

Marine Seismic Surveys: The Search for Oil and Gas offshore Atlantic Canada

Presentation to oversight hearing on “The
Science behind Discovery: Seismic Exploration
and the Future of the Atlantic OCS”

Paul Barnes

Manager, Atlantic Canada

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CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS

Overview

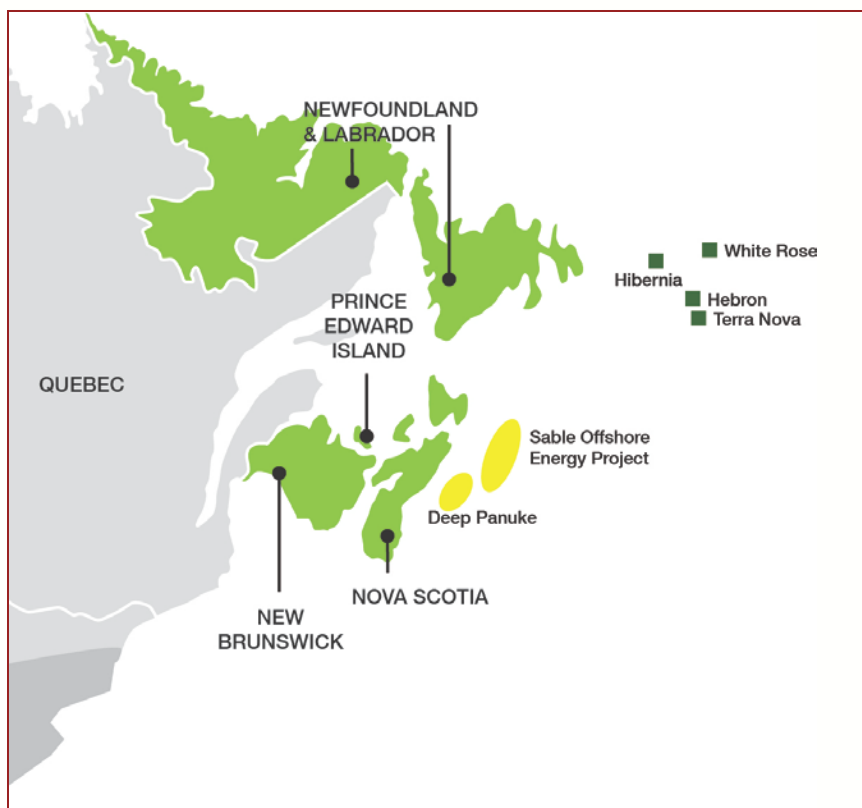
- **Who is CAPP**
- **Atlantic Canada Offshore Overview**
- **What is a marine seismic survey?**
- **Why are seismic surveys conducted?**
- **What are the impacts of seismic surveys?**
- **Environmental protection during seismic surveys**
- **Impact on fishing and other marine activities**



Canadian Association of Petroleum Producers (CAPP)

- Represents Canadian upstream oil & gas sector (~ 100 member companies)
- Members explore for, develop and produce natural gas, natural gas liquids, crude oil, and oil sands throughout Canada
- Members produce about 90 per cent of Canada's natural gas and crude oil
- **Key focus areas:**
 - Education
 - Communications & outreach
 - Policy & regulatory advocacy
 - Industry performance
- **Offices in St. John's, Ottawa, Calgary and Victoria**

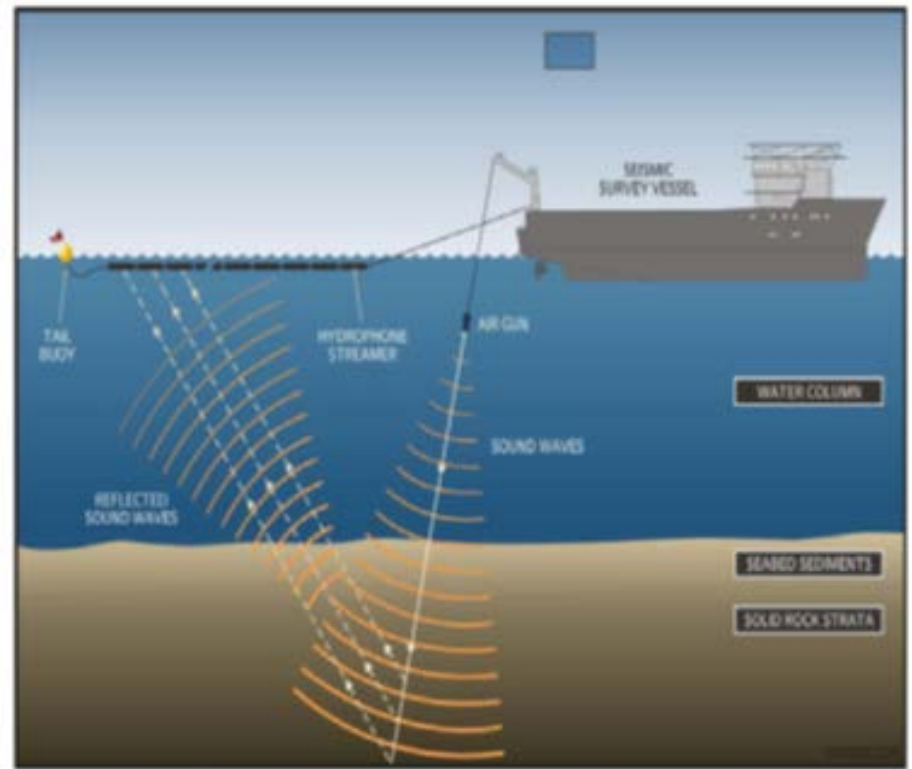
Atlantic Canada Offshore



- **Bringing substantial benefits to region:**
 - Directly employs over 7,000 people (thousands more indirectly)
 - Supports over 800 local supply/service companies
 - Cumulative expenditures since 1996 - over \$31 billion in NL, over \$8 billion in NS
 - Impact of production on provincial Gross Domestic Product (GDP)
 - Oil production accounts for 30% GDP in NL
 - Mining and oil and gas production account for 2% of GDP in NS
- **Five producing projects**
- **Exploration ongoing**

What is a marine seismic survey?

- Uses sound energy to map geological structures under the seabed
- Vessels tow devices that use compressed air to produce pulses of high energy, low frequency sound waves
- Sound waves can penetrate more than 6,000 metres below the sea floor
- Travel through the water and into the rock layers beneath the seabed
- Bounce back to receivers (“hydrophones”) that measure strength and return time



Source: Sikumiut Environmental Management

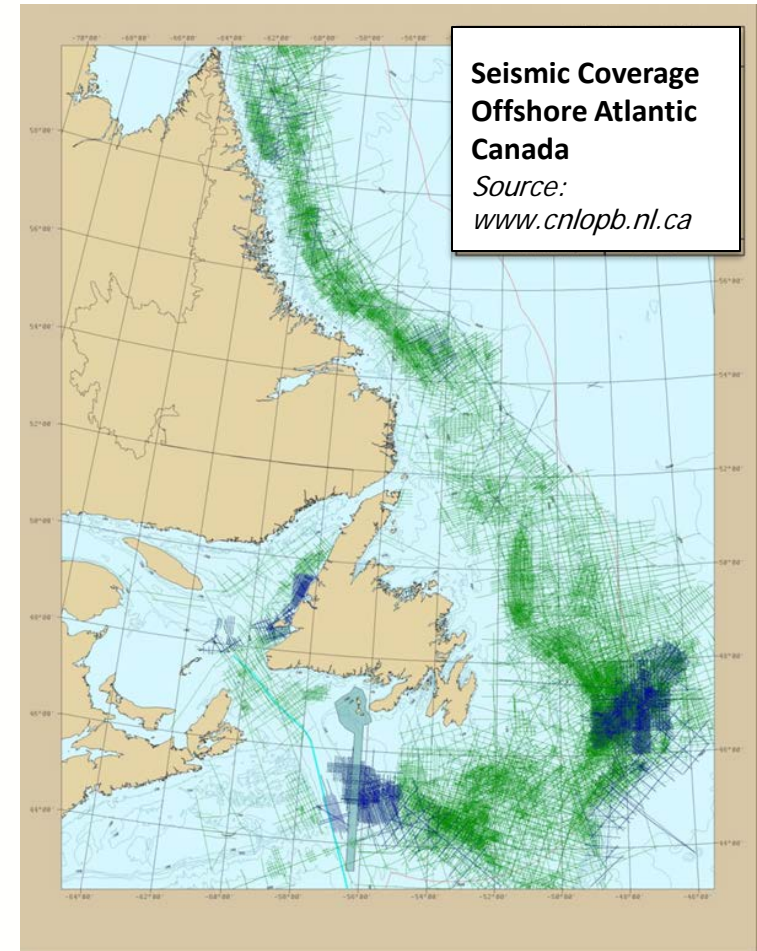
What is a marine seismic survey (cont'd)

- **Types of seismic surveys:**

- Two dimensional (2D): Uses one sound source and one set of receivers
- Three dimensional (3D): Uses multiple synchronized sound sources and hydrophones
- Four dimensional (4D): Uses multiple synchronized sound sources and hydrophones with the added dimension of time (i.e.: a 3D survey is conducted multiple times over the same location at different periods to compare data)
- Geohazard or well site survey: Uses one sound source and one set of receivers towed over a small area prior to drilling to check for possible hazards
- Vertical Seismic Profiles: Hydrophones are lowered into a drilled well and sound is produced at the surface to give a detailed view of the geology near the well bore

Why are seismic surveys conducted?

- Seismic surveys provide information on the depth, position and shape of underground geological formations that may contain oil or gas
- Data is processed to improve the quality and filter out background “noise”
- End result is a detailed picture of the structures and rock formations in the survey area
- Geophysicists look for specific features that could indicate whether oil or gas might be present:
 - Sedimentary basins
 - Faults
 - Ancient reefs or buried former beaches



Why are seismic surveys conducted

- **Seismic surveys help companies decide whether:**
 - The available information is sufficient to justify drilling an exploratory well
 - Additional surveys are needed to better define the structures before drilling
 - The features present are not attractive enough to warrant further interest
- **Survey results do not show definitively whether oil or gas are present**

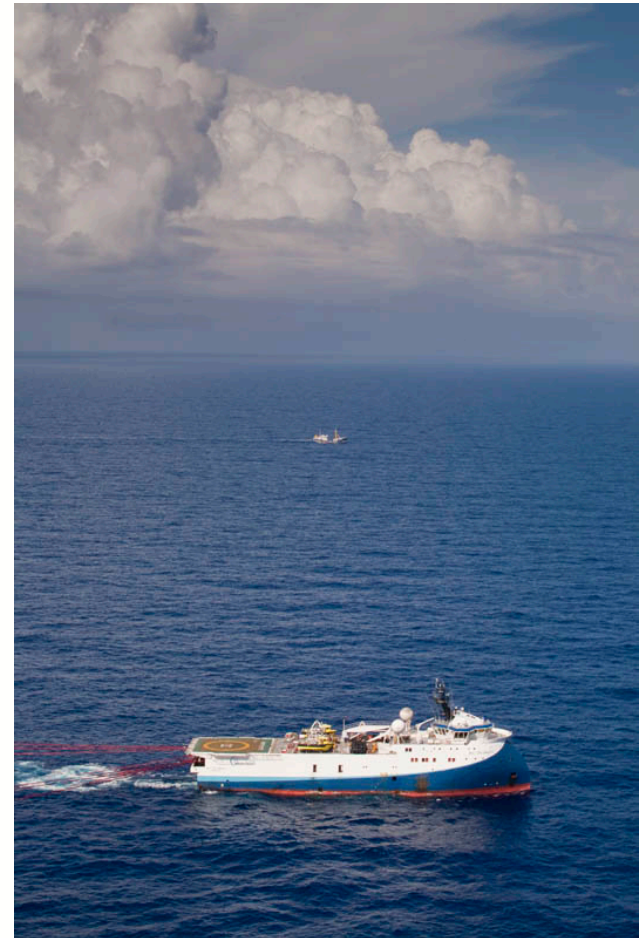


Photo courtesy of Schlumberger

What are the impacts of seismic surveys on marine life?

- **Substantial research has been conducted to determine whether seismic surveys have an impact on ocean life and additional research is ongoing:**
 - Current research indicated there is minimal risk of mortality in marine mammals, fish and invertebrates
 - Marine mammals, depending on species and proximity, can experience temporary changes to hearing thresholds and in some extreme cases these effects can be permanent
 - Laboratory research conducted in NL show no mortality among invertebrates (crab, shrimp scallop etc.) but showed some non-life threatening physical effects
 - Governments, academia and industry continue to invest in research related to seismic impacts to further broaden the body of knowledge
- **Carefully designed mitigation measures are applied to seismic surveys to minimize risk to marine life**

Environmental protection

- **Comprehensive Environmental Assessments (EAs) are completed prior to conducting surveys which must be approved by regulators**
- **Seismic vessels and their operators are guided by the *Statement of Canadian Practice with Respect to Mitigation of Seismic Sound in the Marine Environment***
 - Outlines mitigation measures that must be considered in the planning of seismic surveys
 - Examples:
 - Air source arrays must be shut down immediately if an endangered marine mammal or sea turtle is observed within 500 metres
 - Surveys must be planned to avoid dispersion of groups of spawning fish from known spawning areas

Impact on fishing and marine industries



Photos courtesy of Schlumberger

- **Seismic surveys in the Atlantic Canada offshore must be scheduled during optimal weather conditions (June to Sept) because:**
 - Surveys cannot take place if waves are higher than 3 metres
 - Rough seas affect quality of data
- **June to Sept is also peak fishing season in Atlantic Canada**
- **Effective communication and coordination between petroleum and fishing industries is critical**

Proactive mechanisms in place to minimize potential conflicts between both industries

- Fishing industry advised of marine seismic survey activity through direct communication and communiqués with fishing industry members, public service announcements etc.
- In NL a single point of contact is appointed by the operator that fishers can go to for precise information about geographic location and potential impacts
- A fisheries liaison officer (FLO) may be required on board the seismic vessel - the FLO communicates directly with fishing vessels in the field to resolve situations where overlap and conflicts could occur
- **Working with the fishing industry:**
 - In NL, *One Ocean* was created as a communication & liaison organization between fishing and petroleum industries
 - Fisheries advisory committee in NS advises regulator on minimizing impact on fishing industry
- **Compensation programs in place for damage to fishing vessels or gear**



More information
available at:
www.capp.ca
www.oneocean.ca

Questions?