NL Offshore Industry and Environment, Health & Safety Management Overview
Agenda

- Who is CAPP?
- Context – Why We’re Here
- Offshore 101
- NL Industry Overview
- Environment, Health and Safety Management
- Innovation
Canadian Association of Petroleum Producers

- Represents large and small producer member companies
- Members explore for, develop and produce natural gas, natural gas liquids, crude oil, and oil sands throughout Canada
- Produce about 80 per cent of Canada’s natural gas and oil
- Associate members provide a wide range of services that support the upstream oil and natural gas industry
- Offices in St. John’s, Ottawa, Calgary and Vancouver
- Offshore operations for CAPP driven by an Offshore Policy Group comprising senior leaders from CAPP members with interests in Atlantic Canada
- www.AtlanticCanadaOffshore.ca – provides industry overview and benefits information & safety and environment content
Context

- November 2018 storm and related incidents resulted in significant interest in public domain about environment, health and safety in the offshore
- CAPP is increasing awareness efforts to build a greater understanding of the offshore industry and how industry manages environment, health and safety
Lifecycle of an oil and gas field

Exploration
- Seismic
- Exploration drilling
- Delineation drilling

Development
- Drilling wells
- Engineering
- Fabrication/constructon

Production
- Recovering the resource
- Transportation to market

Decommissioning
- Completion of project
- Removal of installation

Environment, Health and Safety
Exploration Activities

- Seismic Surveys use sound energy to map geological structures under the seabed
- Significant planning occurs before a seismic survey is conducted
- Once seismic and other data is interpreted to determine the best location to search for oil and gas resources, an exploration well may be drilled
- In the offshore, exploration wells are drilled by Mobile Offshore Drilling Units
  - Semi-submersibles
  - Jack-up rigs
  - Drill ships
- If a discovery is made, further drilling is typically required to determine the size of the discovery
Development

- Getting from the exploration to development phase can take many years if the discovery is commercial.
- If a company decides that a discovery warrants development, plans are submitted to regulators to outline the company’s proposed approach to develop the resource safely and sustainably.
- Significant front-end engineering work and safety and environmental analysis must be completed to assess the various options for development.
- If development is approved by regulators, development and construction can begin and more wells are drilled.

Construction of the Hebron gravity based structure (Credit: ExxonMobil Canada Properties)
Production

- Following construction and development, and once all regulatory approvals are in place, production can begin
- Oil and gas is extracted offshore via fixed or floating platforms
- Production can also occur from subsea infrastructure that is tied back to a production facility
Sample Subsea Tie-back Project
Offshore Production Installations - Overview

- Production facilities are designed and built to withstand the harsh NL climate and selected based on the needs of specific fields
  - Gravity Based Structure (GBS)
    - Sits on the ocean floor and supports topsides (accommodations, drilling and production); base contains storage for oil
  - Floating Production Storage and Offloading Vessel (FPSO)
    - Floating vessel used for production, processing and storage of oil; drilling usually takes place from nearby platforms or subsea

- Installations are built and/or modified to suit the NL offshore environment, including meteorological and oceanographic conditions
Decommissioning

- A well can produce for many years
- For offshore projects, production life typically lasts 25+ years
- Once the oil and gas reserves are depleted, the project is decommissioned, meaning that infrastructure is removed and the site is reclaimed and restored
NL Offshore Overview
Offshore industry provides significant value to Newfoundland and Labrador

- **Bringing substantial benefits to region:**
  - Directly employs over 5,000 people (thousands more indirectly)
  - Supports over 600 local supply/service companies
  - Cumulative expenditures in NL 1995-2017 total more than $45 billion
  - Represents 25% of provincial GDP and 41% of exports over the past 20 years*
  - Cumulative royalties paid to the Government of NL from 1998-2017 total more than $21 billion
  - Over $506 million spent on R&D and education and training in NL*
  - Significant contributions through community investment initiatives

*Indicates source is Government of NL; all other statistics: CAPP
Newfoundland and Labrador’s Offshore Production Projects

**Hibernia**
Operated by HMDC
Start-up: 1997
Gravity Base Structure (GBS)

**Terra Nova**
Operated by Suncor Energy
Start-up: 2002
Floating Production, Storage and Offloading Vessel (FPSO)

**White Rose**
Operated by Husky Energy
Start-up: 2005
FPSO

**Hebron**
Operated by ExxonMobil Canada
Start-up: 2017
GBS
New Projects

- **West White Rose Project**
  - Operated by Husky Energy
  - Concrete Gravity Supported Platform
  - Fixed drilling rig, producing back to the SeaRose FPSO
  - Project sanctioned Q2 2017
  - Fabrication underway
  - First oil target: 2022

- **Bay du Nord**
  - Operated by Equinor
  - FPSO development concept
  - Framework agreement with Government of NL announced July 2018
  - Project sanction decision anticipated: 2020
  - If approved, first oil target: 2025
Exploration

• **Currently nine exploration drilling projects in Eastern Newfoundland**
  - Equinor Canada Ltd. - Flemish Pass (2018-2028)
  - ExxonMobil Canada – Eastern Newfoundland (2018-2030)
  - CNOOC Intl. – Flemish Pass (2018-2028)
  - BP Canada – Orphan Basin (2017-2026)
  - ExxonMobil Canada – Southeastern Newfoundland (2020-2029)
  - Chevron Canada – West Flemish Pass (2021-2030)
  - Suncor Energy – Tilt Cove (licence awarded January 2019)
  - BHP Billiton – Eastern Newfoundland (licences awarded January 2019)

• **Exploration levels low in recent years but likely to increase in 2019-2020 pending regulatory approvals**
# Responsibility and Oversight of Environment, Health and Safety

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<th>Operator</th>
<th>Government</th>
<th>Regulator</th>
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<td>• The Operator has overall responsibility for ensuring the health and safety of workers and protection of the environment.</td>
<td>• Governments (federal and provincial - jointly) are responsible for developing the statutory requirements that operators must adhere to in order to ensure health and safety and environmental protection.</td>
<td>• The Regulator is responsible for ensuring the Operator complies with requirements to ensure health and safety and environmental protection.</td>
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Regulatory Framework

- NL Offshore is regulated primarily by the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)
  - Mandate to interpret/apply the provisions of the Atlantic Accord and the Atlantic Accord Implementation Acts and oversee compliance with statutory provisions
  - No offshore activities can be conducted without authorization from the C-NLOPB. Requirements include:
    - Description of the proposed activities, along with prescribed technical details;
    - Execution plan and schedule;
    - Benefits Plan;
    - Development Plan (for development related activities);
    - Safety Plan;
    - Environmental Assessment;
    - Environmental Protection Plan;
    - Emergency Response/Contingency Plans;
    - Spill Response Plan;
    - Financial Requirements;
    - Certificate of Fitness (if applicable);
    - Declaration of Operator, and
    - Cost Recovery
Management of Environment, Health & Safety (EH&S)

- **Safety of the public, industry personnel and the environment is of paramount importance**
  - Comprehensive management systems used by operators to manage EH&S at all levels of the organization and ensure compliance to regulations
  - Aspects of management systems that are relevant to EH&S are subject to review and performance monitoring by regulators and certifying authorities
    - The C-NLOPB audits company health and safety programs and regularly inspects offshore work locations
    - The C-NLOPB has the authority to shut down operations that are deemed unsafe

- **Industry’s top priority is to enable safe and reliable operations**
Operational Decision Making

- **Guided by risk management processes**
  - Offshore operators have processes in place to recognize risk, implement measures to reduce risk and make decisions based on the level of risk involved
  - When a risk is identified, operators will take a series of specific actions to reduce any potential risk
    - Specific actions can range from securing loose equipment or gear to shutting down production depending on the level of risk identified
    - Specific steps/actions vary based on the facility and the plans they have in place, which have been reviewed by regulators
Checklist – Offshore Weather Event Emergency Preparedness

Pre and Post-emergency checklists are developed and updated as required based on the specific incident; preparation checklists may include:

- Review weather forecasts and continue monitoring
- Decision on whether shut down is required
  - Follow shut down plans if decision made to shut down
  - If decision made to continue operations, continue to monitor and perform checklist and adjust plans as required
- Communicate with the workforce (pre-event and ongoing as required)
- Communicate with air and marine transportation providers
- Communicate with regulator to advise of preparation for weather event
- Perform safety checks
- Secure all equipment
- Test communications systems and back-up systems in case of power loss
- Ensure emergency response equipment is ready for immediate use
- Continuous radio watch maintained
- Prep onshore personnel to respond to any potential emergencies
- Continue to monitor and adjust as appropriate
Spill Prevention & Response

- Industry works to prevent incidents
- Spill prevention measures include:
  - Identifying and analyzing potential risks, designing/implementing engineering controls and establishing procedures to reduce or eliminate hazards
  - Monitoring, maintaining and repairing equipment
  - Using comprehensive internal and external reviews, inspection, testing and audit programs of facilities, equipment and processes
  - Training workers to recognize and respond to potential emergencies
  - Evaluating and implementing new research and technology as they become available
  - Using global standards
- While industry’s focus is on preventing environmental incidents, proper preparation is crucial and contingency plans are developed to ensure adequate response measures are in place in the event of an environmental emergency
Spill Prevention & Response (cont’d)

- NL Offshore Operators have a variety of equipment available to them in the event of a spill, including:
  - Equipment stored on offshore installations and supply vessels
  - Equipment stored and maintained through Eastern Canada Response Corporation
  - National and International resources available, as required, including:
    - Canadian Coast Guard
    - Global spill response providers servicing the industry (operators have agreements in place with response providers)
  - NL operators have never had to avail of international spill response equipment

- Response efforts tested and practiced through tabletop and annual on-water exercises
  - Video: Synergy Exercise
Oil Spill Response

• Two types of oil spills
  ▪ Batch spill
    • Typically an instantaneous or short-duration discharge of oil
    • If conditions allow, operators can move quickly to mobilize containment and recovery equipment and begin clean-up
  ▪ Continuous release
    • There has never been a continuous release in the NL offshore
    • Would include “blowouts”; though extremely rare as blowout preventers (BOPs) are effective tools used to maintain control of a well
    • Loss of pressure control and fluids at the wellhead resulting in continuous spill that lasts until the operator regains control of the well
Well Capping & Containment

- In the unlikely event of a blowout, operators would try to shut-in the well using other methods.
- A capping stack is a piece of equipment that can be installed at the wellhead to control the flow of oil and gas into the environment.
  - Large and complex
  - Can be transported by air or vessel; however, a number of steps required to prepare the site before a capping stack can be deployed, including:
    - Inspections using remotely operated vehicles
    - Removal of debris
    - Confirmation that the site is safe for deployment
    - Preparation of the wellhead
    - Modifications to capping stack
  - NL offshore operators have agreements in place with global response organizations to access capping and containment equipment.
Oil Spill Response – The Toolkit

Operators regularly assess new research and technology and are committed to continuous improvement.
Environmental Effects Monitoring

- Operators are required to conduct environmental effects monitoring to evaluate the effectiveness of actions to reduce effects, provide early warning of changes in the environment and assist in identifying R&D needs
- Programs generally comprised of sampling marine sediments, water and fish at various sites
- Results are submitted to regulators for review and approval, and are made available to the public
- To date, EEM programs submitted by Atlantic Canada offshore operators show minimal localized impacts within predicted levels approved during EA process
- Video: Environmental Effects Monitoring
Seabird Observations & Handling

- As part of the environmental assessment process, operators identify and demonstrate how they will mitigate against potential impacts on marine ecosystems
- **Operators required to identify processes related to seabird observations & handling**
  - Operators follow processes developed by Environment and Climate Change Canada’s Canadian Wildlife Service (CWS) and must receive a CWS permit
- **All offshore operators make environmental observations as part of their daily routine and respond if birds are found on offshore facilities**
  - Observations conducted by trained and experienced personnel
  - Data gathered is provided to relevant regulatory agencies
- **Industry has funded various studies on seabirds which has resulted in multi-year monitoring programs offshore NL conducted by Environment & Climate Change Canada**
Innovation

- Industry takes a science-based approach to developments that relies on proven technology
- From actual development of resources to emergency preparedness, industry relies on the latest scientific developments and technology to plan safe operations
- Significant advances have been made, resulting in safer offshore operations
  - Ice and iceberg detection, iceberg management, monitoring equipment
  - Safety systems and equipment (Helicopter Passenger Transportation Suit, Helicopter Underwater Emergency Breathing Apparatus in training etc.)
- Industry involved in several research programs related to spill prevention, preparedness and response
  - Environmental Studies Research Fund focus area on studying the fate and effects of accidental releases of petroleum
  - Multi-Partner Research Initiative: Researching effectiveness of dispersants, development of improved oil absorption technologies, enhanced computer simulations to forecast oil spill risk and clean up needs etc.
- Industry continues to conduct research and development to fill the knowledge gap and to improve operations