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: Sikumilut 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

Seismic Coverage Offshore Atlantic Canada
Source: www.cnlopdb.nl.ca

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

- 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

Photos courtesy of Schlumberger

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