

# NOIA 2017

## / Turning 50...

## The Regulators' Perspective on Untapped Resources

### Slide 1 – Introduction

Thank you to NOIA for the opportunity to speak this year.

The topic I wish to talk about this morning is Turning 50 - The Regulators' Perspective on Untapped Resources.

Last year we passed an anniversary of 50 years of exploration and development in the Newfoundland and Labrador offshore.

### Slide 2 – Safety Moment

For my safety moment this morning, I want to put out the phrase “Safety First and always take the alarm seriously.”

I want to relate a story that happened during a recent visit to a medical clinic.

As you would expect, the clinic was completely full with people waiting in a line for their number to be called - When suddenly the fire alarm went off.

So being last into the clinic I was the first one out and arrived at the muster station in the parking lot.

After a few minutes, I realized that not many people were coming out.

There were maybe 20 people in a parking lot and normally there should have been 100 to 150 people during that time of day.

I was told that they had a number of false alarms in the days prior to my visit and people were treating this alarm as just another false alarm.

The Deputy Fire Chief, who showed up with his three trucks, was not impressed.

He proceeded to go to each room and give everyone a lecture on the importance of treating alarms as the real thing unless told otherwise by someone in authority.

So a reminder to those who may have showed up late and are not familiar with the new building there is no scheduled alarm today. If an alarm sounds we will proceed out these doors and to one of the muster stations around the building.

### **Slide 3 – Canada –Newfoundland Offshore Area**

For those of you who are unfamiliar with the C-NLOPB, we regulate all the petroleum activity that occurs from the Southern part of Newfoundland in the Gulf of St Lawrence to eastern edge of the Continental shelf right up to the north tip of Labrador – an area larger than the Gulf of Mexico.

Since 1966, there have been 441 wells drilled in our offshore area, including 215 development wells, 56 delineation wells and 167 exploration wells.

1.6 billion barrels of oil have been produced from four projects – Hibernia, Terra Nova, White Rose and North Amethyst. Over one billion barrels have been produced from the Hibernia field alone.

As heard yesterday Hebron is expected to begin producing later this year.

In terms of seismic activity, almost 3.8 million lines of seismic have been shot.

### **Slide 4 – First well**

In the next few slides, I am going to look back and talk how much has changed over the last fifty years - what are the biggest drivers of the change in the Newfoundland and Labrador offshore.

Most of my focus as is on my department of Resource Management and will be on the development side.

This is a picture of the drillship *Glomar Sirte* which drilled the first wildcat well in offshore Canada in 1966 by Amoco and Imperial Oil.

The Tors Cove D-52 well was drilled to a total depth of 1473 m in South Whale Basin on June 7<sup>th</sup>. It was plugged and abandoned in Jurassic salt after encountering minor shows of methane.

Shortly after, another well was drilled to the northeast but was also dry after it failed to reach its total depth due to deteriorating weather conditions.

This drillship had basically was a rig mounted onto a freighter and was very limited in its drilling capacity and data collection ability.

## **Slide 5 – Transocean Barents**

Compared that rig to this one – This is the Transocean Barents which is a 6<sup>th</sup> generation harsh environment drilling rig built in 2009.

It is an ultra deep water rig which can drill in 9800 ft of water to a maximum drill depth of 35,000 ft.

It has been drilling wells on the Norwegian Shelf and will soon begin a 15-month contract with Suncor Energy for drilling operations at the Terra Nova Field pending regulatory approval.

## **Slide 6 – Hibernia 1986**

Now moving over to the development side.

Hibernia was discovered in 1979, 215 km southeast of St. John's in 80 m of water in the Jeanne d'Arc Basin.

The initial development plan was approved in 1986. Initial exploitation called for about 80 wells to be drilled which target the both the Ben Nevis Avalon reservoir as well as the Hibernia reservoir shown here.

The Drill rigs had a lateral reach of 3500 – 4000 meters from the GBS shown in the diagram.

The initial production rate as seen in the lower right was for a twenty year life starting in 1992 and plateau at around 16,000m<sup>3</sup>/d which is roughly 100,000 bbls a day.

Reserves were estimated to be around 522 million bbls. However it was recognized that the potential could be more and thus the inclusion of the J tubes which could allow subsea tie backs in the future were included in the design.

## **Slide 7 – Hibernia 2017**

Today, in its twenty year, Hibernia has produced over 1 Billion bbls with an estimated 600 million barrels to go. Currently it is producing about 150,000 bbls day after reaching a peak of just over 220,000 bbls/d back in 2004.

120 wells have been drilled with another 40 wells in next ten years.

The current estimated field of life is about 2047.

Some additional projects underway to increase recovery:

- Gas lift was started last year
- Water Alternating Gas Enhanced Oil Recovery pilot began in February This could possibility increase 5-10% additional reserves in some blocks (50 -100 million)
- Infill opportunities being explored in the gas flood region
- Ben Nevis Avalon exploitation plan being optimized where multilaterals are being considered
- preliminary production from the Catalina formation is being looked into

It is considered the 2<sup>nd</sup> most productive field in Canadian history and still has a lot of potential left.

### **Slide 8 – Terra Nova 1997**

Terra Nova was discovered in 1984.

The initial development plan was approved in 1997.

Initial exploitation called for 44 wells to be drilled which target the fluvial Jeanne d’Arc sands.

The initial production has seen in the lower right was also a twenty year life starting in 2000 and plateau at around 15,500m<sup>3</sup>/d which is roughly 100,000 bbls a day (seen in the solid line ). Sorry for the quality of the images. They were scanned from the report.

Reserves were estimated to be around 400 million bbls.

### **Slide 9 – Terra Nova 2017**

Today in its 15<sup>th</sup> year Terra Nova has produced just under 395 million with an estimate 110 million barrels to go.

51 wells have been drilled to date with a new development drilling program with the rig Transocean Barrens about to begin next month which will do some infill wells and workovers dealing with production efficiency.

The current estimated field of life is now 2027.

Some additional projects underway to increase recovery:

- Gas to Water conversion well to increase recovery
- Possible Far East development

## **Slide 10 – White Rose 2001**

White Rose was also initially discovered in 1984.

The initial development plan was approved in 2001.

Initial exploitation called for 30 wells to be drilled which target the Ben Nevis Avalon reservoir.

The Gas produced from the project was reinjected into a subsurface storage area for possible future development.

The initial production has seen in the lower right was also a 15 year life starting in 2005 and plateau at around 14,600m<sup>3</sup>/d which is roughly 92,000 bbls a day (seen in the solid line.)

Reserves were estimated to be around 233 million bbls.

## **Slide 11 White Rose today**

Today in its 12<sup>th</sup> year White Rose has produced just under 275 million barrels produced and 190 million to come.

The biggest change in this field was the discovery and tieback of the adjacent North Amethyst satellite field in 2006/2010 which added an additional 75 million bbls to the development. This was not in the original development plan and had first oil within four years after the discovery.

47 wells have been drilled to day with current development drilling occurring in South Extension area.

The current estimated field of life is until 2027.

A Pilot pair project in the West White Rose pool started in late 2013 help prove up reserves and reduce risk . This project just recently received sanction and should come on in 2022 adding additional 180 million to project.

## **Slide 12 – Hebron discovery**

Hebron was also discovered in the early 1980s.

It is located nine km north of the Terra Nova field and consists of three Significant Discoveries (Hebron, West Ben Nevis and Ben Nevis).

Initial estimates were in 414 million barrels range with little gas or NGLs.

One of the biggest challenges for Hebron back then was that a majority of the resource is a lower oil quality which made it harder to develop and sell.

This presented issues with drilling, completions, production and market ability.

With more drilling, refined seismic, advances in technology and drilling ability, overall market price thinking changed for Hebron in late 2000s.

### **Slide 13 – Hebron Today**

First oil is expected in Q4 2017.

52 well slots available:

- 28 Extended Reach Producers
- 12 Water Injectors
- 1 Gas Injector
- 11 Undesignated for Future Resource Development

Field capacity: estimated rate of 150,000 bbls/d.

Reserves are estimated at 707 million barrels.

Some new technologies that you will see:

- Gravel pack completions technology sand screens – improve gravel packing of cased and open hole completion wells.
- Vessel Internal Electrostatic Coalescer (VIEC) – help reduce the water-in-oil content of the oil stream exiting the separator.

### **Slide 14 – Significant Discoveries in the Jeanne d’Arc region**

Today’s panel is to discuss things in the Jeanne d’Arc basin where the majority of development and production has occurred over the last twenty years.

One of the mandates of the Resource Management department at the C-NLOPB is to ensure operators acquire data during production operations sufficient to assess the effectiveness of pool and field depletion schemes and to ensure that production operations are conducted to maximize petroleum recovery.

This is a slide of the Significant Discoveries and production licenses that are located in the Jeanne D’Arc basin. The tear droplets are proportionally to each field and represent the remaining oil reserves (in Black) as well as the oil resources (in green) and gas resources (in red).

The take away from this slide is that there are **substantial reserves remaining** on the existing production licences as well as resources that need to be evaluated as compared to the known resources on the other SDAs in the Jeanne d'Arc Basin.

The focus of the operators is to ensure that maximum recovery can be achieved and to look at ways of capturing the remaining resources such as gas resources.

### **Slide 15 – Lessons learned from the last twenty years**

From the regulators perspective there has been some lessons learned at accessing the potential of developments going forward.

I would list them in three categories:

- 1) Data is Key - Continuous collection of technical data of various types such as seismic, well, core analysis, production data. Being able to integrate all of the available data and information to ensure that Models are updated

For example at Hibernia with the drilling data at B-16 54 which challenged the one oil water contact concept and lead to HSE, the use of 4D seismic which can detect bypass oil and early production data which can be redefine an concept with

- 2) Adapt and always learn. Like any industry you must constantly be innovating and adapting with the use new technologies. This is especially true in the offshore where there are such technologies as multilaterals, tracers and gravel packs.
- 3) You must be willing to look at alternatives – think outside of the box. The prime example is North Amethyst which no one thought was there but someone challenged the preset notion and drilled a well

Some of the changes that C-NLOPB has done to regulate for increasing the potential are talked about briefly over the next few slides

1. Scheduled Land Tenure system
2. Use of Production Pilots
3. Use of new technology to achieve the same legislative goals  
Example FTWT vs DSTs in Significant Discovery applications

### **Slide 16 – Scheduled Land Tenure System**

The scheduled land tenure system was designed to improve transparency, predictability and input.

It provides additional time for exploration companies to conduct geoscientific assessments of the hydrocarbon prospectivity in the lesser explored basins of the Canada-Newfoundland and Labrador Offshore Area.

Collection of more data and the ability to conduct proper research was the goal.

This May is the 2016 Call for Bids

### **Slide 17 – 2017 Geoscience Programs**

So we are seeing some of the results in the 2017 Geoscience programs

More seismic is being shot over wider areas with more extensive exploration licencing opportunities.

Also substantial exploration work commitments to be met over the next 6 years – 2.6 billion.

### **Slide 20 – Use of Pilots – maximize the potential**

Pilot projects are useful to gather dynamic production data to better optimize depletion plans and reduce uncertainty.

This has been done at Hibernia in Ben Nevis reservoir, at White Rose in the west and it is being proposed for Pool 3 at Hebron.

The idea is to try to produce in a test area with the clear goals and outcomes defined.

At West White Rose it helped reduce the risk of the productivity of the field and convinced the Operator that the wellhead was the best option in the long run compared to subsea tiebacks.

### **Slide 21 – Recent C-NLOPB ruling regarding FTWT**

As illustrated by the Statoil submission in March 2017, the Board acknowledges that Formation Testing While Tripping (FTWT) technology does meet the legislative requirements of the Formation Flow Testing regulations outlined in Section 52 (4) regulations when run on certain reservoirs under certain conditions.

Previously All Significant Discovery Declarations to date have been based upon formation flow test as required by the Act. The formation flow test conducted in support of such Significant Discovery Declarations has been a drill stem test (DST).

Formation testing while tripping is a technology developed over the last ten years by Statoil and services companies to reduce the amount of fluid brought to surface but still properly evaluate the reservoir.

It was found that FTWT is not equivalent to a Drill Stem Test. This is because of the volume produced from FTWT as compared to a DST and thus the resulting comparison of the radius of investigation that is achieved by each test.

FTWT could be used in requirement for formation flow testing in support of an application for “Significant Discovery Declaration.

This guidance is now being written by the C-NLOPB in the use of this application of technology for operators to consider in future SDDs.

### **Slide 22 - So what does this mean for the potential of the NL offshore?**

### **Slide 23 – Production forecast**

Hopefully the curve continues to grow to the right and up with maximum recovery which would be good for the industry, governments and the public.

### **Slide 21 – Thank You and Contact Information**

Thank you for your attention this morning and I’d look forward to listening to the rest of discussion from the panel.