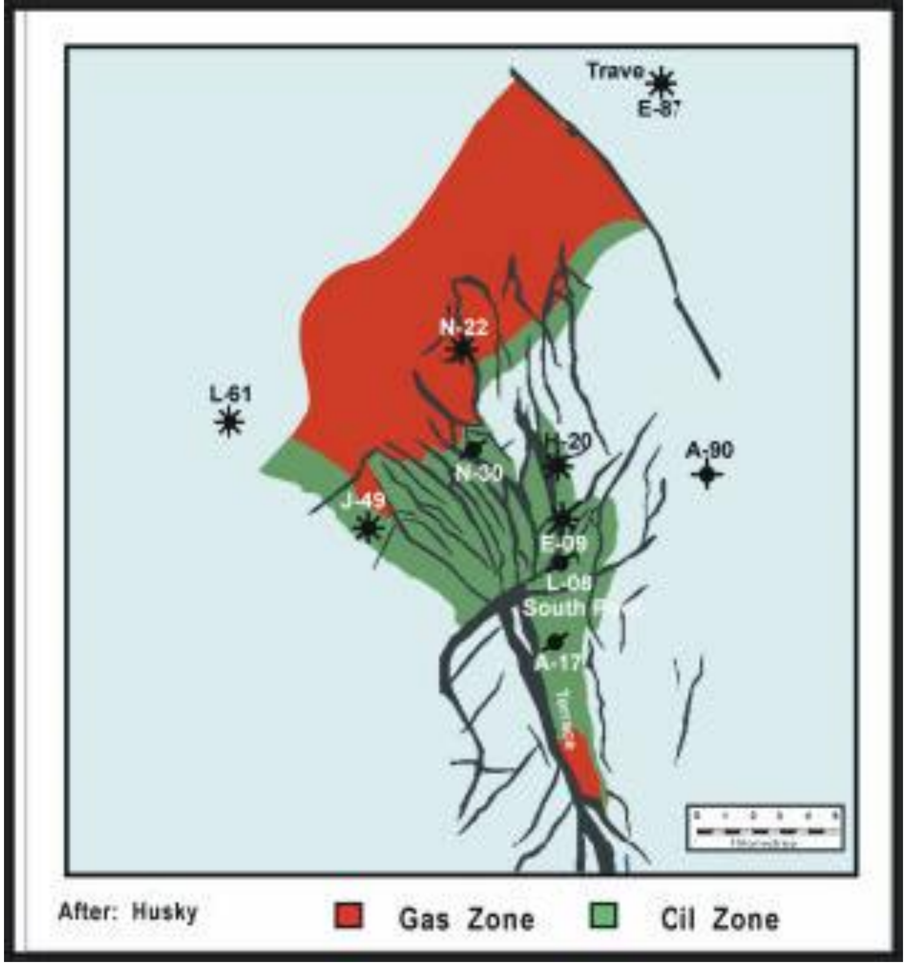
<u>SeaRose FPSO</u>

- Similar to Terra Nova FPSO wish some design changes
- 940,000 bbls of oil storage capacity
- Largest disconnect turret mooring system
- Design capacity = 140,000 bbls oil/day
- Offshore personal 425



White Rose





Structure Map of Avalon/Ben Nevis Sandstone (Newfoundland and Labrador Oil and Gas Report, 2005

White Rose Field Geological Cross Section (Newfoundland and Labrador Oil and Gas Report, 2005)


Decision 2001.01

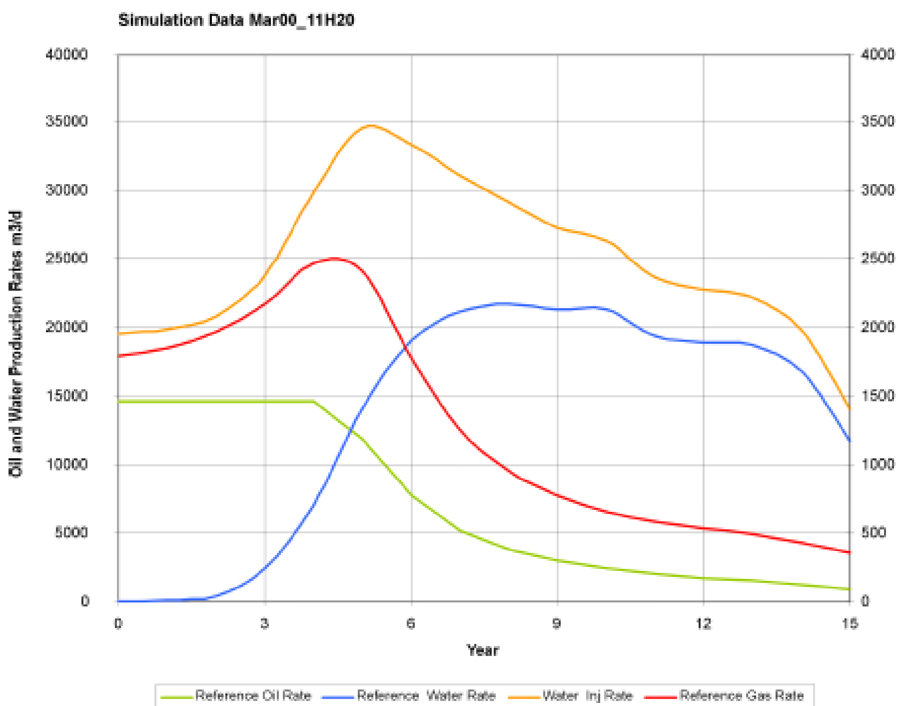
November 26, 2001
St. John's, Newfoundland
Canada

Application for Approval

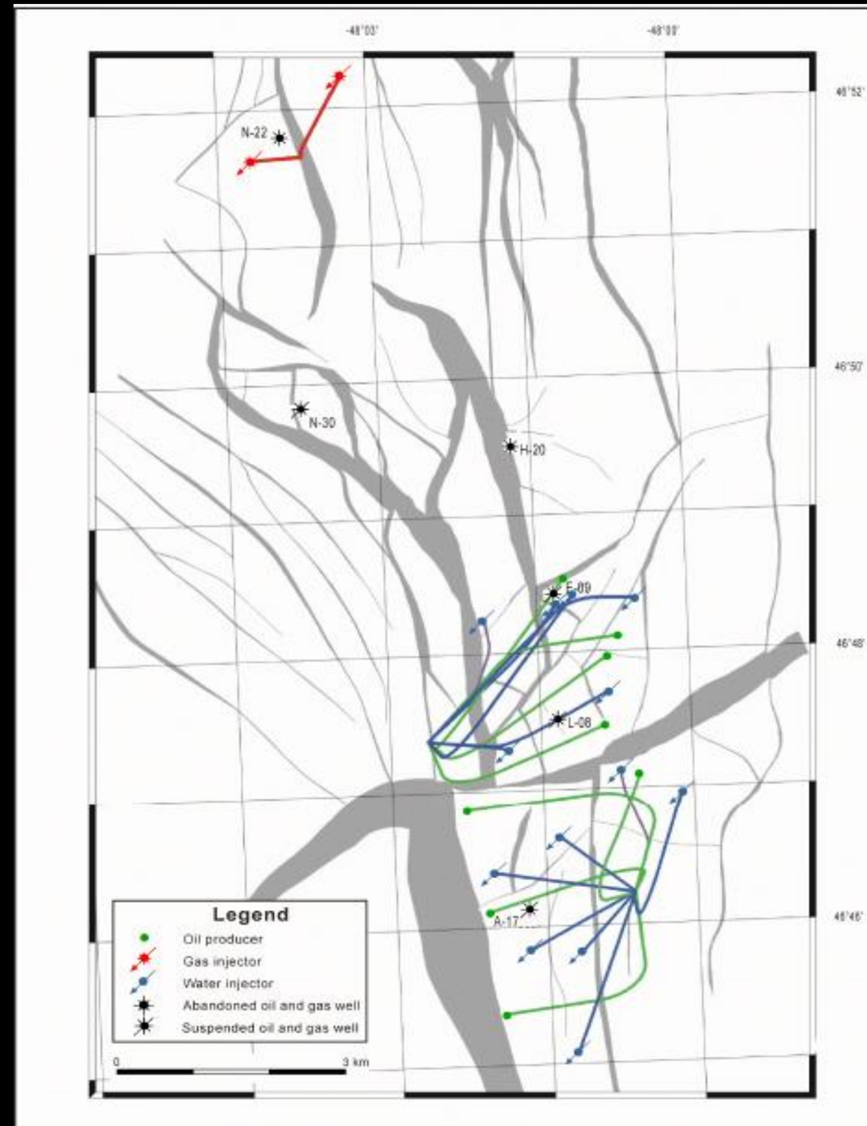
White Rose Canada-Newfoundland Benefits Plan

White Rose Development Plan

Figure 4.10 South Avalon Pool Production Forecast



Source: after Husky 2001



Source: after Husky 2001

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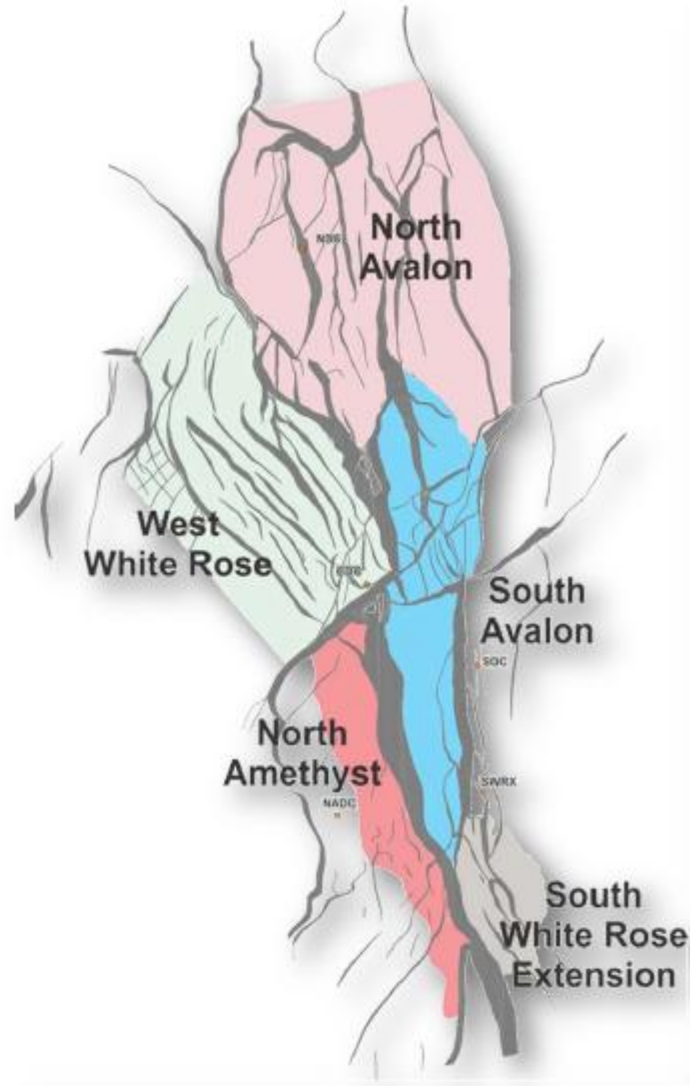
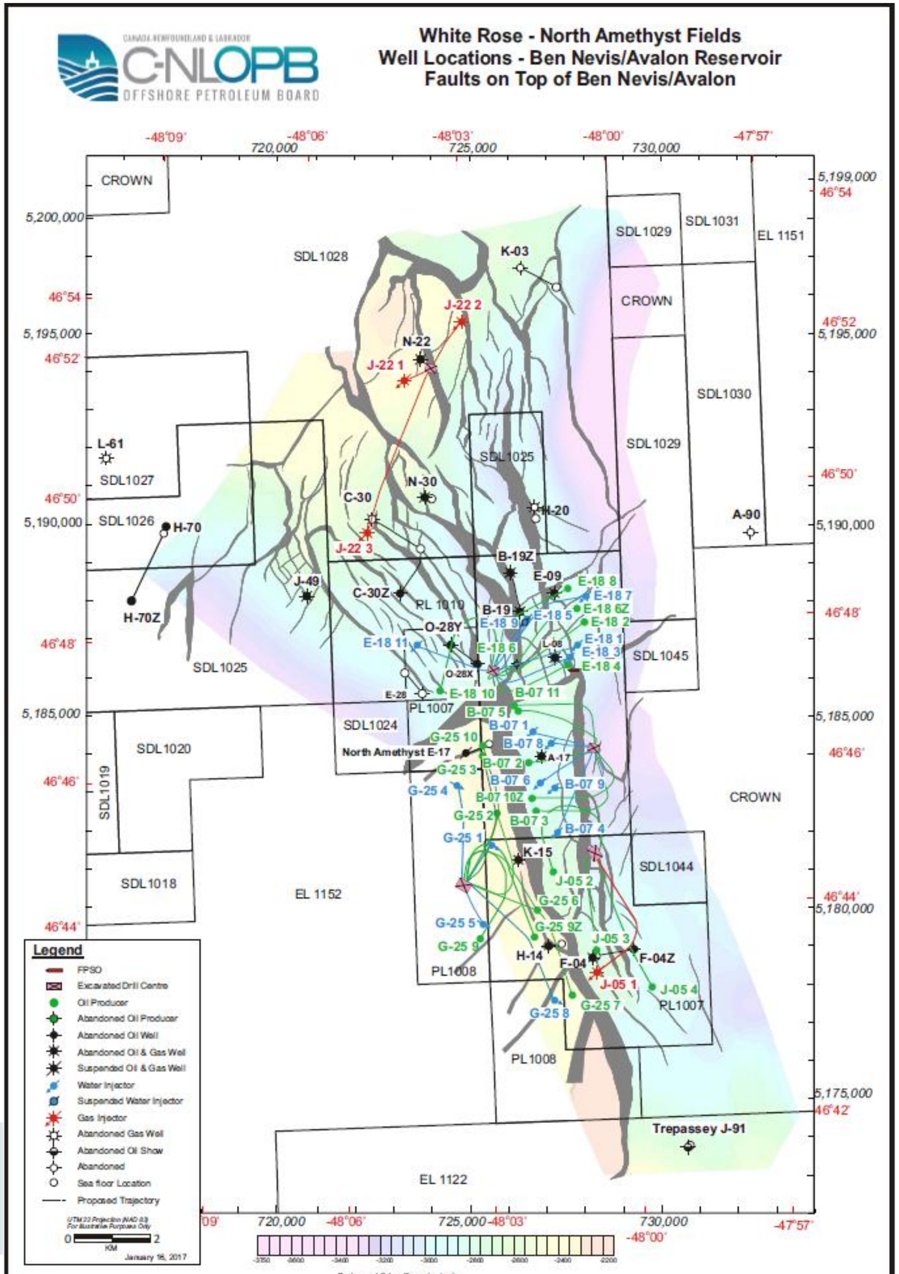
White Rose

Since the original development plan in 2000, the White Rose field has grown and is now comprised of several pools and other satellite developments which include:

1. South Avalon Pool began in 2005
2. North Avalon Pool – Majority of Gas Injection took place in 2006
3. South White Rose Extension (SWRX) was approved in 2007 and Production started in 2016
4. North Amethyst Field was approved in 2007 and began production in 2010
5. West White Rose Pool – A two well pilot project commenced in 2011
6. North Amethyst Hibernia began production in 2016





White Rose Field

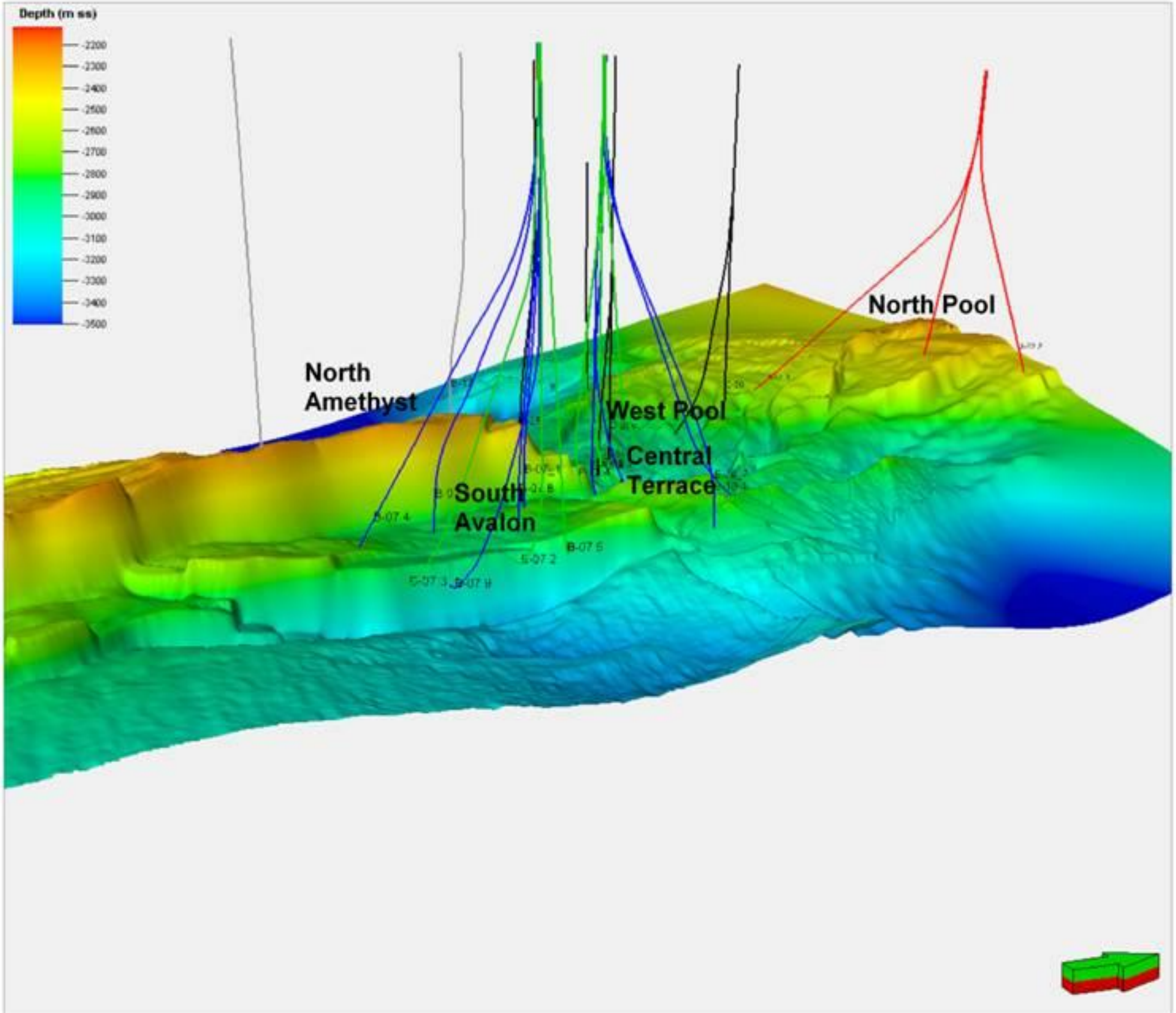
13 oil producers
11 water injectors
4 gas injectors
28 wells

Reserves

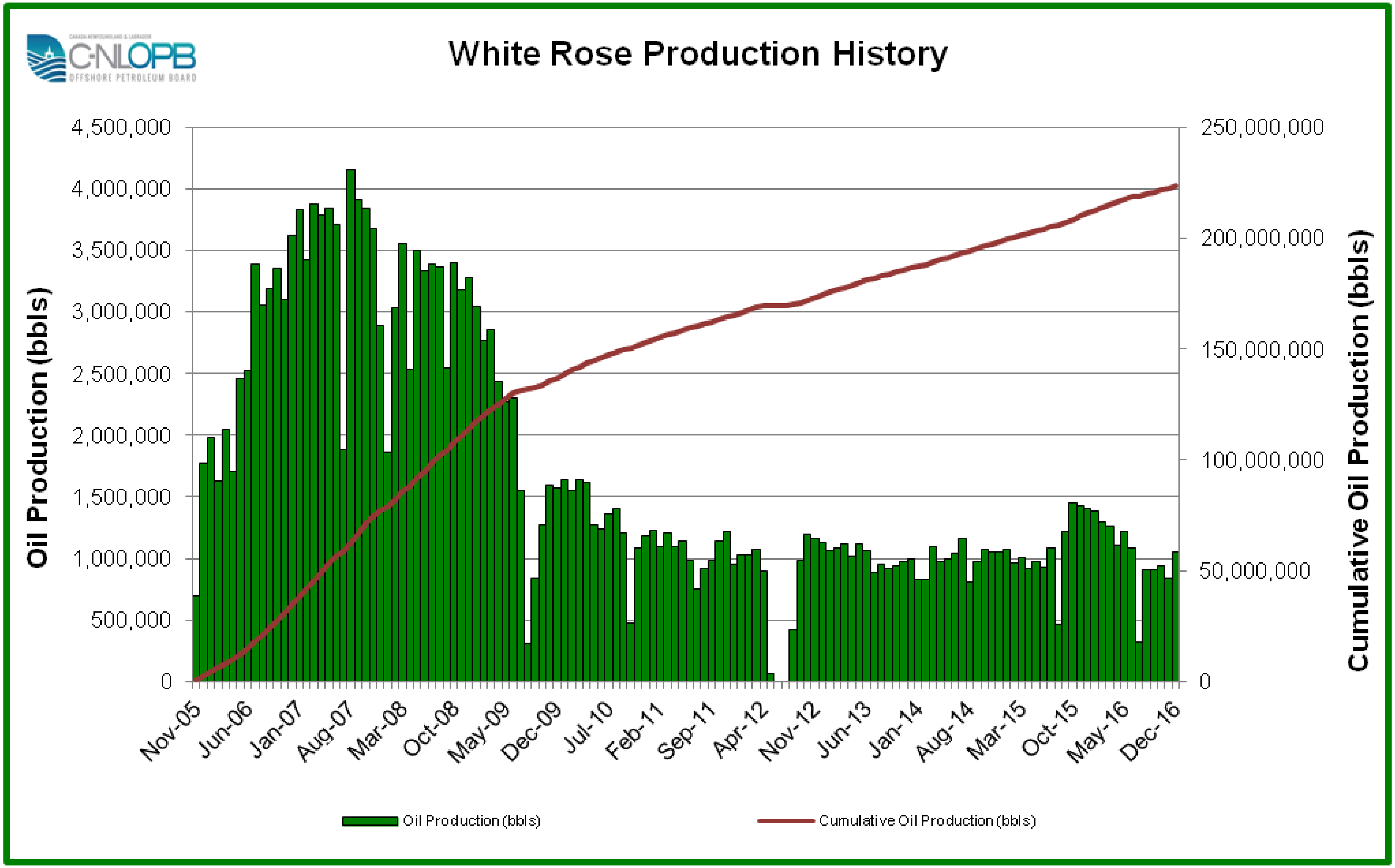
Proven – 50.4 Million m^3
(317 Million bbl)

Proven & Probable – 64.2 Million m^3
(404 Million bbl)

Proven, Probable & Possible – 77.5 Million m^3
(487 Million bbl)


Depth (m ss)
-2200
-2300
-2400
-2500
-2600
-2700
-2800
-2900
-3000
-3100
-3200
-3300
-3400
-3500
North Amethyst
West Pool
North Pool
Central Terrace
South Avalon

C-NLOPB

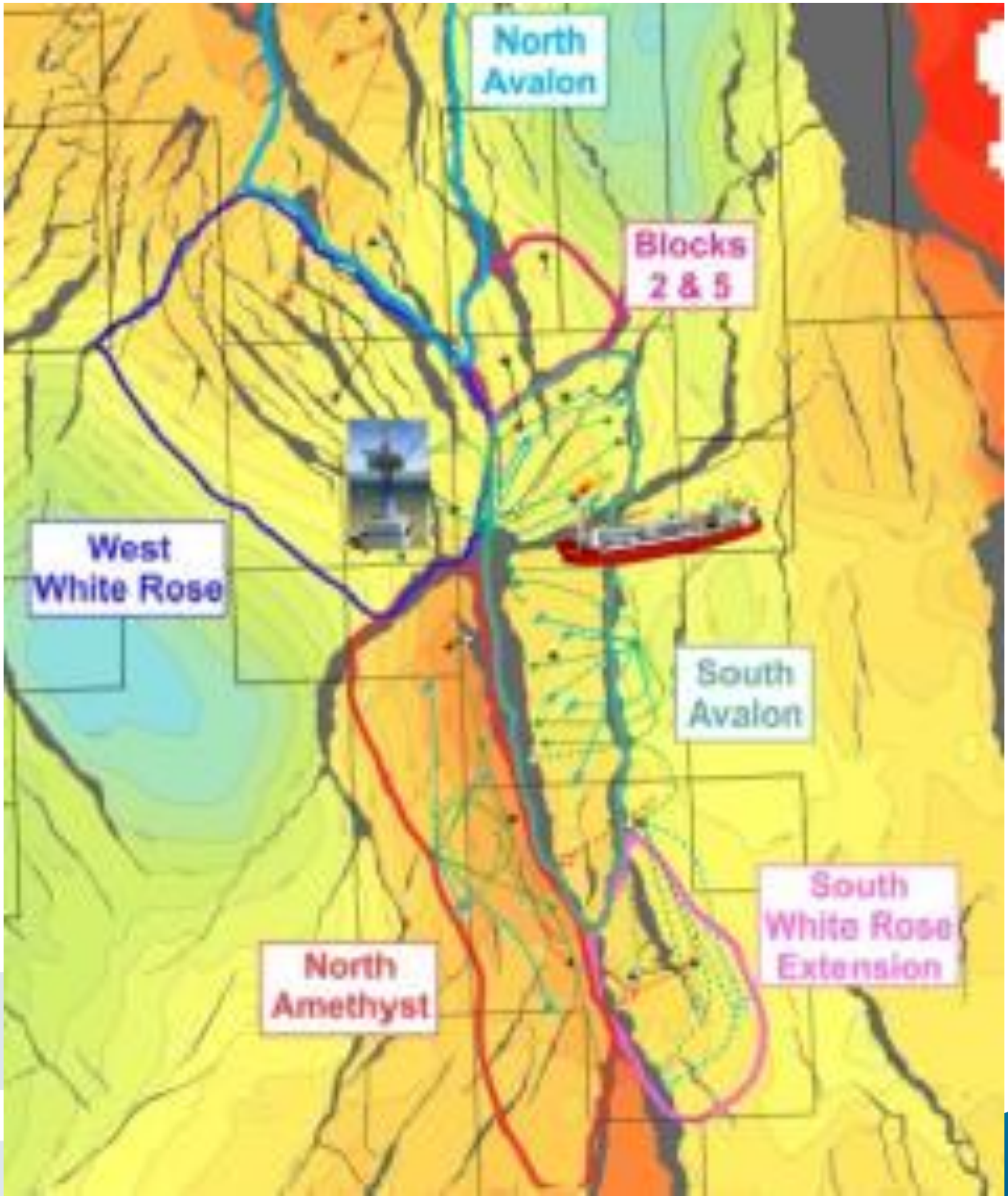


2015 Production: 12.91 MMbbl

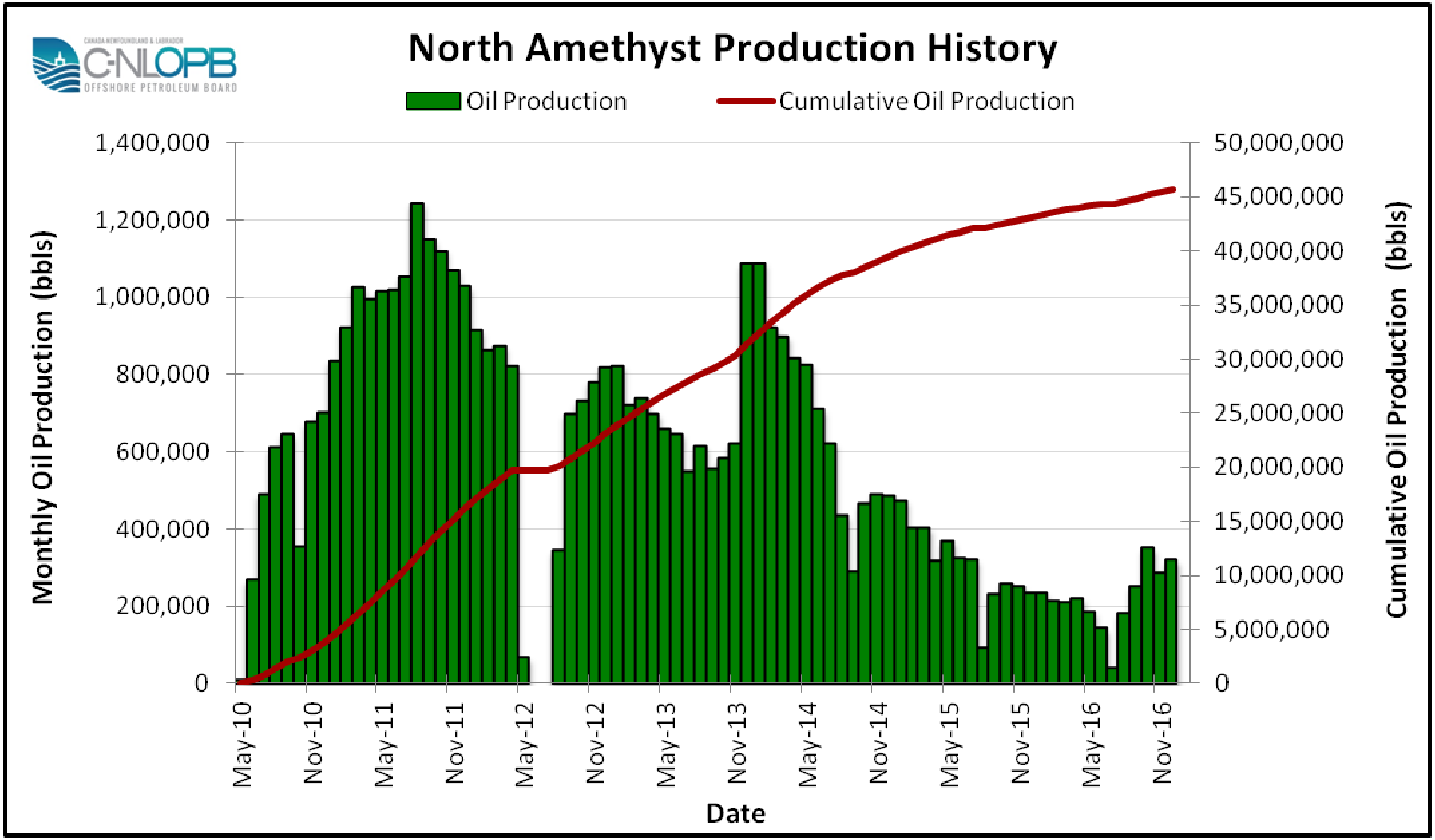
2016 Production: 12.30 MMbbl

Cumulative Production: 223.6 MMbbl

C-NLOPB


North Avalon
Blocks 2 & 5
West White Rose
South Avalon
South White Rose Extension
North Amethyst

C-NLOPB



2015 Production: 3.66 MMbbl

2016 Production: 2.62 MMbbl

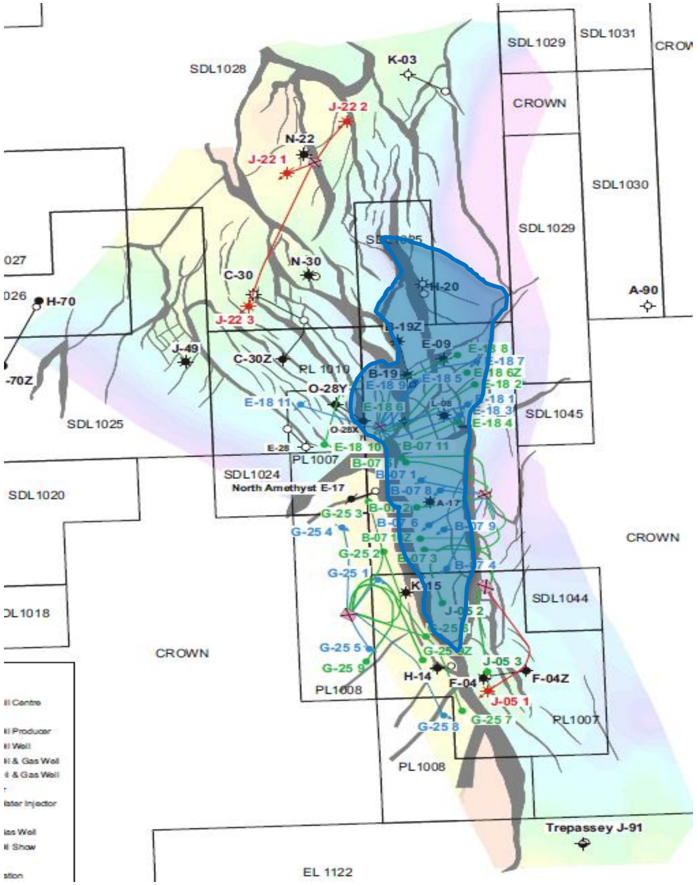
Cumulative Production: 45.8 MMbbl

South Avalon Region

- 10 Producers
- 10 Water Injectors

- 8.58 MMbbls in 2016 (70% of field production)
- 26.72 MMbbls of water was injected in 2016

- Region's 3 highest producers are:
  - J-05 2
  - E-18 6Z
  - B-07 11



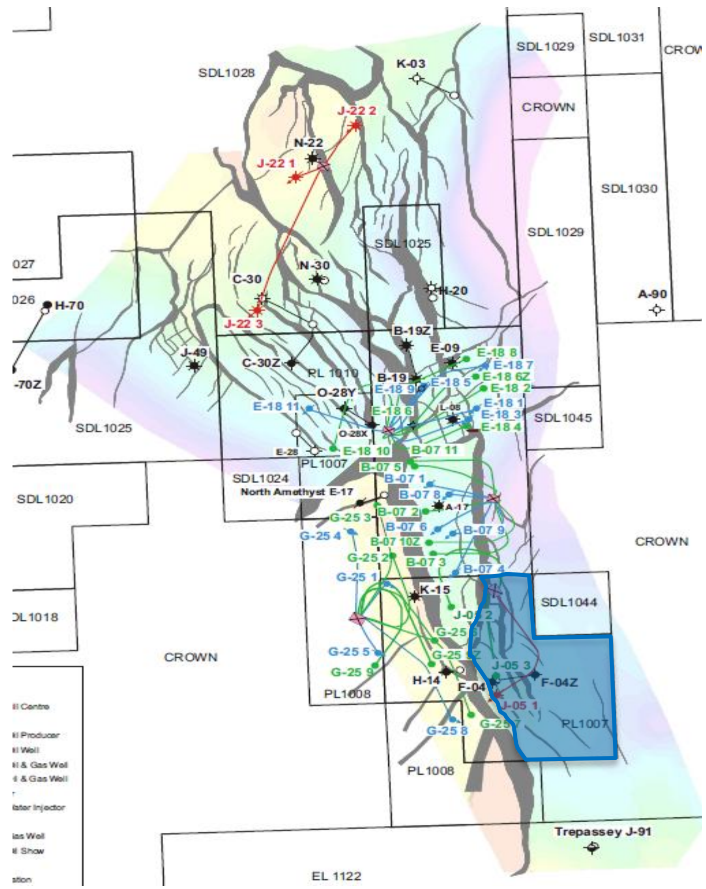
2017 Production Forecast:
5.33 MMbbls (14,600 bbls/d)

South White Rose Extension Region

- 2 Producers
- 1 Gas Injector

- 2.03 MMbbls in 2016 (17% of field production)
- 0.53 Bm^3 of gas was re-injected in 2016

- Region's 3rd producer, J-05 5, forecasted to come online in November, 2017.

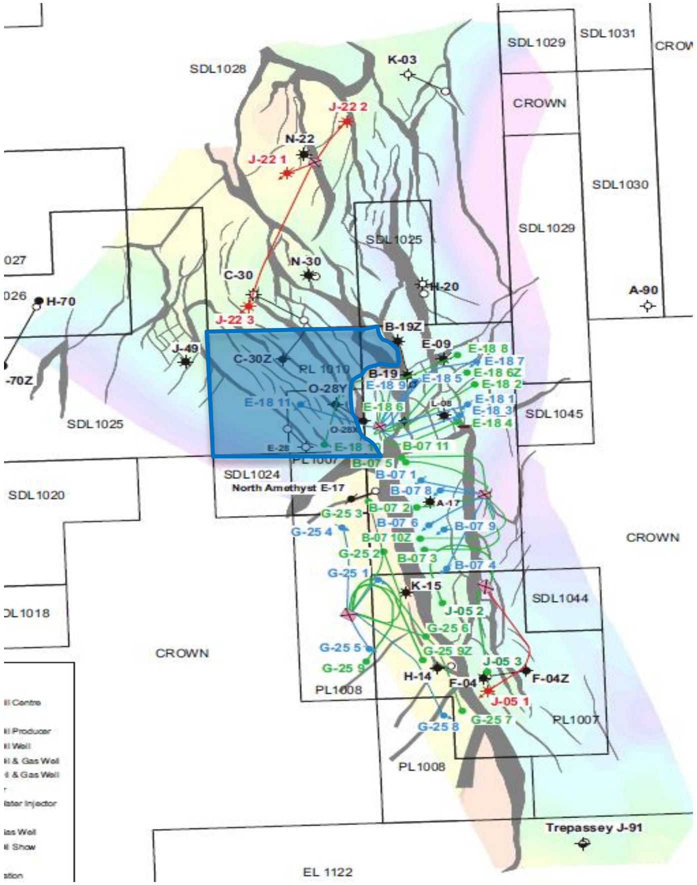


2017 Production Forecast:
2.15 MMbbls (5,900 bbls/d)

West White Rose Region

- 1 Producer
- 1 Water Injector

- 1.69 MMbbls in 2016 (13% of field production)
- 4.45 MMbbls of water was injected in 2016



2017 Production Forecast:
1.34 MMbbls (3,700 bbls/d)

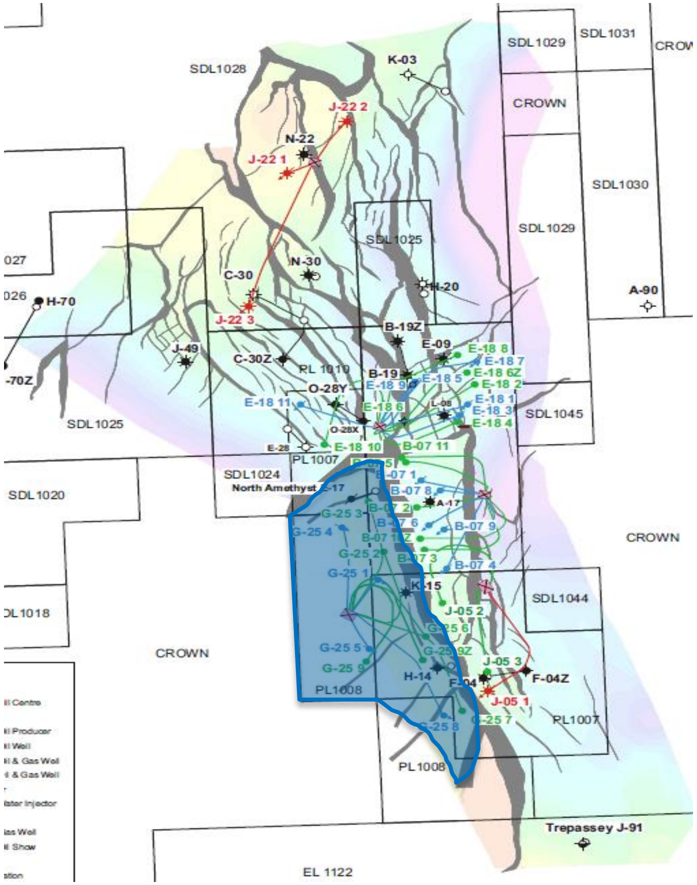
C-NLOPB

North Amethyst Region

- 6 Producers
- 4 Water Injectors

- 1.93 MMbbls in 2016 (74% of field production)
- 10.19 MMbbls of water was injected in 2016

- Region's 2 highest producers are:
  - G-25 7
  - G-25 9



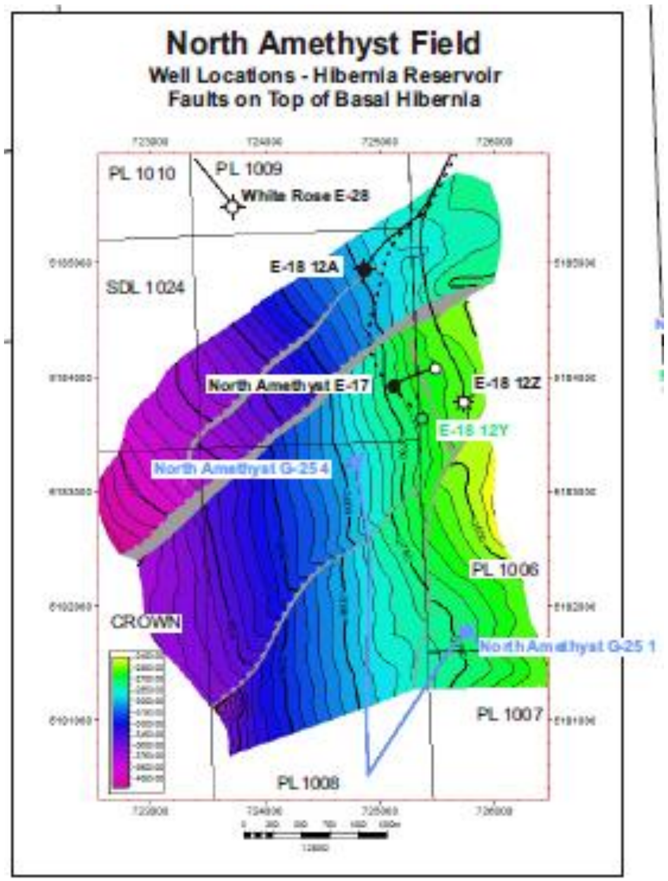
2017 Production Forecast:
5.33 MMbbls (14,600 bbls/d)

North Amethyst Hibernia

- 1 Producer
- 1 Water Injectors

- 0.68 MMbbls in 2016 (26% of field production)
- 0.94 MMbbls of water was injected in 2016

- North Amethyst's highest rate well in 2016 was E-18 12Y



2017 Production Forecast:
5.33 MMbbls (14,600 bbls/d)

Well Schedule

Well	End Date
• North Amethyst G-25 10 (northern infill) Now complete	Feb 3, 2017
• North White Rose A-78 delineation well	Mar 23, 2017
• 3 SWRX Riserless batch (P1, I3 and SA Infill)	Apr 29, 2017
• SWRX I3 Water injector (Drill to TD and run liner)	Jul 29, 2017
• SWRX P1 producer (Drill to TD and run screens)	Oct 26, 2017
• SWRX P1 producer upper completion	Nov 25, 2017
• SWRX I3 water injector upper completion	Dec 20, 2017
• South Avalon infill (from SWRX)	Mar 31, 2018
• North Amethyst gas flood (from SWRX) ***Requires DPA**	Jun 21, 2018
• White Rose delineation well	Sep 25, 2018
• South Avalon infill producer	Jan 5, 2019

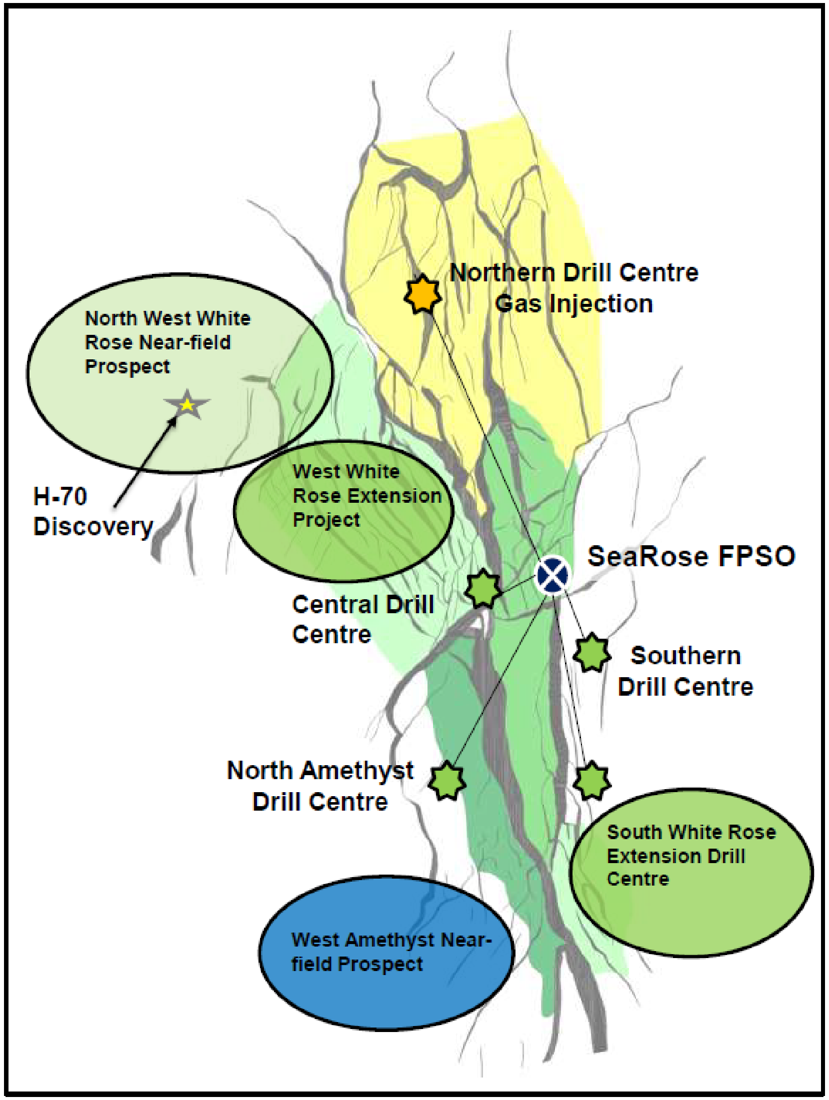
Husky has revised the estimated dates on the drill schedule due to better than expected drilling performance

Atlantic Region – Big fields get bigger

- White Rose produced its originally sanctioned 200 millionth high netback barrel in January 2013

- Near-field developments progressing
  - South White Rose Extension - 20 million barrels of 3P reserves[1] (on production 2014)
  - West White Rose Extension - 80 million barrels of 3P reserves[1] (on production 2016/17)

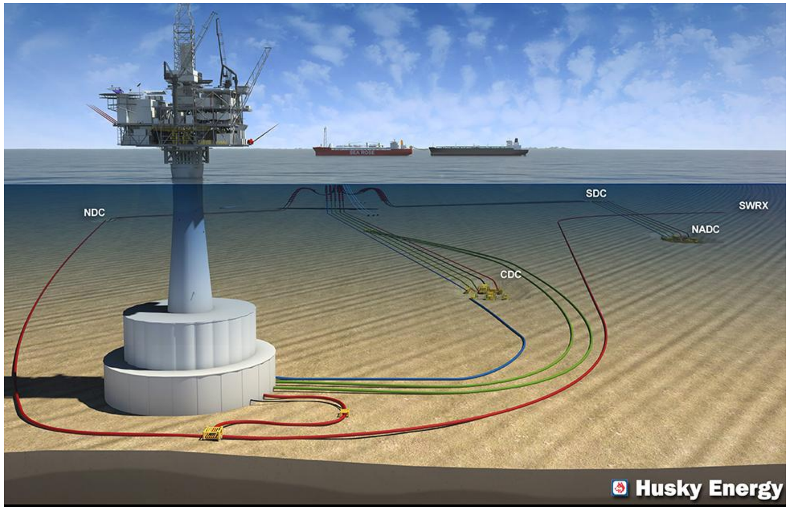
- Near-field exploration success:
  - Hydrocarbons discovered at Northwest White Rose, H-70 well results continue to be evaluated
  - West Amethyst prospect in drilling queue

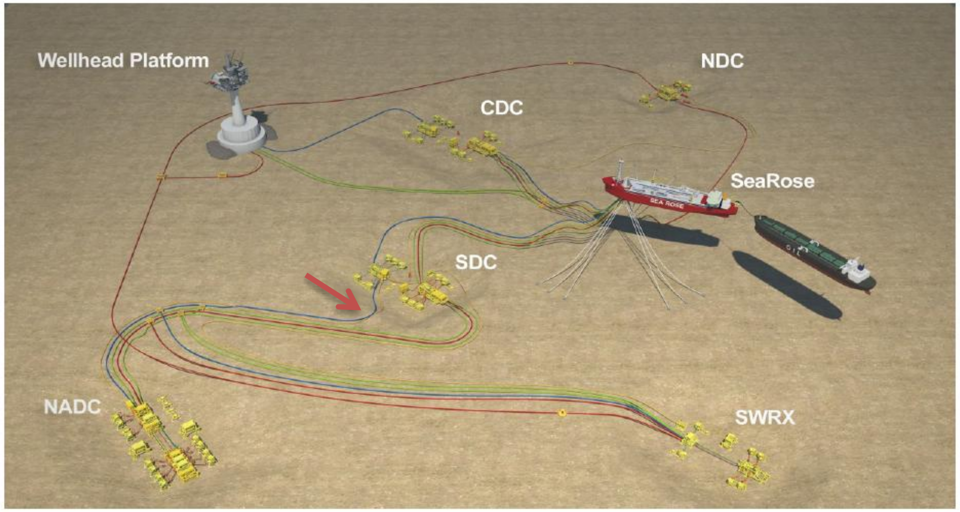


C-NLOPB

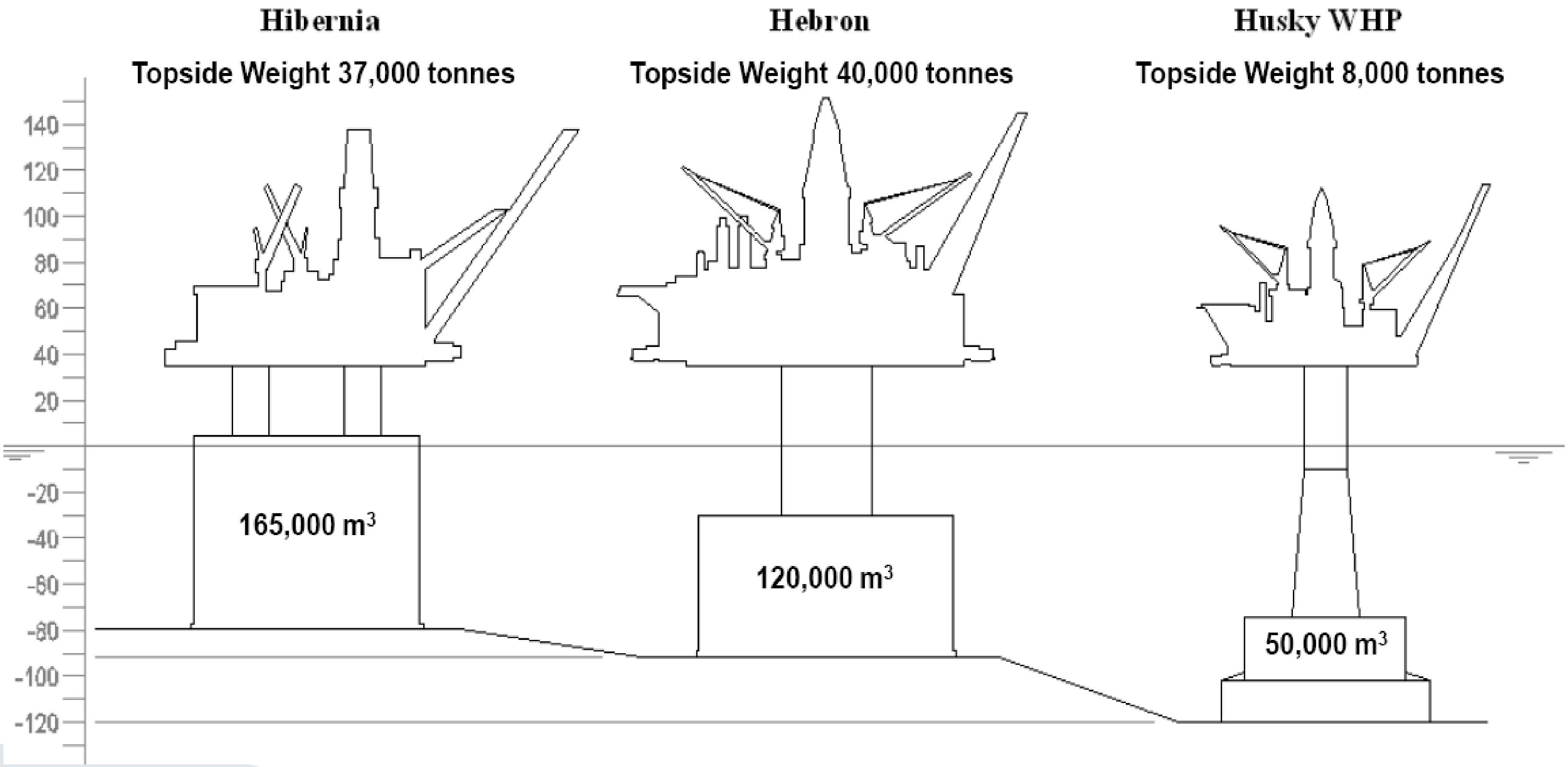
Husky Wellhead Platform

- To access the resources of the West White Rose pool, Husky is exploring the option of developing this resource using a wellhead platform (WHP) tied back to the existing *SeaRose* FPSO.
- Single derrick, intervention workover capabilities
- No production but will have test separator
- Person on Board : 120
- 20 well slots – 40 wells, 2 per slot (Conductor Sharing Wellhead Systems)





Platform Comparisons

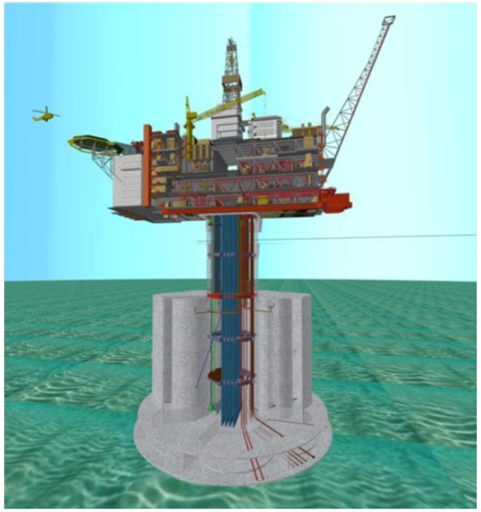


Production Profile End Date

- Production Profiles ended in 2030 in Development Plan Amendment
- Stewarding towards end of 2034
- Ongoing plan to assess maintenance and capital required on extending life
- WHP production profiles are currently running with end of 2034 as end of field life
- Longer FPSO life increases existing base production life (South Avalon, North Amethyst, SWRX, etc.) – beneficial to all White Rose pools

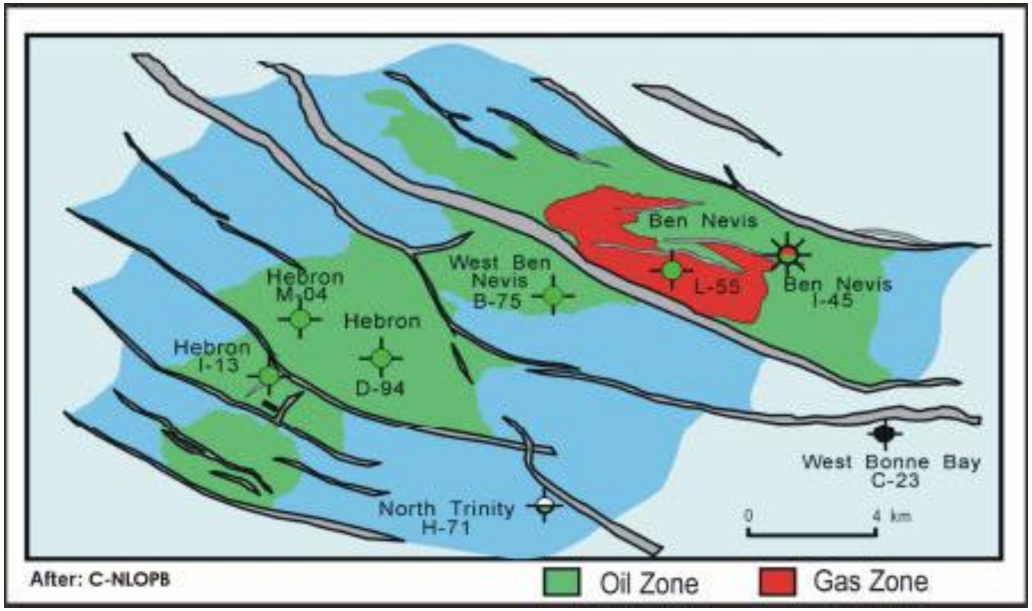
Hebron

- Field Discovered in 1980
- 340 km southeast of St. John's in 88-100 m of water
- First Oil – Q4 2017
- Operated by Exxon Mobil

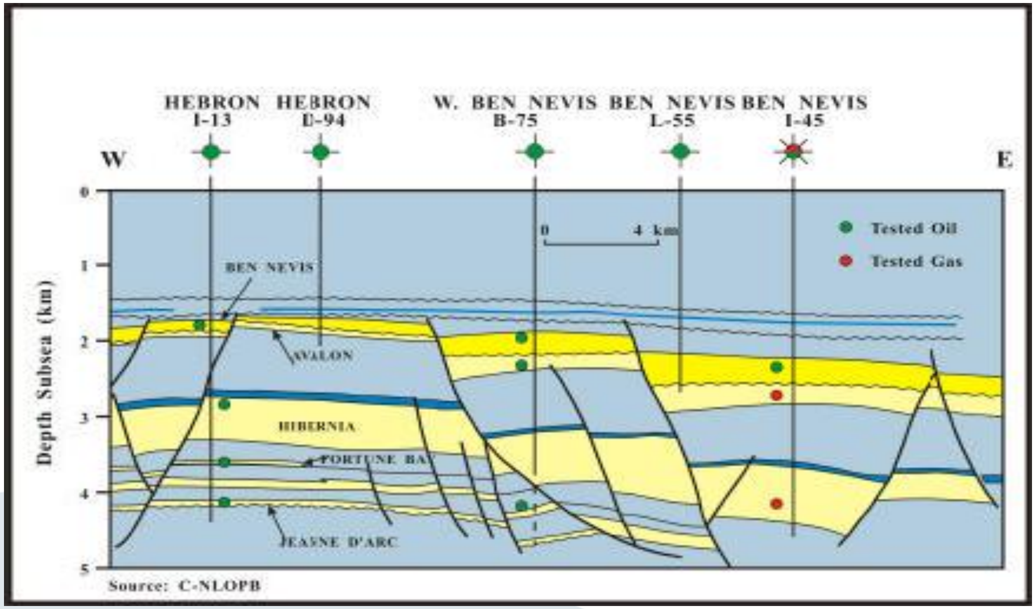


GBS Structure

- 120-130 m of concrete
- 100-110 diameter foundation diameter
- Weighs ~400,000 tonnes
- Has 1 drilling derrick
- 52 Well Slots
- Design capacity of 150 to 180 kbd
- Life expectancy of 50 years



Hebron/Ben Nevis Field Geological Cross Section



Structure Map of Avalon/Ben Nevis Sandstone.

Both Images from Newfoundland and Labrador Oil and Gas Report, 2005

Hebron/Ben Nevis

Discovered: 1981

Located in Southern Jeanne d'Arc Basin

Fields:

- Hebron
- West Ben Nevis
- Ben Nevis

Key Reservoirs

- Avalon / Ben Nevis Sandstone
- Hibernia Sandstone
- Jeanne d'Arc Sandstone

Resource Estimate

- 414 million barrels of oil
- 315 bcf of natural gas
- 30 million barrels of natural gas liquids.

C-NLOPB

Hebron Complex– First Production ~2017

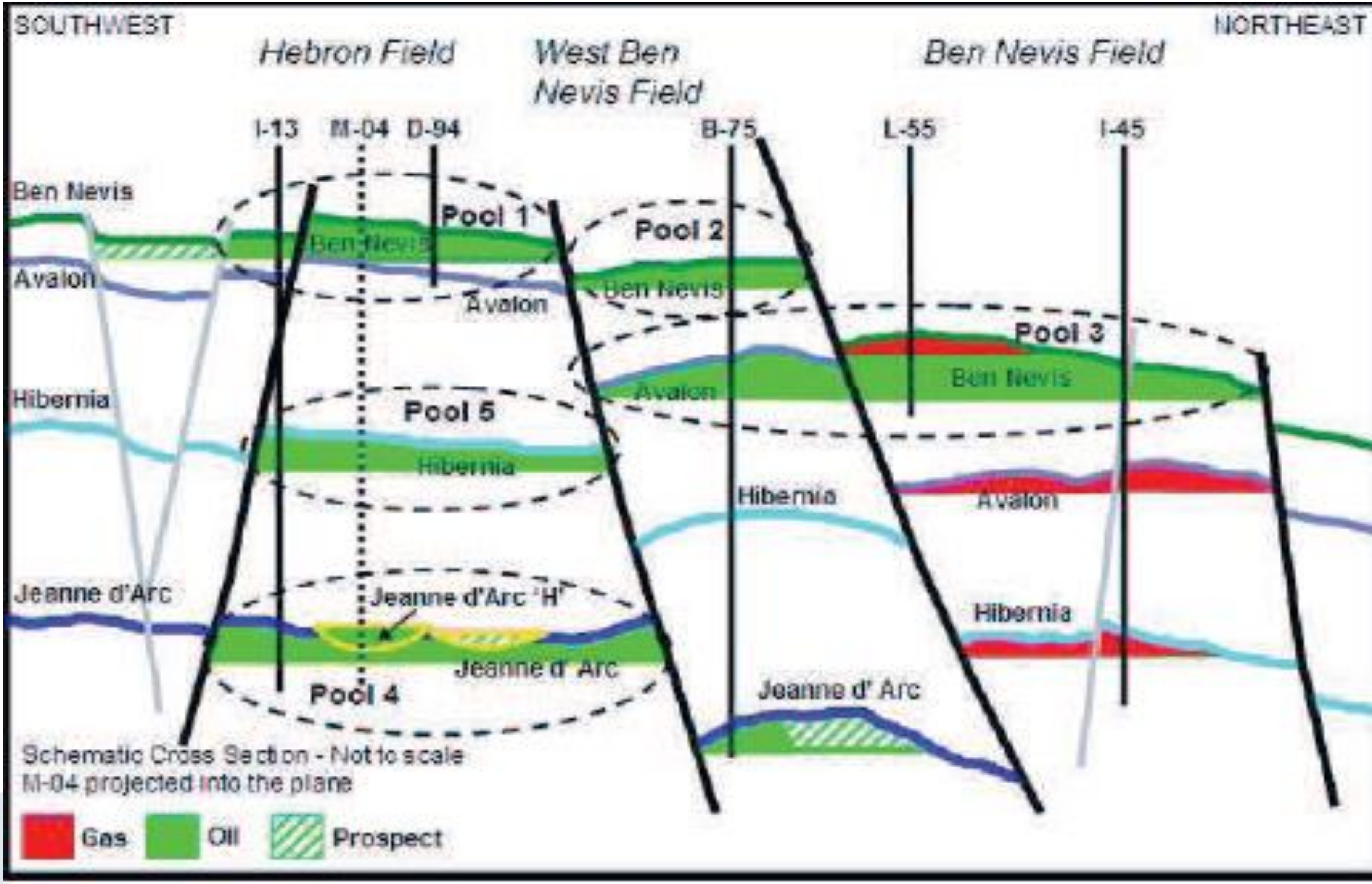


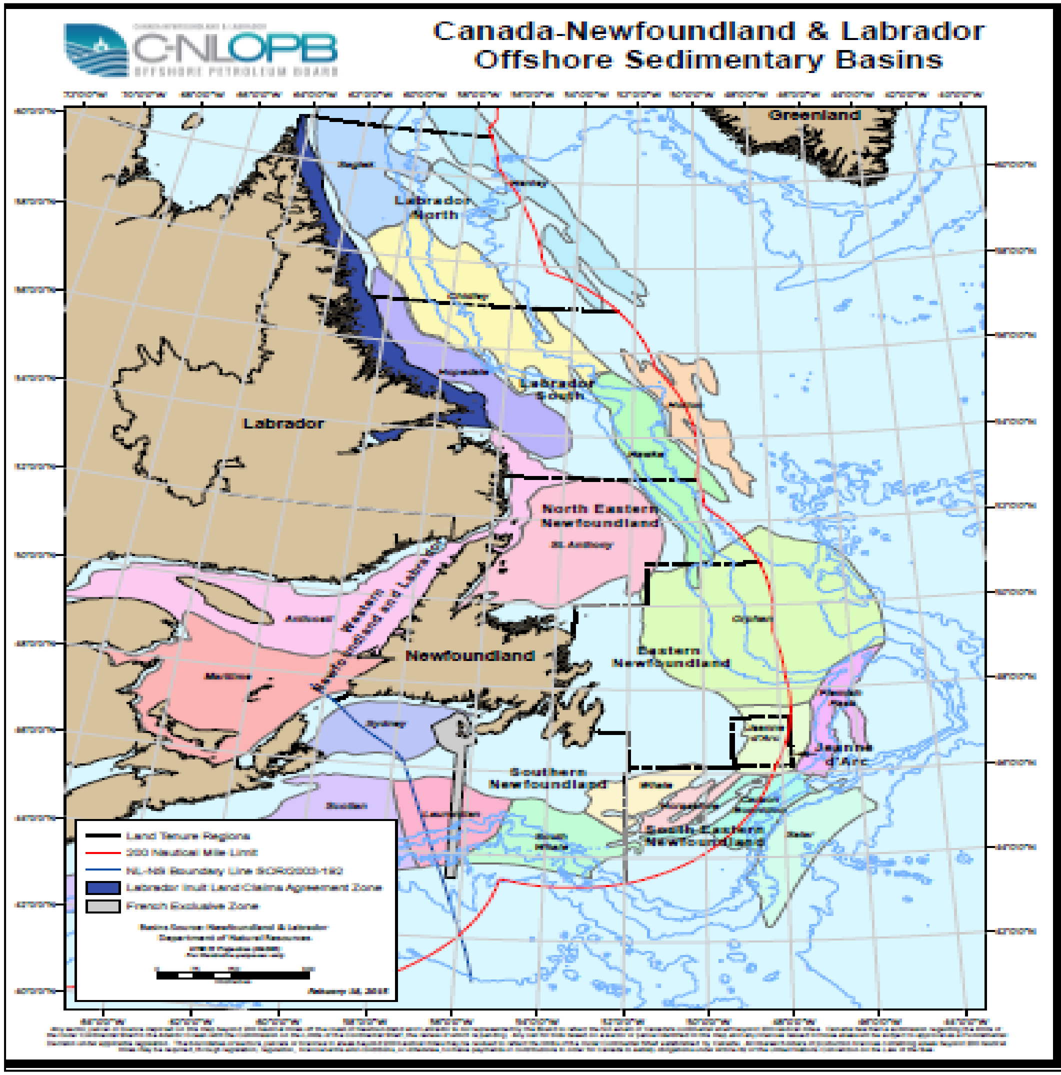
Figure 1.4-1: Schematic Cross-section across the Hebron Project Area

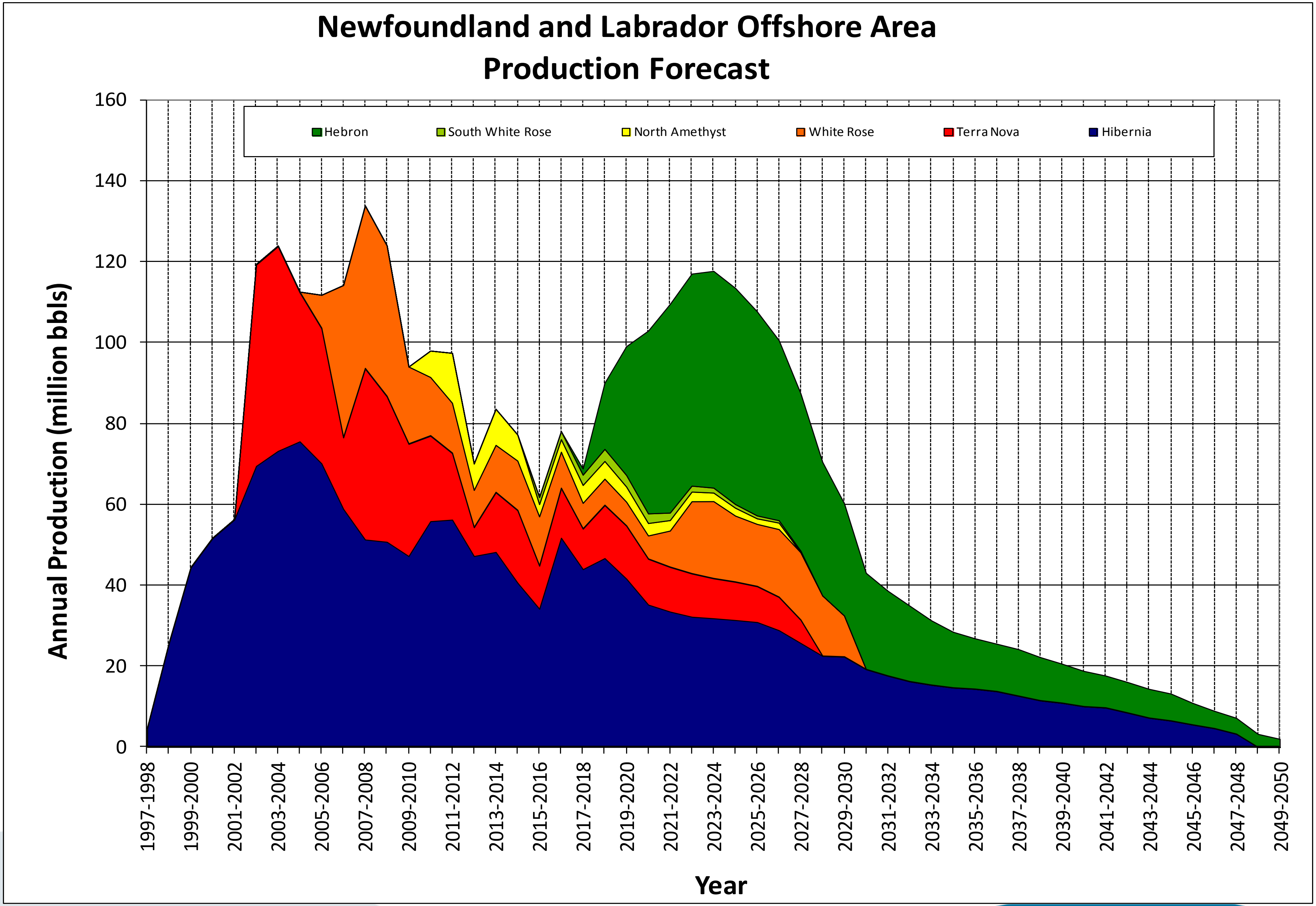
Hebron Complex– First Production Q4 2017

GBS submergence test

Topsides –GBS Mating complete

So what does this mean for the future?




Newfoundland and Labrador Offshore Area
Production Forecast
Hebron
South White Rose
North Amethyst
White Rose
Terra Nova
Hibernia
Annual Production (million bbls)
0
20
40
60
80
100
120
140
160
1997-1998
1999-2000
2001-2002
2003-2004
2005-2006
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016
2017-2018
2019-2020
2021-2022
2023-2024
2025-2026
2027-2028
2029-2030
2031-2032
2033-2034
2035-2036
2037-2038
2039-2040
2041-2042
2043-2044
2045-2046
2047-2048
2049-2050
Year

2017 and Beyond

- Over 20 offshore sedimentary basins
- Continued Geoscience Activity
- Return of Drilling Activity
- Extensive exploration licensing opportunities
- Substantial exploration work commitments to be met over next 6 years - $1.8 billion
- Upcoming close of Call for Bids on November 9, 2016

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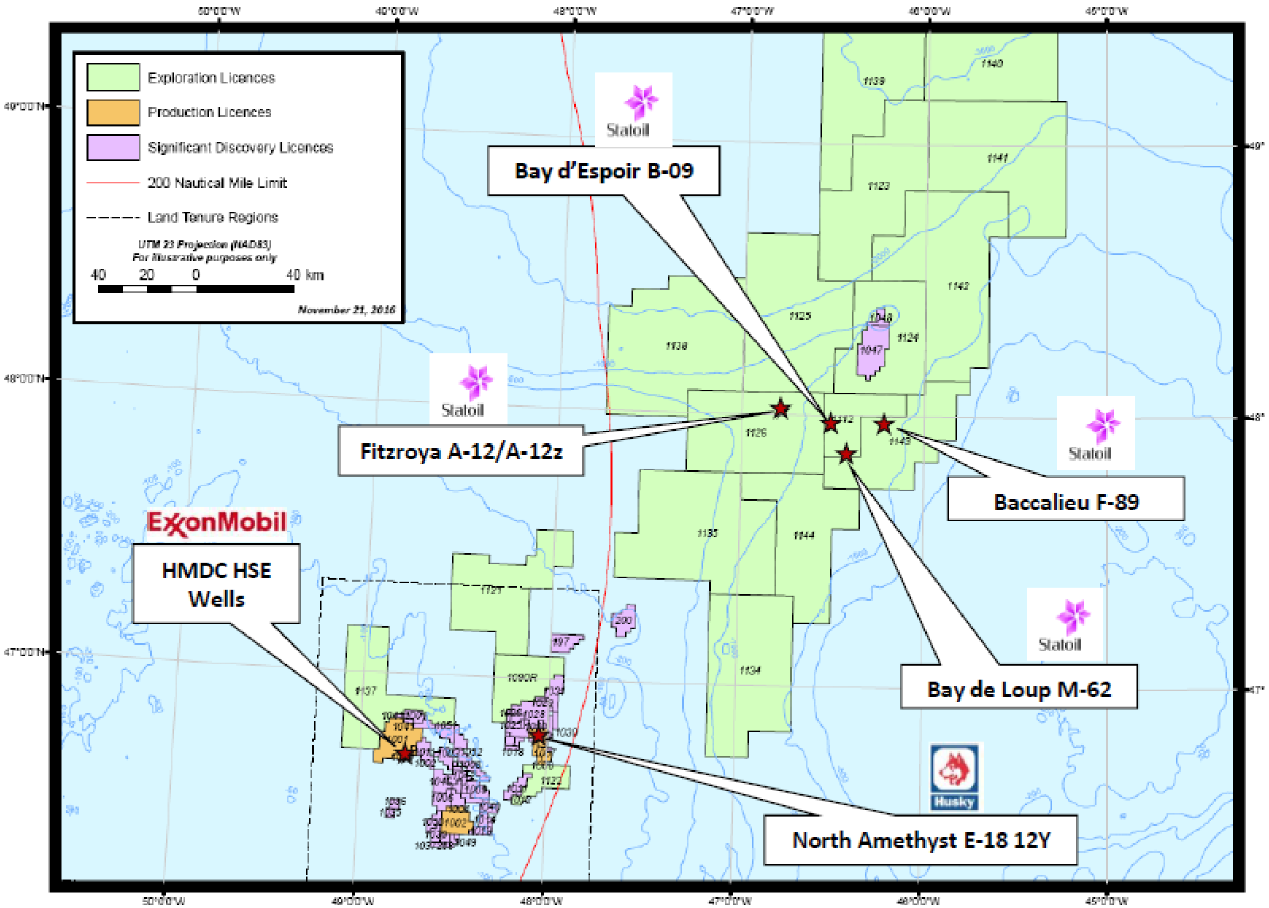
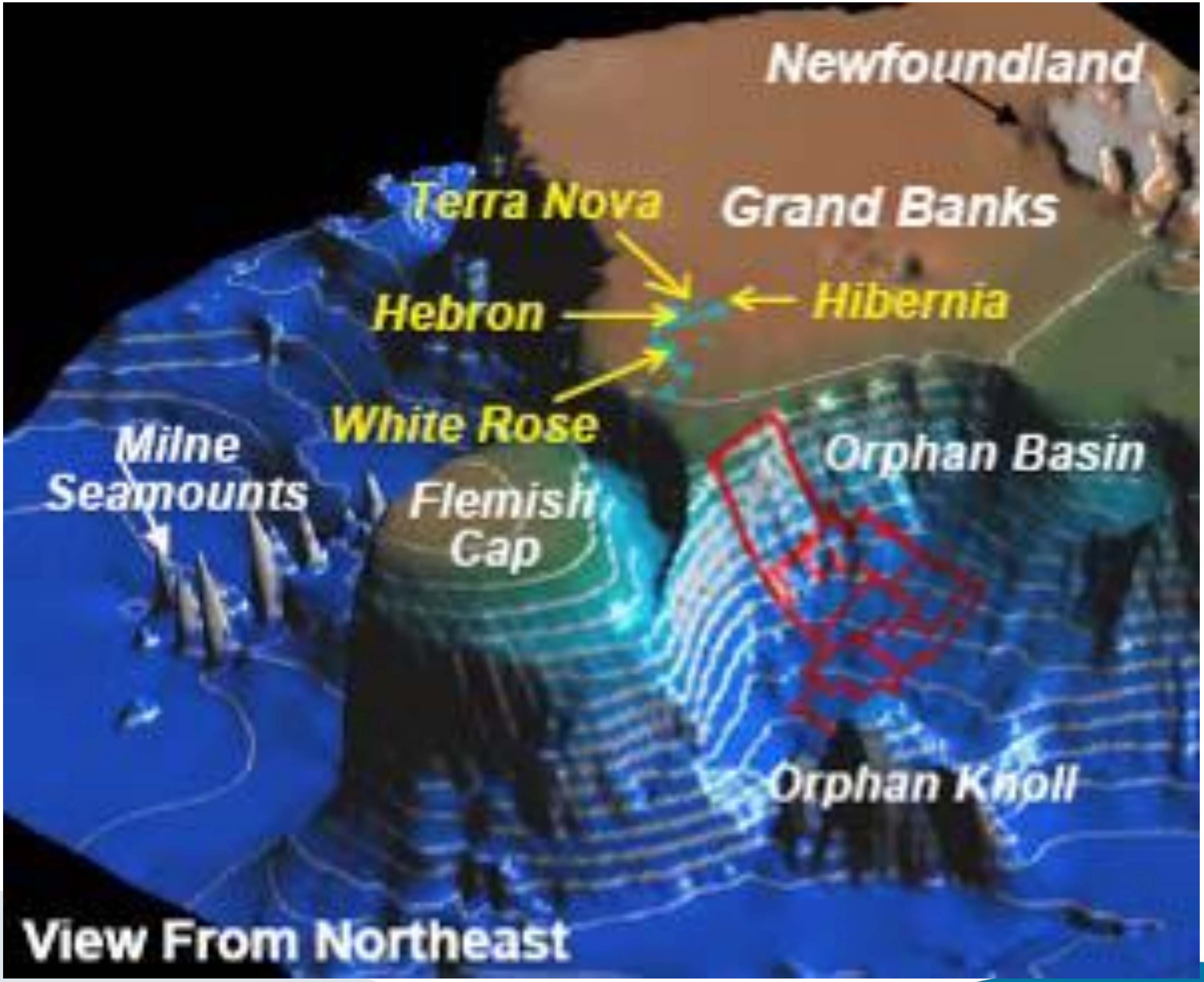
2016 Exploration and Delineation Wells

- Exploration Wells
  - Statoil et al Fitzroya A-12/A-12Z
  - Statoil et al Bay d'Espoir B-09
  - Statoil et al Bay de Loup M-62
  - Statoil Baccalieu F-89
- Delineation Wells
  - None drilled in 2016
- Other Wells of Interest
  - Husky North Amethyst E-18 12Y
  - HMDC HSE Water Injector Wells




Newfoundland
Terra Nova
Grand Banks
Hebron
Hibernia
White Rose
Milne Seamounts
Flemish Cap
Orphan Basin
Orphan Knoll
View From Northeast

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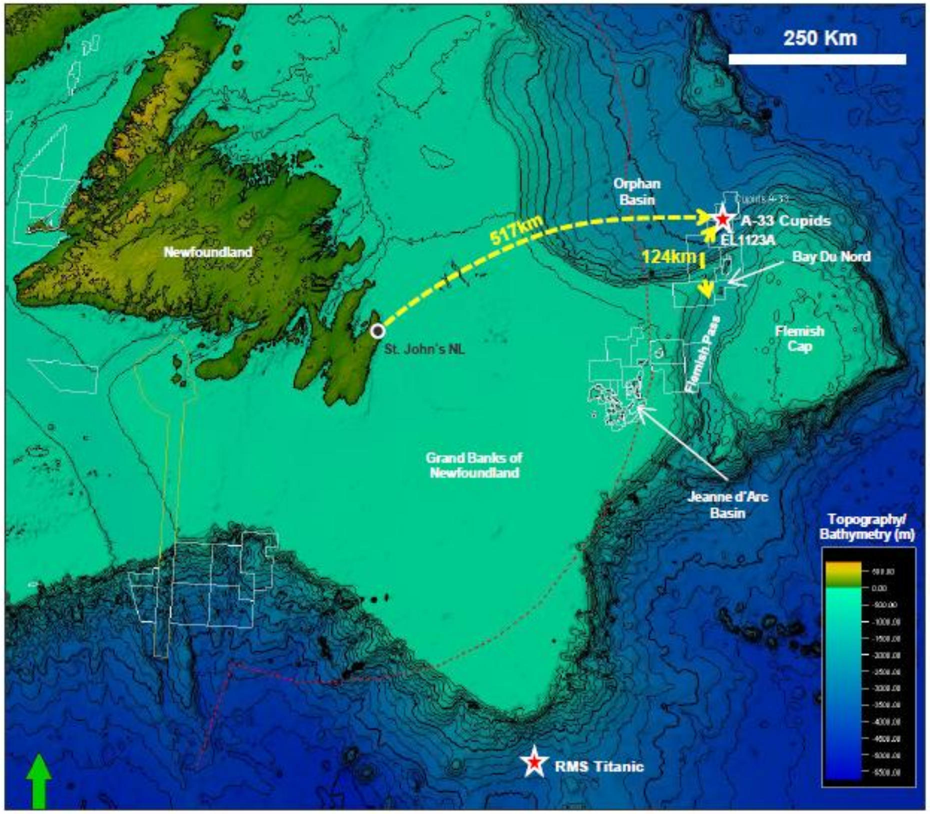
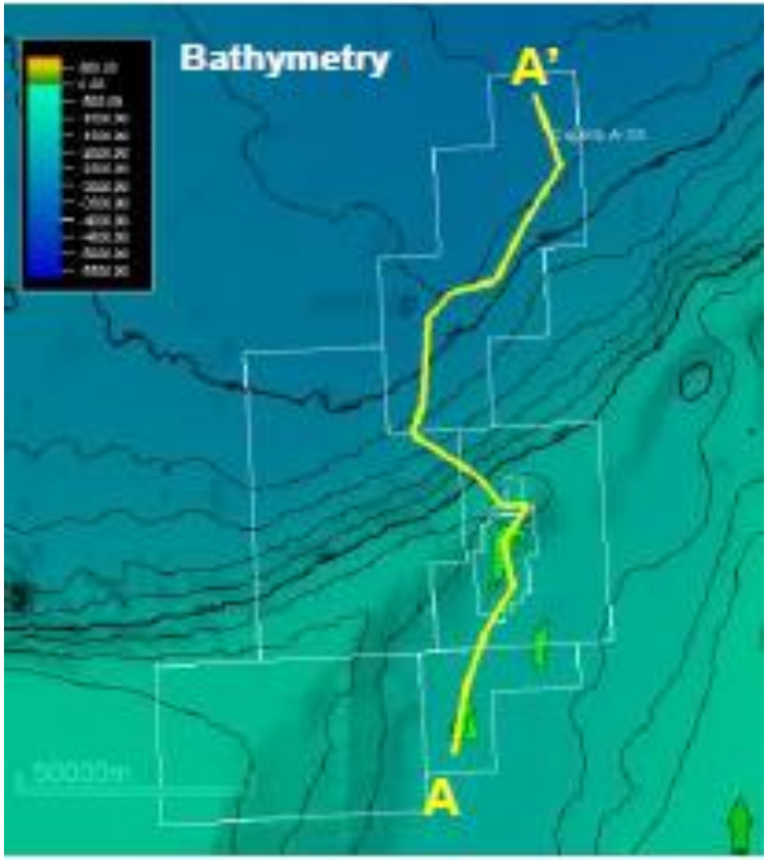
A-33 Cupids

Water Depth	2828m
Distances	Nearest Land - 517km Bay Du Nord Discovery – 124km

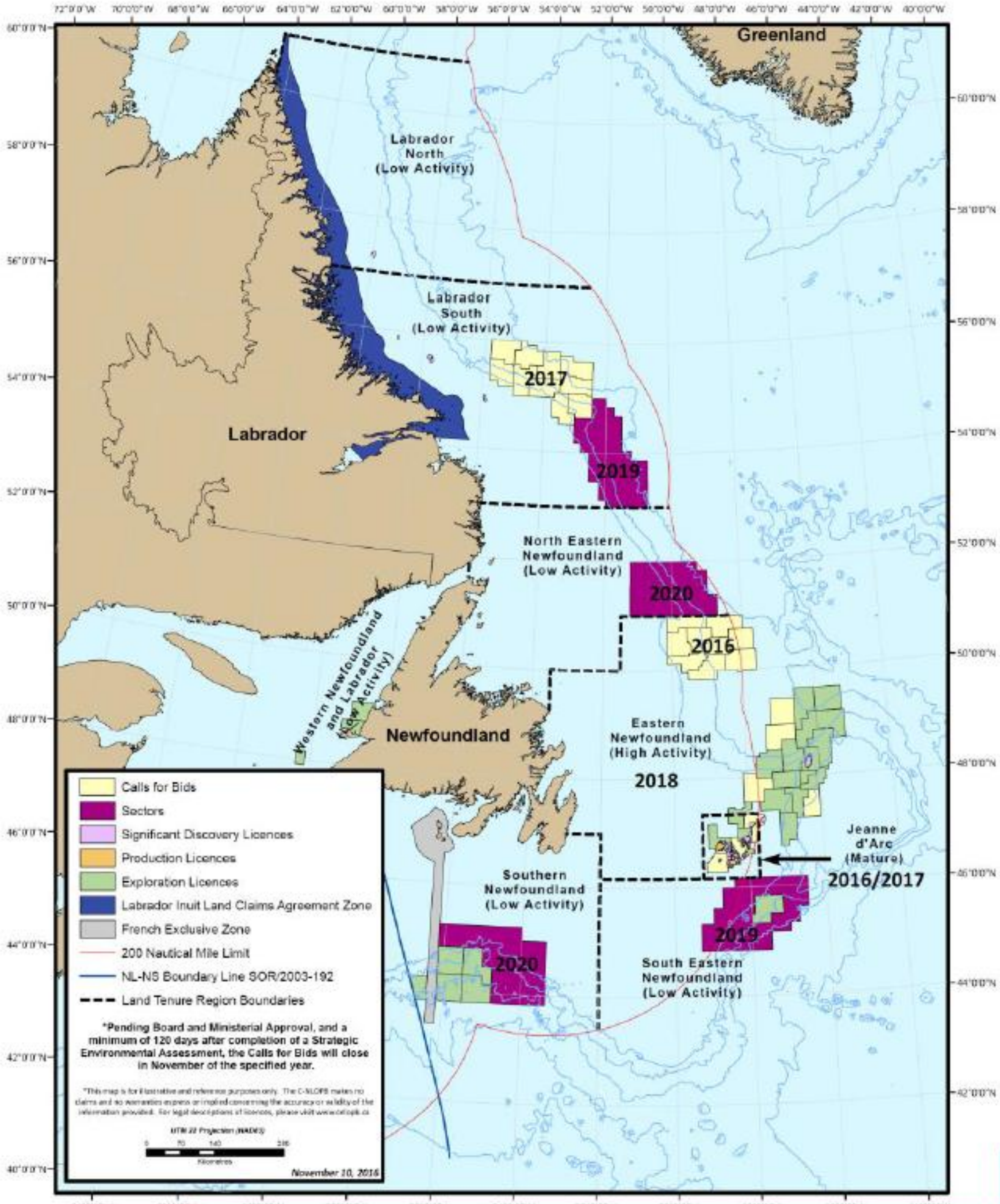




- Ultra-deep water well
  - Deepest water well offshore Canada
  - Deepest water well operated by Statoil

Exploration in 2017 and beyond….

- Husky White Rose A-78 Well (Delineation) (2017)
- Potential for Drilling campaign by Statoil (2017)
- Substantial exploration work commitments to be met over next 6 years - $2.5 billion
- Extensive exploration licensing opportunities



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EMAIL: INFORMATION@CNLOPB.CA