TRIOX Environmental Emergencies

SPILL RESPONSE CAPABILITY ASSESSMENT 2021, NEWFOUNDLAND AND LABRADOR OFFSHORE AREA

Final Report

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS

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ARM	Alternative response measures
BOP	Blowout Preventer
CAPP	Canadian Association of Petroleum Producers
CCO	Chief Conservation Officer
CEAA	Canadian Environmental Assessment Agency
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CNOOC	China National Offshore Oil Corporation
COP	Common Operating Picture
CWS	Canadian Wildlife Service
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
ECRC	ECRC-SIMEC (formerly Eastern Canada Response Corporation)
EEM	Environmental Effects Monitoring
EEZ	Exclusive Economic Zone
EH&S	Environment, Health and Safety
EMCP	ExxonMobil Canada Properties
EPCMP	Environmental Protection and Compliance Monitoring Plan
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ESRF	Environmental Studies Research Fund
FPSO	Floating Production, Storage and Offloading Vessel
GBS	Gravity Base Structure
GIS	Geographic Information System
GRN	Global Response Network
HMDC	Hibernia Management and Development Company Ltd.
IAP	Incident Action Plan
ICS	Incident Command System

IG	Indigenous Groups
IMO	International Maritime Organization
IOGP	International Association of Oil and Gas Producers
IMS	Incident Management System
IPIECA	International Petroleum Industry Environmental Conservation Association
ISB	In Situ Burning
ISR	Intelligence, Surveillance and Reconnaissance
ISTOP	Integrated Satellite Tracking of Pollution
JSA	Job Safety Analysis
MPRI	Multi-Partner Research Initiative
NEBA	Net Environmental Benefit Analysis
NL	Newfoundland and Labrador
OA	Operations Authorization
OLS	Offshore Loading System
OPRC	Oil Pollution Preparedness, Response and Co-operation Convention
OSRL	Oil Spill Response Limited
OSRP	Oil Spill Response Plan
PPE	Personal Protective Equipment
R&D	Research and Development
RO	Response Organization
ROV	Remotely Operated Underwater Vehicle
SCAT	Shoreline Clean-up and Assessment Technique
SIMA	Spill Impact Mitigation Assessment
SITREP	Situational Report
SME	Subject Matter Experts
SOPEP	Shipboard Oil Pollution Emergency Plan
STA	Spill Treating Agent
SVSS	Single Vessel Side Sweep

TQC	Training and Qualifications Committee
TRIOX	Triox Environmental Emergencies
TRG	The Response Group

1 EXECUTIVE SUMMARY

This report, *Spill Response Capability Assessment 2021, Newfoundland and Labrador Offshore Area,* has been prepared by Triox Environmental Emergencies (TRIOX) on behalf of the Canadian Association of Petroleum Producers and the Grand Banks Exploration & Production Operators including BHP, CNOOC International, Equinor, Exxon Mobil Canada Properties, Hibernia Management and Development Company, Cenovus Energy (formerly Husky Energy) and Suncor Energy (the Operators). The purpose of this report is to augment their commitment to continuous improvement and to meet the Canada-Newfoundland and Labrador Offshore Petroleum Board requirement to update a 2009 report on spill response capability.

Since the 2009 assessment, *Marine Hydrocarbon Spill Response Capability Assessment, Jeanne d'Arc Production Operations*[1]*,* there have been significant enhancements to response capability**.** All of the recommendations from the 2009 assessment have been implemented including the continuation of ongoing commitments to improve efficiency in the deployment of Tier 1 equipment and mobilization of Tier 2 resources, to consider new technologies to enhance capability and to monitor and support oil spill response Research & Development.

For this report, response capability was assessed using key elements from the international guidance document *Oil spill preparedness and response: An Introduction, Guidance document for the oil and gas industry, IPIECA-IOGP, 2019*[2] as a framework. For each of the key elements, the Operators were able to demonstrate capability in the form of documentation, inventory lists, and service agreements or arrangements. Capability for each Operator for the key elements is detailed in Sections 4 (Preparedness), 5 (Response) and 6 (Restoration) of the report. Through this assessment, TRIOX has concluded that an appropriate level of response capability exists for each of the key elements assessed in the Newfoundland and Labrador offshore region based on the level of activity.

Opportunities to enhance capability based on recent experience and exercises was also discussed with the Operators as part of this assessment. An important component of continuous improvement in capability is the consideration of lessons learned over time and the actions taken based on these learnings. The learnings from the annual mutual aid Synergy Exercise are evaluated following each exercise, and where applicable, changes to policies, processes or procedures have been made or are being made. Generally, these learnings include the need to improve communications, information sharing, and deployment procedures. Additionally, the Operators are currently working to improve capability with respect to the dispersant approval process, subsea surveillance and monitoring, wildlife response plans, data collection and sharing, and containment and recovery operations.

[1] C-NLOPB, (2009). "Marine Hydrocarbon Spill Response Capability Assessment Jeanne d'Arc Basin Production Operations"[Online]. Available: https://www.cnlopb.ca/wp-content/uploads/sr/oilassrep.pdf
[2] IPIECA, (2019). " Oil spill preparedness and response: An introduction" [Online]. Available: https://www.ipieca.org/resources/good-practice/oil-spill-preparedness-and-response-an-introduction-2019/

2 INTRODUCTION

2.1 Background

The oil and gas industry brings substantial benefits to the Canadian economy and to the Newfoundland and Labrador (NL) region, by directly employing approximately 6,000 people and supporting over 600 local supply/service companies[3]. Within this industry there are currently four active production projects offshore Eastern NL which include: 1) the Hibernia project operated by Hibernia Management and Development Company Ltd. (HMDC) with a Gravity Base Structure (GBS) located approximately 300 km east-southeast of St. John's, NL; 2) the Terra Nova project operated by Suncor Energy with a Floating Production, Storage and Offloading Vessel (FPSO) located 350 kilometres east-southeast of St. John's, NL; 3) the White Rose project operated by Husky Energy with a FPSO located approximately 350 kilometres east of St. John's, NL; and 4) the Hebron project operated by Exxon Mobil Canada Properties (EMCP) with a GBS located 350 kilometres east-southeast of St. John's, NL. Other potential projects that were in different stages of development prior to COVID-19 include the West White Rose Project and the Bay du Nord Project. The West White Rose Project, operated by Husky Energy, would utilize a Concrete Gravity Supported Platform and fixed drilling rig, producing back to the SeaRose FPSO. This project was sanctioned in 2017 and, prior to COVID-19, fabrication was underway with first oil target in 2022, but the project was put on hold in early 2020. The Bay du Nord Project is operated by Equinor Canada Ltd. and has also been deferred. In addition, there are currently nine exploration drilling projects also in various stages offshore Eastern NL[4] [5]. Details on the current offshore activities are included in **Appendix 1.**

Each of these operations are designed with a spill "prevention first" philosophy and incorporate a variety of process and engineering controls to minimize the potential for oil spills, such as comprehensive management systems, and detailed preventative and corrective maintenance routines. Facility and well design minimize potential for releases and backup systems ensure redundancy. If spill response is required, the overall objectives include the health and safety of personnel first, followed by source control and minimizing environmental, cultural, and socio-economic impacts. The Grand Banks Exploration & Production Operators (the Operators) involved in oil exploration, development or production, operating offshore NL are guided by risk management processes and are committed to continuous improvement.

It is the mandate of the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) to interpret and apply the provisions of the *Atlantic Accord* and the *Atlantic Accord Implementation Acts* to

[3] CAPP. Website: https://www.capp.ca/about/capp/

[4] With the ongoing global pandemic, target dates for various projects listed in this report may have been affected as all industries adapt to the necessary changes in operations to protect the health and safety of personnel.

[5] CAPP. Website: https://www.capp.ca/about/capp/

all activities of the Operators and to oversee compliance with those statutory provisions[6]. In the fall of 2008, the C-NLOPB required the producing operators (Hibernia, Suncor Energy and Husky Energy) to undertake an assessment of their hydrocarbon spill response capability, and to report to the C-NLOPB's Chief Conservation Officer (CCO). The results of this assessment are documented in a report titled *Marine Hydrocarbon Spill Response Capability Assessment, Jeanne d'Arc Production Operations*[7] which was completed in 2009 (2009 Assessment Report). Since the release of the 2009 Assessment Report, all response capability recommendations outlined in the report have been implemented, resulting in enhancements to spill response capability in the NL offshore including:

- The purchase of two NorLense 1200-R spill containment boom systems with TransRec 150 skimmers capable of functioning in harsh sea states. These systems are designed for use in the offshore environment; however, like all at-sea operations, there are limitations in equipment performance and at the vessel operation level. Safety of personnel is always the priority and the vessel master makes the final decisions regarding all vessel operations including equipment deployment for oil spill response. The equipment is maintained by the Transport Canada certified spill Response Organization (RO) ECRC in accordance with Original Equipment Manufacturer (OEM) standards. Details on equipment specifications are included in the Operator's Oil Spill Response Plans (OSRP). Figures 4a. and 4b. in **Appendix 2** provide more details and show the Norlense 1200-R boom and the TranRec 150 skimmer systems deployed respectively and response equipment specifications are included in the Operator's OSRPs.
- The installation of mounting systems on offshore support vessels to enable rapid mobilization and deployment of shore-based response equipment. Operators ensure equipment is properly fitted to support vessels using various arrangements for mounting which have been engineered and certified in accordance with Classification Standards. The Operator's OSRP outlines specific configurations for deck anchoring points for suitable oil recovery equipment. **Appendix 2,** Table 3 provides details on support vessel capability.
- Providing information to regulatory agencies on the suitability and effectiveness of chemical dispersants as a spill response option for Jeanne d'Arc Basin offshore Eastern NL. This includes ongoing work that is being done on the document *Net Environmental Benefit Analysis of Dispersant Use for Responding to Oil Spills from Oil and Gas Production Installations on the Newfoundland Grand Banks (August, 2021)* which discusses the potential net environmental benefits of using the currently approved dispersant as part of a response to a crude oil spill from production or drilling facilities on the Grand Banks offshore Newfoundland. This report is designed to support a situation-specific NEBA submission which would be required in order to request approval for dispersant use at the time of a spill. Section 4.4 provides more details.

[6] C-NLOPB. Website: https://www.cnlopb.ca/about/mandate/
[7] C-NLOPB. Website: https://www.cnlopb.ca/wp-content/uploads/sr/oilassrep.pdf

- Improvements in cooperation and communication between offshore operators in relation to spill prevention and response take place through several venues:
    - Following the completion of the 2009 capability report, offshore operators formed a committee to oversee implementation of recommendations stemming from the 2009 report. That committee was disbanded following implementation of the key recommendations in 2009.
    - Offshore operators participate in CAPP's Atlantic Canada Environment & Sustainability Committee, with a mandate to discuss and, where possible, work together on key issues related to environment and sustainability of the Atlantic Canada offshore. Spill prevention and response is a recurring agenda item for the Environment & Sustainability Committee.
    - As the need arises, CAPP's Environment & Sustainability Committee establishes the Oil Spill Prevention & Response Task Force to work on specific issues and/or opportunities. This is an ad hoc task force that comes together as needed and is disbanded following completion of the work plan, reporting to the Environment & Sustainability Committee.
    - Offshore operators also collaborate on Synergy – an annual on-water spill response exercise, with a joint operator steering committee.
- Expanded contractual service agreement between producing operators (Hebron, HMDC, Cenovus, Suncor) and ECRC titled *Offshore Preparedness Program*. This agreement established the consolidation and maintenance of operator owned response equipment caches, the provision of oil spill response equipment training to offshore supply vessel crews (Section 4.8) and annual procedure/capability verification.
- Continued and expanded subscription to international agreements to provide access to oil spill response resources/expertise, well capping and containment technologies, and a global chemical dispersant stockpile (Oil Spill Response Ltd. (OSRL) service(s) memberships).
- Providing support for research initiatives that examine the effects of oil spills and the development of new technologies to enhance response.

These enhancements were presented by CAPP at the C-NLOPB Spill Prevention and Response Forum in St. John's, NL on December 3-4, 2019. The Forum allowed participants to review the lessons learned from spills in the NL offshore between April 2018 and August 2019, and included representatives from regulatory agencies and government departments, oil and gas industry companies, and fishing industry representatives. Presentations are available for review on the C-NLOPB website[8].

2.2 Purpose

The Canadian Association of Petroleum Producers (CAPP) represents Canada's upstream oil and natural gas industry, and advocates for economic competitiveness and safe, environmentally and socially

[8] C-NLOPB. Website: https://www.cnlopb.ca/environment/prevention/

responsible performance. CAPP supports its members, including the Operators, in their efforts to prevent oil spills and improve spill response by enabling and enhancing collaboration. The CAPP report *Collaborating for Safety and Sustainability: A Continuous Improvement Plan, 2020*[9] highlights the need for continuous improvement by increasing understanding and information sharing, and by enhancing performance. Part of this commitment to improvement and to the C-NLOPB includes updating the 2009 Assessment Report. The expectation of the C-NLOPB is that the detailed 2009 Assessment Report would be used as a reference and provide background information for the updated report which would include information on changes to equipment, plans and processes as well as lessons learned since 2009. Importantly, there is also a new international guidance document available from Global Oil and Gas Industry Association for Environmental and Social Issues (IPIECA) and International Association of Oil and Gas Producers (IOGP) that pertains to key elements of oil spill preparedness and response programs. The requirements set by the International Maritime Organization's (IMO) International Convention on Oil Pollution Preparedness, Response and Co-operation Convention (OPRC), ratified by the Government of Canada[10], are aligned with the key elements of response described in this international guidance document. While the key elements from this guidance document are intended for use globally, they were modified slightly to reflect the NL offshore environment including the addition of Response Outside of the Exclusive Economic Zone (EEZ).

Triox Environmental Emergencies (TRIOX) was tasked to provide an updated assessment report examining the spill response capability of the Operators using *Oil spill preparedness and response: An Introduction, Guidance document for the oil and gas industry, IPIECA-IOGP, 2019*[11] (IPIECA-IOGP Guidance Document) as a framework. This report, *Spill Response Capability Assessment 2021, Newfoundland and Labrador Offshore Area,* has been prepared on behalf of CAPP and the Operators in order to meet the C-NLOPB requirements for an updated spill response capability assessment, and to augment the commitment of CAPP and the Operators for continuing improvement. The findings of this report do not supersede any regulatory requirements.

3 ASSESSMENT APPROACH

TRIOX worked with the CAPP project authority who provided directional support to this assessment and with the Operators to review current and planned spill response capabilities and processes. To prepare

[9]Atlantic Canada's Offshore Oil and Gas Industry. "Continuous Improvement Plan" [Online]. Available: http://atlanticcanadaoffshore.ca/collaborating-for-safety/

[10]Government of Canada. "International Convention on Oil Pollution Preparedness, Response, and Cooperation" [Online]. Available: https://www.canada.ca/en/environment-climate-change/corporate/international-affairs/partnerships-organizations/convention-oil-pollution-preparedness-response-cooperation.html

[11]IPIECA, (2019). "Oil spill preparedness and response: An introduction" [Online]. Available: https://www.ipieca.org/resources/good-practice/oil-spill-preparedness-and-response-an-introduction-2019/https://www.ipieca.org/resources/good-practice/oil-spill-preparedness-and-response-an-introduction-2019/

this report, TRIOX reviewed the 2009 Assessment Report and the IPIECA-IOGP Guidance Document. The IPIECA-IOGP Guidance Document provides an international guidance framework for effective oil spill preparedness, response and restoration, and summarizes consensus views on good practice for a range of oil spill preparedness and response topics. To maintain world-class standards in preparedness and response, it is important to look to international benchmarks. This document was therefore used as a model to conduct the capability assessment and the key elements were used to structure this report, CAPP *Spill Response Capability Assessment 2021, Newfoundland and Labrador Offshore Area*.

The Operators provided TRIOX with information on the key topics taken from the IPIECA-IOGP Guidance Document regarding their collective and individual capabilities. Information regarding updates or knowledge gained since 2009 related to the physical environment, oil fate and behaviour modelling, offshore operations and spill response in the NL offshore area was also shared with TRIOX. Additionally, Operator plans for new equipment, preparedness enhancements and the degree to which alternative and emerging technologies may be integrated into preparedness programs to enhance existing capabilities were discussed.

Under regulatory requirements, the Operators must obtain a series of authorizations and approvals including an Operating Licence and an Operations Authorization (OA) preceding any work or activities offshore. This rigorous process also includes developing and submitting an array of plans for approval by the C-NLOPB. Requirements include:

- Development Plan (for development related activities);
- Environmental Assessment (EA);
- Description of the proposed activities, along with prescribed technical details;
- Execution Plan and Schedule;
- Benefits Plan;
- Safety Plan;
- Environmental Protection Plan (EPP);
- Emergency Response/Contingency Plans (ERP/ECP);
- Oil Spill Response Plan (OSRP);
- Financial Requirements;
- Certificate of Fitness (if applicable);
- Declaration of Operator.

Following approval, the C-NLOPB ensures that the Operators follow their plans on an ongoing basis through audits and compliance verification. Because the requirements and approvals apply to all

operators, there are many similarities in the way in which they ensure capability. For this reason, concurrency tables have been used throughout the report to summarize capabilities and reduce duplication. These tables were developed for each key element considered and are organized by participating Operator including BHP, CNOOC International (CNOOC), Equinor, ExxonMobil Canada Properties (EMCP), Hibernia Management and Development Company Ltd. (HMDC), Cenovus Energy (Cenovus) and Suncor Energy (Suncor). It is important to understand that each of the plans listed have either been reviewed and approved by the C-NLOPB, or will be submitted for approval where under development. BHP, CNOOC International and Equinor are not in the production phase. As such, their capability and plans are in various stages of development and relate to exploration activity. The following sections demonstrate the spill capability of the Operators with respect to key elements from the IPIECA-IOGP Guidance Document in the following areas: Section 4 Preparedness; Section 5 Response; and Section 6 Restoration. Section 7 Conclusion provides a summary of the Operators capability, highlights the lessons learned through exercises and response and conveys the Operators future plans for continuing improvement.

4 PREPAREDNESS

4.1 Overview

Being well prepared is essential to a successful and timely response. Several key elements are required to ensure that this preparation is in place. This includes having in-situ response capability to initiate countermeasures, a process for cascading resources to a spill location to ensure adequate capability is available when needed and an incident management system in place to effectively manage the response while maintaining situational awareness. Preparedness also includes conducting a Net Environmental Benefit Analysis (NEBA) or Spill Impact Mitigation Assessment (SIMA) to inform good decision-making, developing contingency plans, identifying sensitivities, engaging stakeholders, and ensuring robust training and exercise programs are in place.

4.2 Tiered Preparedness and Response

Tiered preparedness and response is an established three-tiered structure based on the principle of cascading equipment and resources by integrating local, regional and international capabilities, and is in alignment with the requirements of the OPRC which states that response capabilities shall be established in accordance with potential risk, either individually or through bilateral or multilateral cooperation[11]. This system requires cooperation and partnership between the parties involved and is scalable which helps to avoid equipment redundancy while ensuring appropriate and adequate response resources are always available. The tiered preparedness and response structure must include resources that are appropriate for various spill volumes, the identified risks, and the location and type of environment in which they may be needed. Tiers are not defined quantitatively because there are too many variables to be able to calculate the amount and quantity of resources required to combat a spill of a given volume. The three tier classifications defined by the IOGP-IPIECA Guidance Document are:

- Tier 1: Locally available capability necessary to handle relatively minor spills that can typically be resolved within a few hours or days and/or provide an initial response to larger spills.
- Tier 2: Regional capability in the wider area or country necessary to supplement Tier 1 resources, including general equipment and specialized tools and services, for responses to more significant spills that may continue for several days or weeks.
- Tier 3: National or international capability necessary for responses to major spills that require substantial additional resources due to incident scale, complexity and/or impact potential and which may continue for weeks or months.

The Operators' response capability is based on this three-tiered structure and subject to initial and re-verification by the C-NLOPB through each operator's OA. All Operators meet the requirements for Tier 1, 2 and 3. Although the Tier system operates in the same way for all of the Operators, it should be noted that Suncor Energy is currently not producing or drilling and therefore only have a support vessel in the Terra Nova Field and BHP is in the planning phase of their project. Table 1 summarizes how Operators meet each Tier of Capability. Equipment inventories and an overview of response organizations ECRC, OSRL and the Global Response Network (GRN) are included in **Appendix 2**.

Table 1. Concurrency Table for Tiered preparedness and response

<table>
<tr><th>Operator</th><th>Tier 1 Capability
Local</th><th>Tier 2 Capability
Regional</th><th>Tier 3 Capability
National or International</th></tr>
<tr><td>BHP</td><td rowspan="7">In-situ equipment and resources offshore on the installation/support vessels including containment booms, sorbents, skimmers, tracking devices, sampling kits and PPE

Mutual Emergency Assistance Agreement</td><td rowspan="7">Equipment and resources onshore that can be mobilized to support the offshore response

Offshore Preparedness Program

ECRC Service Agreement and equipment</td><td rowspan="7">ECRC Service Agreement and equipment

ECRC Mutual Aid Agreements with three Canadian ROs (ALERT, PTMS, WCRMC) and the Global Response Network

Agreements with OSRL.</td></tr>
<tr><td>CNOOC</td></tr>
<tr><td>Equinor</td></tr>
<tr><td>EMCP</td></tr>
<tr><td>HMDC</td></tr>
<tr><td>Cenovus</td></tr>
<tr><td>Suncor</td></tr>
</table>

4.3 Incident Management System

An Incident Management System (IMS) establishes the organizational structure of a response using standardized terminology and understanding. An IMS is used to establish incident command and control and to promote coordination among the parties involved. It is scalable and facilitates the integration of

various organizations in a logical and organized manner. Key principals of an IMS include: the use of a single, integrated organization to manage the response; a structured planning cycle; development of an incident action plan; a clear organizational structure for roles and reporting; and flexibility to adjust to the scale of the response.

The Incident Command System (ICS) is an internationally recognized IMS designed to enable effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. This organizational structure ensures a clear chain of command with defined roles that can be expanded or contracted based on the needs of the response effort. A basic organizational chart is depicted in Figure 1 using the colour coding of the Canadian ICS System.

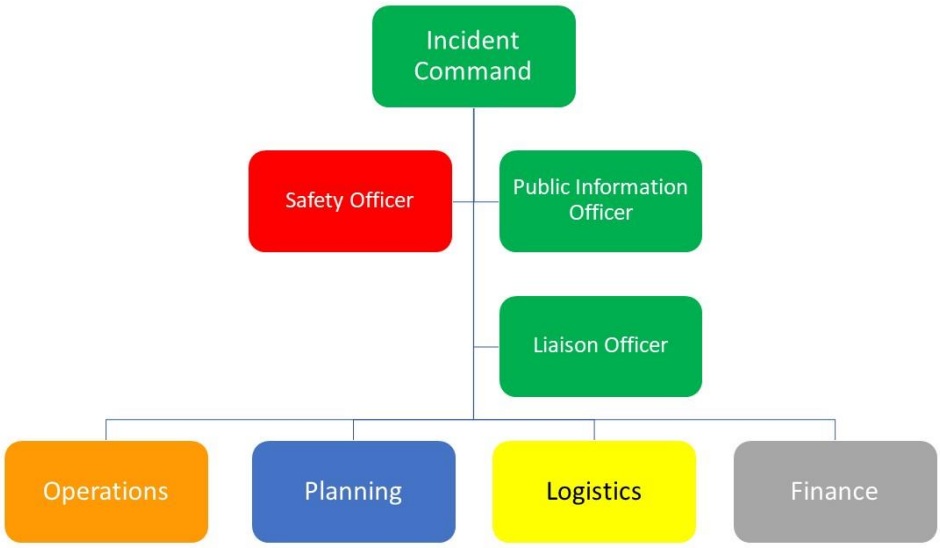

Figure 1. Basic Organizational Chart in ICS

To manage a response, a planning process must be established. Regardless of the size of the incident, the response process begins with incident detection, notification and activation of response personnel and other resources, and establishment of the incident command. For larger/complex incidents, the organizational structure will expand and the planning cycle will be more defined. Response objectives established by Incident Command are accomplished using the Incident Action Plan (IAP) which includes tactics and resource assignments. The incident action planning process helps synchronize operations and ensure that they support incident objectives. The response is typically divided into operational periods, and the Incident Action Plan is reviewed and revised during each operational period to reflect current

objectives, strategies, and response tactics to meet evolving incident conditions. This planning process is known as the Planning P and is depicted in Figure 2[12].

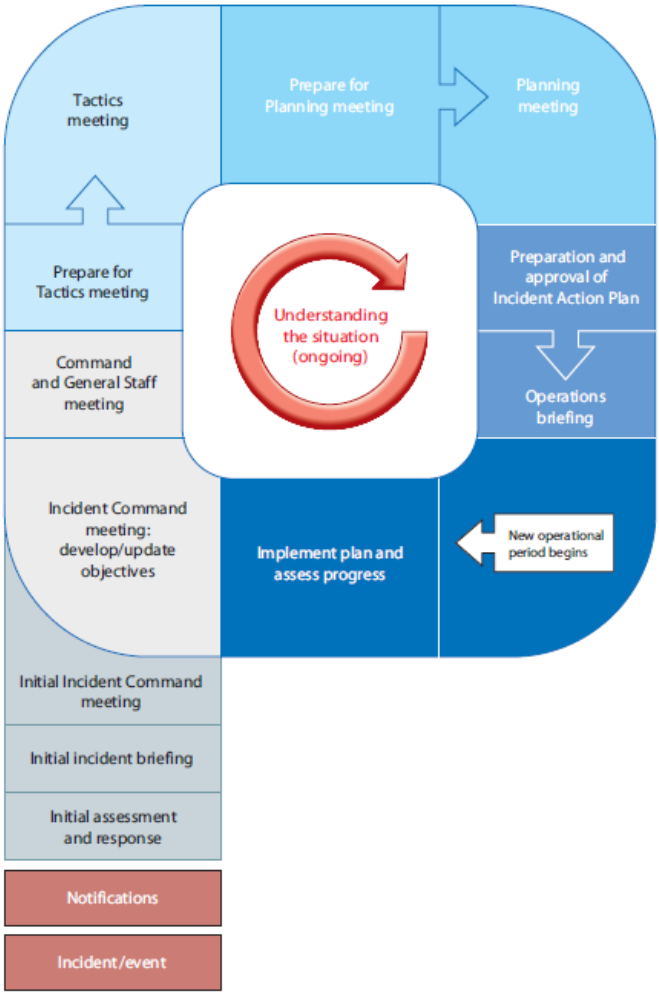

Figure 2. Organizational Cycle of Planning: The Planning "P"

This basic organizational structure and the planning process are fundamental components of ICS. Table 2 reflects that all Operators utilize ICS as an IMS for response and ensure continuing capability and proficiency in ICS through training and exercises. The Canadian Coast Guard and ECRC also use ICS, which helps to facilitate engagement and ease integration and improve communication during a response.

[12] IPIECA-IOGP, (2014). "Incident management system for the oil and gas industry, Good practice guidelines for incident management and emergency response personnel" [Online]. Available: https://www.ipieca.org/resources/good-practice/incident-management-system-ims/

Table 2. Concurrency Table for Incident Management System (IMS)

Operator	Incident Management System
BHP	Incident Command System (ICS)
CNOOC	
Equinor	
EMCP	
HMDC	
Cenovus	
Suncor	

4.4 NEBA/SIMA

Net Environmental Benefit Analysis (NEBA) is an analytical concept or approach that reflects an evolution of thought for conducting analyses to inform decisions on the use of response/mitigation measures by comparing the environmental benefits of potential response tools and developing a response strategy that will reduce the impact of an oil spill on the environment. More recently, the concept of Spill Impact Mitigation Assessment (SIMA) is being advanced internationally to support communication of an approach that also considers a wider range of elements than those considered environmental, such as those that are socio-economic and cultural. The benefits and drawbacks of different response techniques need to be compared to natural attenuation with monitoring, to determine which approach will result in the least overall harm to people and the environment.

In Canada, regulatory requirements for the producing operators to conduct a NEBA relate specifically to dispersant use and for that reason, reference to and discussion of the NEBA/SIMA is also included in **Section 5.5.2 Dispersant: Surface Application**. For this section, and with reference to a broader NEBA/SIMA that considers all spill countermeasures as per the IPIECA-IOGP Guidance Document, producing operators have submitted a NEBA to the C-NLOPB. Additional analysis to help inform decision making during an oil spill response is included in the Operator's OSRPs. Conducting a NEBA/ SIMA is a fundamental component of contingency planning and must consider the current physical environment and resources at risk. In recent years, exploration operators have been required to conduct a SIMA as a condition of the EA process for exploration drilling programs. Table 3 outlines the Operators status with respect to conducting a NEBA/SIMA.

Table 3. Concurrency Table for NEBA/SIMA

Operator	NEBA/SIMA
BHP	SIMA currently being prepared
CNOOC	SIMA approved for current drilling program
Equinor	SIMA approved for current drilling program
EMCP	NEBA submitted to C-NLOPB for review; OSRP
HMDC	NEBA submitted to C-NLOPB for review; OSRP
Cenovus	NEBA submitted to C-NLOPB for review; OSRP
Suncor	NEBA submitted to C-NLOPB for review; OSRP

4.5 Situational Awareness

Situational awareness is key to all stakeholders in a response. The use of tools for surveillance and modelling will inform a Common Operating Picture (COP) which is used by the command staff in decision-making. Having this information available to regulators and stakeholders ensures that everyone is operating from the same perspective and is important for offshore response where it is not feasible for many of the stakeholders/command staff/regulators to be on-site. Several suppliers offer incident management software to document situation awareness. Geographic Information Systems (GIS) and plug-in capability allow operator specific criteria to be displayed during an event and different layers to be turned on and off as appropriate. As part of the daily Situational Report (SITREP), a printout of the COP is provided to the regulatory agency for their knowledge of assets, location of event, oil drift and any affected/observed wildlife. These COP snapshots are also used in the daily briefing with the operational groups on water/air. Access is available to those working within the company to see real time displays and the software has a virtual status board that can be viewed by parties who are provided with a password. Table 4 shows how each Operator has planned to provide situational awareness during a response.

Table 4. Concurrency Table for Situational Awareness

Operator	Situational Awareness
BHP	BHP are evaluating the use of IAP Software as a part of their OSRP development
CNOOC	Currently assessing use of incident management software, internal and external options are being reviewed

Equinor	Internal and International IMT would be mobilized in the event of an incident. These teams would manage situational awareness through stakeholder communications, and the use of a status board as well as incident management software
EMCP	Incident management software
HMDC	Incident management software
Cenovus	Incident management software
Suncor	Currently assessing the use of software for a COP

4.6 Contingency Planning

Oil spill contingency plans are required as a part of the OA process. Contingency plans are developed in accordance with the pertinent regulatory requirements and are based on risk assessments, including information on oil fate and effects, and sensitivity identification, resource availability and environmental conditions. Stakeholder engagement is also a critical component of the planning process. Using this information, response strategies and tactics can be identified based on overall objectives including health and safety and minimizing impacts. Contingency plans also contain information on the potential sources/characteristics of crude oils, which includes oil/products in storage cells and a summary of current oil inventory that has been tested to date. Table 5 lists the contingency plans for each Operator.

Table 5. Concurrency Table for Contingency Planning

Operator	Contingency Planning
BHP	BHP is currently preparing an OSRP and associated Tactical Response Plans. Other contingency plans being prepared include: • Spill Impact Mitigation Assessment • Incident Management Plan • Wildlife Emergency Plan • Ice Management Plan Oil Spill Response BHP is in the process of signing Mutual Emergency Assistance Agreement prior to 2021 Exploration Program
CNOOC	Plans that would be considered contingency plans include: • Atlantic Canada Emergency Response Plan • ICS Initial Emergency Response Procedure

	• ICS Expanded Response Procedure • Atlantic Canada HaBERS • Atlantic Canada Adverse Weather Procedural Aid • Human Resources Emergency Response Plan • Corporate Crisis Management Plan • Offshore Spill Response Plan • Offshore Spill Response Manual • Source Control Contingency Plan • Blowout Contingency Plan Procedural Aid • Environmental Protection Plan • Wildlife Response Plan • Atlantic Canada Ice Management Plan
Equinor	An Oil Spill Response Plan, Wildlife Response Plan and Environmental Protection and Compliance Monitoring Plan were submitted with the OA application Also addressed within the EIS submitted to Canadian Environmental Assessment Agency (CEAA) Mutual Emergency Assistance Agreement
EMCP	Plans that would be considered contingency plans and are referenced in the Emergency Response Plan (ERP) include: • Oil Spill Response Manual • Oil Spill Response Plan • Wildlife Response Plan • Waste Management Plan • Vessel Decontamination Plan • Hebron Emergency Response Plan Checklists • Hebron Emergency Response Well Intervention Reference Document • Hebron Environmental Compliance Monitoring Plan • Mutual Emergency Assistance Agreement

HMDC	Plans that would be considered contingency plans and are referenced in the Emergency Response Plan (ERP) include: • Oil Spill Response Manual • Oil Spill Response Plan • Wildlife Response Plan • Waste Management Plan • Vessel Decontamination Plan • Hibernia Emergency Response Plan Checklists • Hibernia Emergency Response Well Intervention Reference Document • Hibernia Environmental Compliance Monitoring Plan • Mutual Emergency Assistance Agreement
Cenovus	Plans that would be considered contingency plans include: • Incident Coordination and Response Management Plan • Oil Spill Response Plan • Atlantic Region Source Control Response Plan • On Deck Spill Response Plan • Shipboard Oil Pollution Emergency Plan (SOPEP) • Wildlife Response Plan • Waste Management Plan • SeaRose FPSO Emergency Response Plan • SeaRose FPSO HaBERS Procedure • Environmental Protection and Compliance Monitoring Plan (EPCMP) - SeaRose FPSO Production Operations • Mutual Emergency Assistance Agreement
Suncor	Plans that would be considered contingency plans include: • Oil Spill Response Plan • Business Process for Emergency Management • Emergency Management Coordination Plan • MODU Blowout Contingency Plan

	• Source Control Response Plan • Terra Nova Blowout Contingency Plan • Terra Nova FPSO Contingency Plan • Terra Nova FPSO Emergency Response Plan • Terra Nova FPSO Shipboard Oil Pollution Emergency Plan (SOPEP) • Environmental Protection Plan – Production • Environmental Protection Plan – Drilling, Completions and Intervention • Terra Nova Safety Plan • East Coast Safety Plan • Suncor Wildlife Response Plan • East Coast Seabird Procedures • Mutual Emergency Assistance Plan

4.7 Sensitivity Mapping

The identification and location of sensitivities, or resources at risk, is a key component of contingency planning. This includes areas or resources with particular ecological, socio-economic, or cultural importance, such as biodiverse or sensitive ecosystems, endangered species or other critical habitats, key natural resources, recreational or commercial activities, etc., which are at risk of encountering spilled oil. Understanding the physical environment of the resources at risk is also a component of sensitivity mapping, which are extensively described in each Operator's EIS and other documents submitted to obtain/renew an OA. Environmental Assessments, SIMAs and updates for operational activities also require the submission of sensitivity mapping information. All Operators have access to the ECRC sensitivity mapping resources through their service agreements if required. Table 6 shows how each operator demonstrates capability with respect to sensitivity mapping information for their project.

Table 6. Concurrency Table for Sensitivity Mapping

Operator	Sensitivity Mapping
BHP	BHP will rely on their EIS and SIMA to identify sensitive areas
CNOOC	This was done within the SIMA, and within the EIS and subsequent Information Requests
Equinor	This was done within the SIMA, and within the EIS and subsequent Information Requests
EMCP	All sensitivity mapping is submitted as part of the EA. Company SME's, broader Regional Response Team and 3rd party contractor(s) assist in trajectory and fate of oil spill

HMDC	All sensitivity mapping is submitted as part of EA Company SME's, broader Regional Response Team and 3rd party contractor(s) assist in trajectory and fate of oil spill
Cenovus	Modeling (Submissions accepted by C-NLOPB) • Decision 2001.01: Application for Approval, White Rose Canada-Newfoundland Benefits Plan and White Rose Development Plan • Potential conditions under the Canadian Environmental Assessment Act, 2012 • White Rose Extension Project Husky Oil Operations Limited, *Canadian Environmental Assessment Act* (S.C. 1992, c. 37) Screening Report Actual data collection from deployed and monitored position transmitting drift tracker buoys demonstrate high correlation with modeling submissions
Suncor	Data collection through seabird monitoring from vessels and installations, tracker buoys, vessel crews, etc. Support for independent research through ESRF, Energy Research & Innovation NL (formerly Petroleum Research NL), etc. Spill modelling for EA Environmental Effects Monitoring programs

4.8 Training

The Atlantic Canada Offshore Petroleum Training and Qualifications Committee (TQC) was formed as a collaborative, multi-stakeholder committee by the regulatory authorities, offshore petroleum industry operators and drilling contractors to meet the intentions set out in the *Accord Acts* for an Offshore Oil and Gas Training Standards Advisory Board. The objectives of the TQC are to support and oversee the development of an offshore Atlantic Canada training standard that outlines the minimum qualifications and certified training required of individuals working in Atlantic Canada's offshore petroleum industry. They also publish the *Atlantic Canada Offshore Petroleum Industry Standard Practice for the Training and Qualifications of Personnel* (Standard Practice), a document that is reviewed and updated regularly by the TQC. The most recent version was published in April 2020[13]. In addition to meeting minimum training requirements outlined in the Standard Practice, the Operators conduct their own training programs and/or contract others to supplement training specific to emergency response.

[13] Atlantic Canada Offshore Petroleum Training and Qualifications Committee, (2020). "Atlantic Canada Offshore Petroleum Standard Practice for the Training and Qualifications of Offshore Personnel" [Online]. Available: http://atlanticcanadaoffshore.ca/wp-content/uploads/2020/05/2020-edition-of-the-Standard-Practice-TQC-Ratification-Copy.pdf

Training is necessary to ensure that response personnel are capable in their roles and can function safely and effectively during a response. An oil spill training program should follow the training cycle, which includes training development, delivery, evaluation, and assessment, and should align with the policies, contingency plans and the IMS being used by the Operator. Training is conducted on a regular basis to inform personnel on their roles and responsibilities during a response and Table 7 lists the training each operator provides/supports relating to spill response. ECRC provides training to all Operators for Tier 1 response through the Offshore Operators Tier 1 Training Program. This includes training on the deployment of equipment from the support vessels that are required to participate in Single Vessel Side Sweep (SVSS) training each year (both crews). Oil spill response equipment is deployed and retrieved under the guidance of ECRC responders. Components of this training also include wildlife observations, water sampling, oil observations and oil sampling. Training on dispersant use, efficacy testing, and application from a vessel is currently under development and delivery is being planned for the near future.

Table 7. Concurrency Table for Oil Spill Training

Operator	Training
BHP	BHP will use a combination of internal and external training in preparedness such as ICS training, TQC - Atlantic Canada Offshore Petroleum Standard Practice for the Training and Qualifications of Offshore Personnel Standard, and IMT position specific training ECRC – Offshore Operators Tier 1 Training Program Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel
CNOOC	Internal training matrix: • ICS 100, 200, 300, etc. Spill Response Tabletop IMT exercises (internal) ECRC – Offshore Operators Tier 1 Training Program Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel
Equinor	Internal training matrix: • ICS 100, 200, 300, etc. • Table top IMT Global exercises (internal) ECRC – Offshore Operators Tier 1 Training Program

	Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel
EMCP	All vessels conducting standby functions at Hebron are required to participate in SVSS training each year (both crews) where Oil Spill Response Equipment is deployed and retrieved under the guidance of ECRC responders ECRC – Offshore Operators Tier 1 Training Program Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel
HMDC	All vessels conducting standby functions at Hibernia are required to participate in SVSS training each year (both crews) where Oil Spill Response Equipment is deployed and retrieved under the guidance of ECRC responders ECRC – Offshore Operators Tier 1 Training Program Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel
Cenovus	All vessels conducting standby functions are required to participate in SVSS training each year (both crews) where oil spill response equipment is deployed and retrieved under the guidance of ECRC responders ECRC – Offshore Operators Tier 1 Training Program Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel
Suncor	All vessels conducting standby functions with Suncor are required to participate in SVSS training each year (both crews) where Oil Spill Response Equipment is deployed and retrieved under the guidance of ECRC responders Oil Spill Response Plan, Section 11 Business Process for Emergency Management, Section 4.1 Most of Suncor documentation outlines some type of training requirements associated with the procedure/plan ECRC – Offshore Operators Tier 1 Training Program Standard Practice - Atlantic Canada Offshore Petroleum –Standard Practice for the Training and Qualifications of Offshore Personnel

4.9 Exercises

Exercises augment training by providing opportunities for response personnel to practice their roles, develop their skills and test the effectiveness of plans and procedures. Exercises give stakeholders an

opportunity to engage with each other during a mock spill/drill, which helps to strengthen relationships and improve communications among the regulatory agency, industry partners, contractors, response teams and other stakeholders. All Operators are required to outline their exercise program when obtaining their OA, and they all participate in training and drills that are executed as a component of the Tier 1 Training Program.

The Operators also plan, execute, and take turns leading the annual Synergy Exercise. One of the producing operators hosts this joint oil spill response exercise in collaboration with the other operators and explorers. The exercise is designed to demonstrate the safe and effective deployment and retrieval of Tier 2 oil spill response equipment in cooperation with Mutual Aid partners and ECRC. This allows the Operators an opportunity to test their emergency response systems and equipment with Mutual Aid partners and the RO and to share information through information sessions. The support vessels allow observers to observe the exercise and gain a better understanding of how the offshore oil spill response program works. Feedback is received from all participants/observers and if applicable, is incorporated into the following year's exercise. Participants in this exercise typically include the Operators, regulators, government officials, fishing industry representatives and ECRC. Any deficiencies observed during this exercise are provided to the C-NLOPB for review, and where required, revisions are made to the applicable OSRP and lessons learned are incorporated into the Operator's Management System. While the Synergy Exercise is usually held on-water, the 2019 Synergy Exercise was a table-top exercise designed to bring together Operators and regulatory stakeholders to improve incident management structures, procedures and communications based on incident management best practices and recent experience. The 2020 Synergy Exercise was held on-water, however the number of participants was limited due to COVID-19 and public health and social distancing requirements. Table 8 lists the exercise programs for each Operator. A summary of learnings from the Synergy Exercises between 2008 and 2019 is included in **Section 7.2**.

Table 8. Concurrency Table for Oil Spill Exercises

Operator	Exercises
BHP	BHP is currently preparing exercise requirements as part of the Oil Spill Response Plan OA requirements ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program
CNOOC	OA requirements

	ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program
Equinor	OA requirements ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program
EMCP	Hebron conducts weekly exercise for emergency response; part of the ER exercise program includes spill response exercises OA requirements ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program
HMDC	HMDC conducts weekly exercise for emergency response; part of the ER exercise program includes spill response exercises OA requirements ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program
Cenovus	Incident Coordination and Response Management Plan, Section 10 Offshore Installation Emergency Drills and Exercises (Standard) OA requirements ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program

Suncor	Oil Spill Response Plan, Section 11 Business Process for Emergency Management, Section 4.1 OA requirements ECRC – Operator's Offshore Preparedness Program. (Practical drills conducted as a component of the Tier 1 Training Program) Offshore Operators Annual On-water Oil Spill Countermeasures Synergy Exercise Program

4.10 Stakeholder Engagement

Stakeholder engagement is vital to oil spill preparedness. Stakeholders provide important knowledge and information that inform the planning process as well as decision making during response. Stakeholders may be varied and can include oil companies, rig or vessel owners/operators, government agencies at all levels, international organizations, fishing associations, environmental groups, Indigenous Groups (IG) and local communities. Stakeholder and IG engagement are built into the regulatory requirements for Operators seeking project approvals and is a component of the EA process and the Regional Assessment (RA) process. A unique model has been developed in NL to facilitate engagement and effective communication between the offshore fishing and petroleum sectors through the liaison organization One Ocean, established by the fishing and petroleum industries in 2002. One Ocean provides a neutral and practical forum to enhance sustainable coexistence and facilitate communication, understanding, and cooperation with equal representation from both sectors. An objective of One Ocean is to assist the fishing and petroleum industries in understanding each sector's operational activities while providing a conduit for effective communication.[14] All Operators are engaged with the fishing industry through the One Ocean Protocol and other stakeholders through the EA process. Table 9 lists the processes Operators use for stakeholder engagement.

Table 9. Concurrency Table for Stakeholder Engagement

Operator	Stakeholder Engagement
BHP	BHP will continue to engage stakeholders in the EA process and plan to engage on the Oil Spill Response Plan development and exercise program EIS Requirements One Ocean Oil Spill Communications Protocol

[14]M.M. Rustaad, 2011. "One Ocean" from Journal of Ocean Technology [Online]. Available: http://www.oneocean.ca/pdf/One_Ocean_Article_JOT.pdf

	Indigenous Groups and Fishers Communication Plan Linkage with academia, government researchers and consultants for various research and development programs i.e. Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc. Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise
CNOOC	CNOOC Exercises EIS Requirements One Ocean Oil Spill Communications Protocol Fishers Communication Plan, including IGs Linkage with academia, government researchers and consultants for various research and development programs ie. Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc. Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise
Equinor	Equinor Exercises (required prior to spudding each well) EIS Requirements One Ocean Oil Spill Communications Protocol Fishers Communication Plan, including IGs Linkage with academia, government researchers and consultants for various research and development programs i.e., Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc.

	Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise
EMCP	EMCP Exercises EIS Requirements One Ocean Oil Spill Communications Protocol Fishers Communication Plan, including IGs Linkage with academia, government researchers and consultants for various research and development programs i.e., Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc. Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise
HMDC	HMDC Exercises EIS Requirements One Ocean Oil Spill Communications Protocol Fishers Communication Plan, including IGs Linkage with academia, government researchers and consultants for various research and development programs i.e., Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc. Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise
Cenovus	EIS Requirements One Ocean Oil Spill Communications Protocol

	Fishers Communication Plan, including IGs Linkage with academia, government researchers and consultants for various research and development programs i.e., Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc. Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise
Suncor	Involvement of stakeholders in Suncor and industry wide exercises EIS Requirements One Ocean Oil Spill Communications Protocol Fishers Communication Plan, including IGs Linkage with academia, government researchers and consultants for various research and development programs i.e., Environmental Studies Research Fund (ESRF) Engagement with IG regarding offshore oil and gas projects, oil spill response preparedness, exercises, actual events, etc. Development of various plans and procedures involve engagement with various stakeholder groups including contractors, oil spill response organizations, government departments and agencies, etc. Annual Synergy Exercise

5 RESPONSE

5.1 Overview

While industry's focus is on prevention, the Operators must also maintain spill response capability for both batch spills and continuous releases. The primary concern during a response is always the health and safety of personnel, followed by source control and minimizing impacts to the environment and resources at risk. Surveillance and modelling of oil location and movement, oil behaviour, and wildlife monitoring will inform decision making when setting response priorities and strategies. When selecting response techniques, the net environmental benefit must be considered for achieving a safe, effective

response with the least impact. Although the likelihood of shoreline impact is small, it is possible under certain conditions and therefore a shoreline response should also be considered including allowances for Shoreline Clean-up and Assessment Technique (SCAT) surveys and shoreline treatment. Other key elements of response include waste management and wildlife response. Because there is also the risk of a spill occurring outside of the Exclusive Economic Zone (EEZ) for some projects, or of oil migrating outside of the EEZ, the Operators also have to consider how they will respond in such a situation.

5.2 Oil Spill Responder Health and Safety

The health and safety of personnel is always the priority in spill response. The environmental conditions in the offshore can be challenging and the well-being of people must not be compromised for any spill operations, including training, exercising or response. Comprehensive management systems are used by the Operators to manage Environment, Health and Safety (EH&S) at all levels of the organization and ensure compliance to regulations. The aspects of these 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 also has the authority to shut down operations that are deemed unsafe. Health and safety is also a key component of the Operator's Offshore Preparedness Program (see **Section 2.1**) which is comprised of vessel-based (Tier 1) response equipment maintenance and inventory checks, shore-based (Tier 2) oil spill response equipment maintenance and storage, training of crew members on offshore support vessels and training of response contractors. ECRC has a rigorous Loss Control Program that provides for the health and safety of ECRC personnel, as well as minimizing the loss of its resources. This program promotes an environment in which loss control becomes a daily activity and concern, creates awareness and assists in the protection of ECRC's personnel and resources, ensuring they remain in a state of readiness[15]. OSRL also has a rigorous health and safety program and has adopted an integrated risk-based management system in accordance with OHSAS 18001 (Safety), ISO 9001 (Quality) and ISO 14001 (Environment) standards[16]. The support vessels also have their own health and safety management systems including risk assessments and Job Safety Analyses (JSA). Support vessel captains make decisions on the safe deployment of response equipment during training sessions, exercises and response. Vessel captains must assess a wide variety of factors to determine if equipment can be deployed safely.

Table 10 summarizes the various Health and Safety programs that are used by the Operators to ensure the safety of oil spill responders.

Table 10. Concurrency Table for Oil Spill Responder Health and Safety

Operator	Oil Spill Responder Health and Safety

[15] ECRC, (2020). "Health and Safety" [Online]. Available: http://www.ecrc-simec.ca/en/about/health-safety/
[16] OSRL, (2020). "Health, Safety, Environment and Quality" [Online]. Available: https://www.oilspillresponse.com/about-osrl/hseq/

BHP	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan that is currently being prepared BHP will utilize Internal HSE Management system and Contractor owned facility management systems to provide direction for the health and safety of responders ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs (Atlantic Towing, DOF, Secunda, Maersk, etc.) OSRL Health and Safety Program
CNOOC	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan that is currently being prepared ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs OSRL Health and Safety Program
Equinor	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan. ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs (Atlantic Towing, DOF, Secunda, Maersk, etc.) OSRL Health and Safety Program
EMCP	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs (Atlantic Towing, DOF, Secunda, Maersk, etc.) OSRL Health and Safety Program

HMDC	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs (Atlantic Towing, DOF, Secunda, Maersk, etc.) OSRL Health and Safety Program
Cenovus	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs (Atlantic Towing, DOF, Secunda, Maersk, etc.) OSRL Health and Safety Program
Suncor	Health and Safety is considered as a part of all contingency plans, including the Oil Spill Response Plan ECRC Tier 1 Training Program ECRC Loss Control Program ECRC JSAs for Tier 1 and Tier 2 Equipment deployment Support Vessel Risk Assessments and JSAs (Atlantic Towing, DOF, Secunda, Maersk, etc.) OSRL Health and Safety Program

5.3 Source Control

A key objective in any spill response is to safely control the source of the release as quickly as possible. Source control from vessels and installations is covered in their respective contingency plans but Operators must also be prepared to manage source control for subsea wells. This includes plans and resources to respond using methods such as blowout preventer (BOP) activation, capping, containment and relief well drilling. Redundant BOP activation uses a remotely operated underwater vehicle (ROV) with the help of a subsea intervention kit to close the BOP. Subsea capping involves installing a capping stack onto the incident well and then closing it to shut off the flow. In the unlikely event of a blowout, operators would try to shut-in the well using other methods. Under the OA process, the Operators are required to have plans to utilize these types of response methods, the capability to drill relief wells and agreements in place with global response organizations to access capping equipment. Through

agreements with OSRL and the GRN, the Operators can establish access to equipment for subsea response including well capping and containment equipment, subsea incident response toolkits, and offset installation kits. Four capping systems, including two 18 3⁄4" 15k stacks and two 7 1⁄16" 10k stacks (with ancillary equipment) that are transportable by sea and/or air are available for a variety of metocean conditions. OSRL is part of a global network of subsea specialists providing an integrated capability for response planning and emergency response. More details are provided in **Appendix 2** Section 3. Table 11 lists the approved plans used by each Operator for source control of subsea wells.

Table 11. Concurrency Table for Source Control

Operator	Source Control
BHP	BHP is currently preparing their source control plan
CNOOC	Source Control Contingency Plan GDC Blowout Contingency Plan Procedural Aid
Equinor	Source Control ERP
EMCP	Hebron Well Intervention Reference Document identifies equipment and processes used in the event of a well integrity issue
HMDC	HMDC Well Intervention Reference Document identifies equipment and processes used in the event of a well integrity issue
Cenovus	Atlantic Region Source Control Response Plan
Suncor	MODU Blowout Contingency Plan Source Control Response Plan Terra Nova Blowout Contingency Plan

5.4 Surveillance and Modelling

The information obtained through surveillance and modelling is critical for achieving and maintaining situational awareness during a response. Surveillance by aircraft, vessel and satellite provide views of the spill location and oil movement. Aerial and vessel surveillance can provide a platform for Subject Matter Experts (SME) to access the spill location to assess spill volumes, movement and behaviour, direct response operations, or to monitor response tactic efficacy, safety, and wildlife. Improvements have been made in surveillance technology since the release of the 2009 Assessment Report. The Operators have agreements in place with contractors to provide aerial surveillance including PAL Aerospace aircraft with Intelligence, Surveillance and Reconnaissance (ISR) packages that are available 24/7/365 for spill

response, monitoring and assessment and are able to respond effectively in all conditions including fog[17]. Drifter buoys are also now used to monitor oil spills and are designed to drift with the slick allowing it to be tracked. These buoys are on board the support vessels in the Tier 1 Kits and can be deployed at the time of the spill from the deck **(Appendix 2)**. The PAL Dash-8 aircraft can also drop drifter buoys to monitor surface drift. Additional monitoring is available through Environment and Climate Change Canada's participation in the Integrated Satellite Tracking of Pollution (ISTOP) program, which uses a variety of satellite imagery to monitor the waters and improve the response to the pollution in any weather, day or night and through clouds, smoke and haze. Some support vessels are fitted with radar oil detection capability providing in-situ surveillance. Trajectory modelling can help to predict and track oil movement and behavior and is used during the planning process and during a response. These models require accurate inputs such as weather and tidal data to be effective. The Operators maintain contracts for these services.

The Operators continue to participate the research and development of new technologies for surveillance and modelling, including the suitability of drones/Unmanned Aircraft Systems and blimps for use in the offshore environment. Table 12 lists the Operators capability for surveillance and modelling.

Table 12. Concurrency Table for Surveillance and Modelling

Operator	Surveillance and Modelling
BHP	BHP is currently evaluating surveillance and modelling requirements as a part of their Oil Spill Response Plan development
CNOOC	Oil Spill Response Plan Pal Aerospace (Primary) OSRL (Secondary) Integrated Satellite Tracking of Pollution (ISTOP) Program via Environment and Climate Change Canada Bridge Watch Oil Surveillance Capabilities on support vessels Drifter Buoys
Equinor	Oil Spill Response Plan Pal Aerospace (Primary) OSRL (Secondary)

[17] PAL Aerospace, (2020). "Airborne ISR Services and Programs" [Online]. Available: https://palaerospace.com/en

	Integrated Satellite Tracking of Pollution (ISTOP) Program via Environment and Climate Change Canada Bridge Watch Oil Surveillance Capabilities on support vessels Drifter Buoys
EMCP	EMCP (Hebron) uses several inputs for creating the COP including C-Core satellite imagery, fixed and rotary wing flights, on vessel and adjacent platform/installation observations. Weather forecasts from government and private companies are all compiled to create a predictive model. EMCE (Hebron) also uses Subject Matter Experts (SME') to back-cast allowing a theoretical "minute zero" picture Pal Aerospace (Primary) OSRL (Secondary) Integrated Satellite Tracking of Pollution (ISTOP) Program via Environment and Climate Change CanadaDrifter Buoys
HMDC	HMDC uses several inputs for creating the COP including C-Core satellite imagery, fixed and rotary wing flights, on vessel and adjacent platform/installation observations. Weather forecasts from government and private companies are all compiled to create a predictive model. HMDC also uses Subject Matter Experts (SME') to back-cast allowing a theoretical "minute zero" picture Pal Aerospace (Primary) OSRL (Secondary) Integrated Satellite Tracking of Pollution (ISTOP) Program via Environment and Climate Change Canada Bridge Watch Oil Surveillance Capabilities on support vessels Drifter Buoys
Cenovus	Cenovus uses several inputs for creating the COP including C-Core satellite imagery, fixed and rotary wing flights, on vessel and adjacent platform/installation observations. Weather forecasts from government and private companies are all compiled to create a predictive model. Pal Aerospace (Primary) OSRL (Secondary) Integrated Satellite Tracking of Pollution (ISTOP) Program via Environment and Climate Change Canada Bridge Watch Oil Surveillance Capabilities on support vessels

	Rutter Oil Radar on Charter vessels Bridge Watch Oil Surveillance Capabilities visual with Navaid support (Chartplotter)
Suncor	Pal Aerospace (Primary) OSRL (Secondary) Integrated Satellite Tracking of Pollution (ISTOP) Program via Environment and Climate Change Canada Bridge Watch Oil Surveillance Capabilities on support vessels Drifter Buoys Cougar Helicopters[18]

5.5 Response Techniques

The response techniques considered for this assessment include containment and recovery, and alternative response measures (ARMs) which, in Canada, include dispersants and other spill treating agents (STAs), such as surface-washing agents, and in situ burning (ISB); however, ARMs require regulatory approval for use. The Operators have a variety of resources available to conduct these operations, including equipment stored on offshore installations and supply vessels, equipment stored and maintained by ECRC, and National and International resources including equipment that can be made available through ECRC Mutual Aid agreements with three other Canadian RO's, OSRL and the GRN.

5.5.1 At-Sea Containment and Recovery

The Operators purchase and maintain containment and recovery equipment that is designed for use in the offshore environment; however, like all at-sea operations, there are limitations at the vessel operation level. Safety of personnel is always the priority and the vessel master makes the final decisions regarding all vessel operations in this challenging environment including equipment deployment for oil spill response, training and exercises. All Operators maintain equipment for at-sea containment and recovery on board support vessels and installations for immediate deployment on-site. This includes sorbents, boom, recovery devices and tracking buoys. Additional equipment is located on shore in St. John's, NL if required and a complete list of equipment is available in the Operator's OSRP and/or Tactical Response Plans. The plans for containment and recovery for each Operator are listed in Table 13. An equipment inventory is also presented in **Appendix 2**.

[18] Cougar Helicopters. Website: http://www.cougar.ca/

Table 13. Concurrency Table for At-sea containment and recovery

Operator	At-sea containment and recovery
BHP	BHP is currently preparing their Oil Spill Response Plan and associated Tactical Response Plans
CNOOC	Outlined in Oil Spill Response Plan and Oil Spill Response Manual
Equinor	Outlined in Oil Spill Response Plan and Oil Spill Response Manual Plans are used as the basis of operations. Daily operational plans are created using ICS planning structure allowing for review and endorsement by the Incident Commander prior to the day of deployment. ECRC, as the certified Oil Spill Response Organization, is utilized for both operational recovery and expertise in planning tasks
EMCP	Outlined in Oil Spill Response Plan and Oil Spill Response Manual Plans are used as the basis of operations. Daily operational plans are created using ICS planning structure allowing for review and endorsement by the Incident Commander prior to the day of deployment. ECRC, as the certified Oil Spill Response Organization, is utilized for both operational recovery and expertise in planning tasks
HMDC	Outlined in Oil Spill Response Plan and Oil Spill Response Manual Plans are used as the basis of operations. Daily operational plans are created using ICS planning structure allowing for review and endorsement by the Incident Commander prior to the day of deployment. ECRC, as the certified Oil Spill Response Organization, is utilized for both operational recovery and expertise in planning tasks
Cenovus	Outlined in Oil Spill Response Plan Plans are used as the basis of operations. Daily operational plans are created using ICS planning structure allowing for review and endorsement by the Incident Commander prior to the day of deployment. ECRC, as the certified Oil Spill Response Organization, is utilized for both operational recovery and expertise in planning tasks
Suncor	Outlined in Oil Spill Response Plan Plans are used as the basis of operations. Daily operational plans are created using ICS planning structure allowing for review and endorsement by the Incident Commander prior to the day of deployment. ECRC, as the certified Oil Spill Response Organization, is utilized for both operational recovery and expertise in planning tasks

5.5.2 Dispersant: Surface Application

The *Canada Oil and Gas Operations Act*, the *Canada-Nova-Scotia Offshore Petroleum Resources Accord Implementation Act*, and the *Canada–Newfoundland and Labrador Atlantic Accord Implementation Act*

establish the legislative framework to allow the use of STAs in the event of an offshore oil spill. Approval for STA use is contingent on several factors including the determination by the CCO at the C-NLOPB that "the use of the spill-treating agent is likely to achieve a net environmental benefit."

In August 2021, CAPP submitted a *Net Environmental Benefit Analysis of Dispersant Use for Responding* to *Oil Spills from Oil and Gas Facilities on the Newfoundland Grand Banks* (the Grand Banks NEBA) to the C-NLOPB on behalf of the producing operators in the region. The C-NLOPB is reviewing the Grand Banks NEBA. The Grand Banks NEBA was originally prepared and submitted in 2013, prior to the establishment of regulations to allow the use of spill treating agents in Canada's offshore. As such, the document was meant to demonstrate that crude oil from producing operations on the Grand Banks is dispersible and outline high level conditions for dispersant use, including time windows, environmental conditions and some scenarios where dispersant use may be a viable response option. Since the submission of the original document, a regulatory framework for dispersant use was developed. A scenario specific NEBA is required at the time of a spill to analyze whether the use of dispersant will have a net environmental benefit. The Grand Banks NEBA will be used as a support document to the scenario specific NEBA as it demonstrates the conditions under which each operator's crude oil is dispersible. Operators have/will include their scenario specific NEBA template as part of their OSRPs.

Exploration projects approved under CEAA 2012 are required to produce a SIMA or NEBA to identify spill response options that would be implemented in the case of a spill to provide for the best opportunities to minimize environmental consequences, and provide it to the Board for review prior to the start of the drilling program. They would also conduct a real-time SIMA in the event of a spill. The use of dispersant would follow the same process as described above.

At this time, there are two products included in the *Regulations Establishing a List of Spill-treating Agents (Canada Oil and Gas Operations Act)*, a dispersant (Corexit EC9500A) and a surface-washing agent (Corexit EC9580A), that are acceptable for use in the event of an oil spill from an offshore facility or during drilling operations, if several conditions are met. Cenovus retains 50 cubic meters of Corexit 9500A in storage. This inventory can be accessed via the mutual Emergency Assistance Agreement and Cenovus is working with the other Operators to transition to a sharing agreement. ECRC also maintains an inventory of surface washing agent Corexit EC9580A. Additionally, the Operators have, or can establish, access to the Global Dispersal Stockpile maintained by OSRL. The Operators have currently included surface application of dispersant in their OSRPs. Training on dispersant use, efficacy testing, and application from a vessel is currently under development and delivery is being planned for 2021. Table 14 shows the how each Operator has addressed dispersant use.

Table 14. Concurrency Table for Dispersant – Surface Application

Operator	Dispersant – Surface Application

BHP	BHP is currently preparing their SIMA, Oil Spill Response Plan and associated Tactical Response Plans
CNOOC	Requires regulatory approval, however it is addressed in the Offshore Spill Response Plan, SIMA submitted
Equinor	Requires regulatory approval, however it is addressed in the SIMA
EMCP	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan
HMDC	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan
Cenovus	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan
Suncor	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan

5.5.3 Dispersant: Subsea Application

The Operators have currently included subsea application of dispersant in their plans however, due to the need for regulatory approval, this varies. The Operators are currently working with the C-NLOPB to further define the approval process for the use of dispersant (see Section 4.4 NEBA/SIMA). Table 15 shows how each Operator has addressed subsea dispersant use.

Table 15. Concurrency Table for Dispersant – Subsea Application

Operator	Dispersant – Subsea Application
BHP	BHP is currently preparing their Oil Spill Response Plan, SIMA and Tactical Response Plans
CNOOC	Addressed in SIMA, requires regulatory approval
Equinor	Addressed in SIMA, requires regulatory approval
EMCP	Requires regulatory approval
HMDC	Requires regulatory approval
Cenovus	Atlantic Region Source Control Response Plan, requires regulatory approval
Suncor	Source Control Response Plan, requires regulatory approval

5.5.4 Controlled In-Situ Burning (ISB)

The Operators consider ISB within their EIS and have currently included controlled ISB in their OSRPs however, there is need for regulatory approval to utilize this technique during a response. (see Section

4.4 NEBA/SIMA). The Operators continue to monitor developments in the research and regulatory approval for the use of ISB for the NL offshore environment. Table 16 shows how each Operator has addressed controlled in-situ burning.

Table 16. Concurrency Table for Controlled In-Situ Burning

Operator	Controlled In-Situ Burning
BHP	BHP is currently preparing their Oil Spill Response Plan, SIMA and Tactical Response Plans Requires regulatory approval EIS
CNOOC	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan EIS
Equinor	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan EIS
EMCP	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan EIS
HMDC	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan EIS
Cenovus	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan EIS
Suncor	Requires regulatory approval, however it is addressed in the Oil Spill Response Plan EIS

5.6 Shoreline Response

The requirement for a shoreline response is unlikely based on the predictive trajectory modeling results and the paths of the deployed tracker buoys, however if tracking and modelling indicated that a spill was likely to impact shoreline, a plan for shoreline response, including shoreline assessment and clean-up (treatment), would be required. The Operators would work with ECRC to develop a Shoreline Response Plan. Table 17 shows how each Operator has made considerations for a shoreline response if required.

Table 17. Concurrency Table for Shoreline Response

Operator	Shoreline Response

BHP	BHP is currently preparing their Oil Spill Response Plan and associated Tactical Response Plans ECRC process for shoreline response
CNOOC	SIMA/ Oil Spill Response Plan ECRC process for shoreline response
Equinor	SIMA/ Oil Spill Response Plan ECRC process for shoreline response
Exxon Mobil	Trajectory modeling from the area of the Hebron Platform indicate a predominant easterly track resulting in low probability of making landfall in Newfoundland. As modeling is created and updated throughout an event a shoreline assessment is conducted as required. If a cleanup is required a plan fit for purpose would be created and approved prior to the spill reaching shore ECRC process for shoreline response
HMDC	Trajectory modeling from the area of the Hibernia Platform indicate a predominant easterly track resulting in low probability of making landfall in Newfoundland. As modeling in created and updated throughout an event if shoreline assessment and cleanup are required a plan fit for purpose would be created and approved prior to the spill reaching shore ECRC process for shoreline response
Cenovus	ECRC process for shoreline response
Suncor	ECRC process for shoreline response

5.7 Waste Management

Waste minimization and management are crucial to the response effort. This can quickly become a bottleneck for recovery operations if storage capacity is exceeded, especially in the offshore environment where waste must be either stored on board or transported long distances. All Operators have a Waste Management Plan (see Table 19) that deals with waste streams, waste management and transportation.

Table 18. Concurrency Table for Waste Management

Operator	Waste Management
BHP	BHP is currently preparing their Oil Spill Response Plan and associate Tactical Response Plans
CNOOC	Oil Spill Response Plan
Equinor	Oil Spill Response Plan
EMCP	Hebron Waste Management Plan Drilling and Production Operations
HMDC	HMDC Waste Management Plan HMDC Transportation on Waste from Platform to Shorebase
Cenovus	Cenovus has a contract with an approved waste management contractor; GFL Environmental (formerly Terrapure) ECRC support of Recovered Materials through Service Agreement
Suncor	Suncor uses field waste contractors e.g., GFL Environmental (formerly Terrapure), Pardy's, etc. In the event of a spill, Suncor would work with ECRC to handle large quantities of oil waste water and/or materials

5.8 Oiled Wildlife

As part of the EA process, operators must identify and demonstrate how they will mitigate for potential impacts on marine ecosystems. Operators are required to identify processes related to seabird observations and handling and to follow processes developed by Environment and Climate Change and 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 are made by trained and experienced personnel and the data gathered are provided to relevant regulatory agencies. Industry has funded various studies on seabirds that have resulted in multi-year monitoring programs offshore NL conducted by ECCC/CWS. The CWS has draft guidelines that describe the requirements for spill preparedness and response plans with respect to wildlife response preparedness, monitoring, and mitigation. Table 20 lists the plans that each Operator has developed to manage oiled wildlife.

Table 19. Concurrency Table for Oiled Wildlife

Operator	Oiled Wildlife
BHP	BHP is currently preparing their Wildlife Emergency Response Plan
CNOOC	Wildlife Response Plan
Equinor	Wildlife Response Plan
EMCP	Hebron Seabird Management HMDC Wildlife Response Plan
HMDC	HMDC Seabird Management HMDC Wildlife Response Procedure
Cenovus	Wildlife Response Plan
Suncor	Suncor Wildlife Response Plan East Coast Seabird Procedures

5.9 Response Outside Exclusive Economic Zone

Some of the current projects operate near the Exclusive Economic Zone (EEZ) border and several exploration licenses, and one proposed project lies outside of the EEZ, making the need for spill response outside this zone a possibility. For Tier 1 response outside the EEZ, the Operators can respond with the equipment that they maintain on site. For Tier 2 response, ECRC can provide a broad range of response services for support of response outside the EEZ and selected activities will be evaluated on a case by case basis to determine if ECRC can provide the service.[19] Tier 3 RO Agreements with OSRL will operate outside the EEZ as required. Table 21 lists the capability that each Operator has for response outside the EEZ.

Table 20. Concurrency Table for Response outside the EEZ

Operator	Response outside the EEZ
BHP	Tier 1 Operator Equipment Tier 2 RO ECRC (case by case) Tier 3 RO OSRL
CNOOC	
Equinor	

[19] Based on correspondence with ECRC

Exxon Mobil	Tier 1 Operator Equipment Tier 2 RO ECRC (case by case) Tier 3 RO OSRL
HMDC	
Cenovus	
Suncor	

6 RESTORATION

As a condition of Authorization, the Operators are required to conduct production-related Environmental Effects Monitoring (EEM) programs to evaluate the effectiveness of mitigation, provide early warning of changes in the environment, and validate EA predictions. By default, regular EEM programs during the life of a production project also monitor for effects of any spills that may have occurred since the previous EEM. Results from each monitoring program are submitted to regulators for review and approval and made available to the public. To date, EEM programs involving monitoring of marine chemistry, toxicity and benthic communities, water chemistry and fish health have shown localized impacts within range of EA predictions.

6.1 Marine Environmental Impacts

The potential environmental impacts of oil spills are covered extensively within each EA for exploration and development project. The NEBA/SIMA analyses the best opportunities to minimize environmental consequences of a spill. Environmental monitoring requirements in the event of a spill are determined by the C-NLOPB in consultation with ECCC's National Environmental Emergencies Centre Science Table in consideration of the magnitude and resources at risk. Table 22 shows the programs or plans used by the Operators to assess marine environmental impacts of an accidental spill.

Table 21. Concurrency Table for Marine Environmental Impacts

Operator	Marine Environmental Impacts
BHP	BHP's exploration project is currently undergoing the environmental assessment process. Potential requirements for environmental monitoring in the event of a spill are expected as a condition of EIS approval
CNOOC	Addressed in the EIS and SIMA Oil Spill Response Plan Environmental Protection Plan Physical Environmental Monitoring Plan

Equinor	Addressed in the EIS and SIMA, except for EEM which is addressed in the Oil Spill Response Plan
EMCP	Hebron – Environmental Compliance Monitoring Plan Hebron - Physical Environment Monitoring Program Hebron – Environment Protection Plan
HMDC	HMDC – Environmental Protection Plan HMDC – EEM Program
Cenovus	Wildlife Response Plan EEM (Production Operations and/or Spill-related EEM)
Suncor	EEM and EA

6.2 Economic Assessment and Compensation

Considerations of the potential effects of an oil spill on fisheries, as well as on other commercial activities and local communities who may be dependent on subsistence or artisanal economies, and identification of the sources of revenue that may be available to compensate for such damages are covered by the Fisheries Compensation Program for all Operators. For claims where the responsible party is known, the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* (C-NLOPB 2017) outlines the process for filing and assessment of compensation claims of loss or damage due to a spill or debris associated with offshore petroleum activity. A claimant may be any individual or corporation with actual loss or damage (including income and future income) or loss of Indigenous hunting, fishing and gathering opportunities. Cost recovery and liability are addressed as per the regulatory requirements under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*.

If the Operator responsible for the incident is not known, a commercial fish harvester or aquaculturalist may file a claim through CAPP to the Canadian East Coast Offshore Operators Non-attributable Fisheries Damage Compensation Program[20].

Table 24 shows the programs or processes used by the Operators to assess economic impacts of an accidental spill or unauthorized discharge

Table 22. Concurrency Table for Economic Assessment and Compensation

Operator	Economic Assessment and Compensation

[20] https://www.capp.ca/wp-content/uploads/2019/11/Canadian_East_Coast_Offshore_Operators_Nonattributable_Fisheries_Damage_Compensation_Progr-117754-.pdf

BHP	BHP is currently reviewing its compensation strategy related to a spill
CNOOC	All operators have Fisheries Compensation Programs as part of their Environmental Protection Plans Fisheries Compensation Program for Gear and Vessel Damage and Oil Spill Operators liaise with the Fishers through One Ocean group for continued communication and relationship building
Equinor	
EMCP	
HMDC	
Cenovus	
Suncor	

7 CONCLUSION

7.1 Capability Assessment Summary

The offshore oil industry in NL is subject to auditing, compliance monitoring, inspections and investigations to confirm compliance with the *Atlantic Accord Act* and regulations by the C-NLOPB. Before carrying out any work or activity respecting petroleum operations in the NL Offshore Area, an Operator must obtain both an Operating Licence and an OA as specified by sections 137 and 138 of the *Atlantic Accord Act.* Throughout the preparation and planning process, the Operators each develop capability in oil spill preparedness. Through training, exercises, and shared learnings from incidents, response capability continues to grow and evolve. The Operators are subject to both environmental monitoring and compensation requirements. The Operators continue to monitor advances in spill response technology and the industry has been involved in several research programs related to spill prevention, preparedness, and response including the ESRF which focuses on studying the fate and effects of accidental releases of petroleum and the Multi-Partner Research Initiative (MPRI) which is currently researching effectiveness of dispersants, ISB, the development of improved oil absorption technologies, and enhanced computer simulations to forecast oil spill risk.

The current capabilities of the Operators have been assessed using the applicable key elements for preparedness, response, and restoration from the IPIECA-IOGP Guidance Document. Each Operator was able to demonstrate capability for each of these key elements, which is detailed in the concurrency tables in Sections 4, 5 and 6. Because BHP, CNOOC and Equinor are not yet in the production phase, their capabilities and plans are in various stages of development and relate specifically to exploration programs.

7.2 Lessons Learned and Planned Improvements

Since the completion of the 2009 Assessment Report, there have been many learnings and actions taken to improve response capability. While the Operators are compliant with the regulatory requirements, and they can demonstrate response capability for the key elements identified in this report, they

maintain their commitment to continuous improvement. This includes learning from research and development, training, workshops, exercises and responses and then making changes to improve policies, processes or procedures where necessary. The following summarizes the learnings from the annual Synergy Exercises from 2008-2019 as well as learnings and planned improvements for subsea surveillance and monitoring, wildlife response plans, data collection and sharing, and containment and recovery operations.

Learnings from Synergy Exercises 2008-2019

Synergy is an annual, cooperative mutual aid exercise between the Operators. Feedback is compiled in annual reports summarizing the important points for continuous improvement and submitted to the C-NLOPB. A review of the feedback with respect to learnings from the Synergy Exercises between 2009 to 2019 has been summarized and can be grouped into three categories: policy, process, and procedures. It is important to note the nuances between the three categories and how they relate to one another (Figure 3).

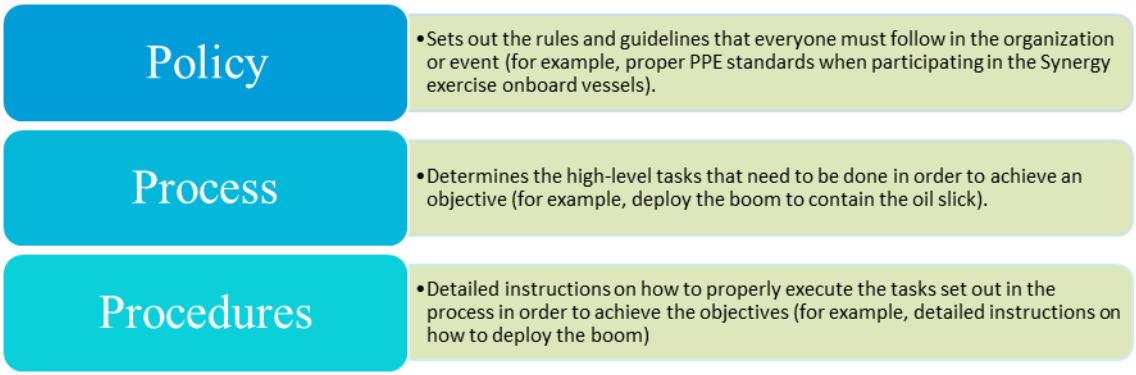

Figure 3. Definitions of the three categories as they relate to the Synergy exercise lessons

Observations impacting Synergy exercise policies were principally directed at improving overall personal safety and the safety within the workplace environment. This includes policies on standard PPE on vessels, the conduct of JSAs, safety issues during the deployment, and the use of designated H&S leads. Observations made on communications policies include the improving the use of communications materials, briefings, and on the information presented before, during and after the exercise, and on the improvement of the general conduct of the exercise e.g. response to unplanned issues. Issues with initial data collection in terms of wildlife monitoring and surveillance have been identified. The Operators are constantly reviewing communication protocols.

Most of the comments and feedback relate to processes that are meant to improve the staging of the next Synergy exercise. They touch mostly on safety, communications (e.g. use of interpreters, pre-exercise briefings), and conduct of the exercise (e.g. sending of materials in advance, briefing of vessel masters, involvement of helicopters in the exercise). Commentaries on procedures are largely on the physical aspect of the exercise such as how the vessels operate in relation to each other, and technical details like how equipment is deployed in specific exercise situations, and on ways to maximize efficiency in handling equipment onboard vessels (e.g. lifting and positioning) and on water (e.g. towing, gap

between booms and vessel) without compromising safety. Most of the documented feedback has been closed. However, it should also be noted that there are still ongoing processes to address observations.

The lessons learned over the past decade have positively shaped Operator capability, which is evident in the comments collected from participants from the *Exercise Synergy 2018 Report*:

- Consensus that exercise demonstrated a clear attention to safety and hazard control from all observers and assessors.
- Personnel demonstrated confidence and professionalism in carrying out tasks.
- Excellent integration of responders and crew – good communication and high skill levels, seamless integration.
- Excellent exercise, well organized and professionally executed.
- Personnel were engaged in the exercise and demonstrated professional capability, safety a priority.

In 2019 the the C-NLOPB agreed with Operators that a one-day workshop would replace the equipment deployment normally included in the annual exercise. This would offer an opportunity to bring together Operators and regulatory stakeholders to improve incident management structures, procedures and communications based on incident management best practices and recent experience. On November 19, 2019 Husky Energy conducted a workshop in two parts with an Incident Management Concepts presentation, followed by a Tabletop Exercise using an overarching offshore oil spill scenario. The main recommendations include implementing the core elements of Incident Management, and improving information sharing and situational awareness during a response by establishing Critical Information Requirements beforehand, by having the Operators provide ICS-214 Unit Logs to the C-NLOPB, by syncing briefing cycles and by inviting the C-NLOPB to attend the Initial Action Plan (IAP) Briefing. Suggestions for streamlining the process for the requesting, approval and use of dispersants and for improving the timeliness and sharing of information and messaging with to the public and respective stakeholders were provided. The Operators also recommended that the C-NLOPB provide an information presentation to Operators and Stakeholders on what happens from a Board/Partners perspective during incident management and include an overview of the C-NLOPB Role, Authority, and Responsibilities. These recommendations were shared with the C-NLOPB and a response to each of the recommendations has been provided.

<u>Subsea Surveillance and Monitoring</u>

In addition to the updating the of 2009 Assessment Report, the CAPP Action Plan *Collaborating for Safety and Sustainability: A Continuous Improvement Plan, 2020* also identified subsea leak detection and monitoring technology as a focus area for improvement. The goal is to provide better observation and monitoring capabilities of existing/future subsea infrastructure, to ensure the integrity of subsea infrastructure and to improve response times. A task group has been established to review potential technologies in this area, share information on what each company is doing and look at international

best practice in this area with a goal of making recommendations on implementing subsea leak detection and monitoring technology.

Wildlife Response Plans

The Canadian Wildlife Service (CWS) has developed draft guidelines which describe the requirements for spill preparedness and response plans with respect to wildlife response preparedness, monitoring/mitigation preparedness. The Operators have reviewed or plan to review their wildlife response plans and update their contingency plans so that they are consistent with guidelines as soon as possible to meet government agencies' expectations.

Containment and Recovery Operations

Compatibility issues with containment and recovery equipment have been identified. The ship construction/deck configuration of the support vessel may be problematic depending on which SVSS is being deployed. The SVSSs are not all made by the same manufacturer and the support vessels are set up to deploy the SVSS that is maintained at that location. This can cause issues during a Mutual Aid response if a support vessel is required to assist that is not set up to deploy a particular SVSS. The Operators continue to review the containment and recovery equipment needs and to look for efficiencies and ways to improve procedures.

Dispersant Use

The use of dispersants as a response strategy has historically been challenging in Canadian waters due to a variety of factors. The Operators and CAPP are continuing to work with regulators to streamline the requesting and approval processes for dispersant use.

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APPENDIX 1

CURRENT OFFSHORE ACTIVITIES

The following provides further details on the current NL offshore activities at the time that this report was written including:

1. Active Projects
2. Development Projects
3. Exploration Projects

1 ACTIVE PROJECTS

There are currently four production projects that are active on the Grand Banks, offshore NL including a) Hibernia, b) Terra Nova, c) White Rose and d) Hebron (Figure 1). All production facilities have been designed and built to withstand the harsh meteorological and oceanographic conditions and were selected based on the needs of specific fields. Gravity Based Structures (GBS) are utilized by the Hibernia and Hebron projects. GBS sit on the ocean floor and support topsides including accommodations and drilling and production facilities while the base contains storage for oil. Floating Production Storage and Offloading Vessels (FPSO) are utilized by the Terra Nova and White Rose projects. FPSOs are floating vessels that are used for the production, processing and storage of oil. The drilling usually takes place from nearby Mobile Offshore Drilling Units (MODU). Crude oil is stored within the GBS or onboard the FPSO until it is offloaded to shuttle tankers for transport. It is important to note that once the shuttle tankers are outside of the 500 m exclusion zone, the vessels fall under the *Canada Shipping Act, 2001* with respect to spill response. The following provides more detail on each of the current producing projects.

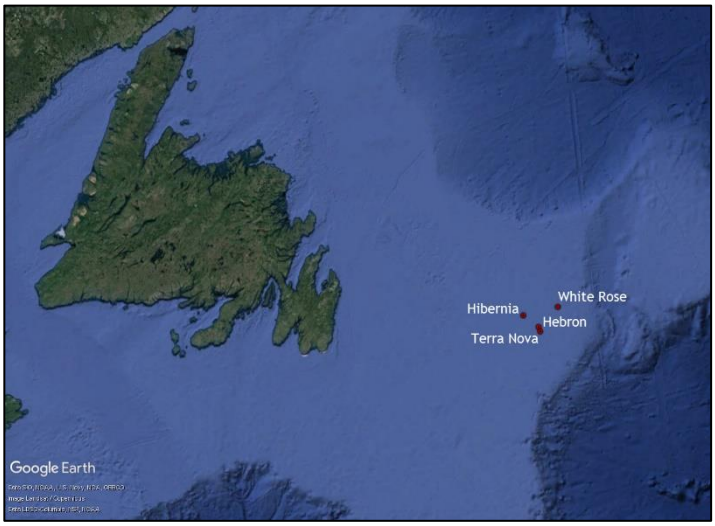

Figure 1. Location map of four production projects offshore NL.

1.1 Hibernia

The Hibernia project is operated by the Hibernia Management and Development Company Ltd. (HMDC) which is comprised of ExxonMobil Canada (33.125%), Chevron Canada Resources (26.875%), Suncor Energy (20%), Canada Hibernia Holding Corporation (8.5%), Murphy Oil (6.5%) and Equinor Canada Ltd. (5%). The Hibernia oil field is located 315 km east southeast of St. John's, NL, within the Jeanne d'Arc

Basin which underlies the northeast portion of the Grand Banks. It consists of two principal reservoirs, the Hibernia and Ben Nevis-Avalon reservoirs, located at average depths of 3,700 and 2,400 metres respectively. The Hibernia oil field is the fifth largest field ever discovered in Canada and began producing oil in 1997. The Hibernia platform has a design capacity of 230,000 barrels of crude oil production per day.

The Hibernia platform stands 224 metres high and consists of three components including the topsides, a GBS and an Offshore Loading System (OLS) (Figure 2). The topsides provide accommodations for approximately 185 people, and houses drilling, producing and utility equipment. The topsides are supported by the GBS, a massive concrete pedestal which sits on the ocean floor, and is 111 metres high and has storage capacity for 1.3 million barrels of crude oil in its 85-metre-high caisson. The OLS is a network of transmission pipelines that offloads oil from the Hibernia platform onto large shuttle tankers with a flow line running along the sea floor. Hibernia primarily uses two shuttle tankers. These tankers are 127,000 deadweight tonnes (DWT), ice reinforced, double hull and double bottom vessels with segregated cargo and ballast tanks.

HMDC has an Ice Management Strategy to keep icebergs away from the platform area but, in the unlikely event that an iceberg does encroach upon the loading area, the OLS can be flushed to minimize risk to the environment. The GBS is specially designed to withstand the impact of sea ice and icebergs to allow for year-round production.[21]

Figure 2. The Hibernia Platform Source: Hibernia

1.2 Terra Nova

Suncor Energy is the operator and majority owner of the Terra Nova field. On September 8, 2021 Suncor announced an agreement to restructure the project ownership of Terra Nova. Under the new agreement joint venture owners include Suncor Energy (48%), Cenovus (34%), and Murphy Oil (18%). Located approximately 350 kilometres southeast of St. John's, NL, the Terra Nova field was discovered in 1984 and production began in 2002, using the Terra Nova Floating, Production Storage and Offloading (FPSO)

[21] Hibernia. "Ice management" [Online]. Available: https://www.hibernia.ca/ice.html

vessel. This was the first project in North America to use FPSO technology in a harsh weather environment featuring sea ice and icebergs. On September 8, 2021 the company announced that the co-owners of the project have finalized an agreement to move forward with the Asset Life Extension project. The Asset Life Extension Project is expected to extend production life by approximately 10 years, providing an additional 70 million barrels of resource for the partnership and providing many benefits to the Newfoundland and Labrador and Canadian economies in the form of taxes, royalties and employment. The FPSO will undergo maintenance work at the Bull Arm Fabrication site in Newfoundland and Labrador starting early September 2021 prior to sailing to dry dock in Ferrol, Spain later in 2021 with return to operations anticipated before the end of 2022.

The *Terra Nova FPSO* is 292.2 metres long and 45.5 metres wide and from the keel to the helideck, is more than 18 stories high and is one of the largest FPSO vessels ever built (Figure 3). The *Terra Nova FPSO* can store 960,000 barrels of oil and accommodate up to 120 people while producing up to 150,000 bbls/day. The vessel is a double-hulled, ice-reinforced vessel with five thrusters and a global dynamic positioning (DP) system. The DP system maintains the vessels heading and adjusts automatically to reduce the impact of waves by allowing the FPSO to change to more favourable headings in high winds and storms.

Oil flows from production wells that were pre-drilled by a semi-submersible mobile offshore drilling unit (MODU) through a network of 40 kilometres of flexible flow lines. The connection between the FPSO and the subsea flowlines is the spider buoy, which is the lower portion of the turret. The spider buoy provides the mooring point for the FPSO, and the pathway for oil and fluids that flow to and from the FPSO and reservoir. The spider buoy has a quick-disconnect feature, allowing the FPSO to safely disconnect in an emergency. Produced gases are separated from the oil and re-injected into the reservoir to support oil production and for possible future extraction. Crude oil is offloaded from the FPSO onto large shuttle tankers for shipment.

The Terra Nova ice management program includes monitoring and detection of icebergs as well as iceberg re-direction using support vessels if required. The wellheads and production manifolds are placed in excavated drill centres that protect the equipment from scouring icebergs. [22]

[22] Suncor. "Terra Nova" [Online]. Available: https://www.suncor.com/en-ca/about-us/exploration-and-production/east-coast-canada/terra-nova

Figure 3. The *Terra Nova FPSO* Source: Suncor

1.3 White Rose

Cenovus is the operator and majority owner (72.5%) of the White Rose field and satellite extensions along with Suncor Energy (27.5%). On September 8, 2021 Cenovus announced a potential restructuring of the project ownership, contingent on the restart of the West White Rose project (See Section 2.1). The White Rose field is located 350km east of NL in the Jeanne d'Arc Basin. Oil production commenced in 2005 with a production capacity of up to 140,000 barrels per day.[23]

Oil is extracted from subsea wells in the Southern and Central drill centres while surplus gas is re-injected into the Northern Drill Centre for future extraction. On the eastern edge of the White Rose field are the North Amethyst, West White Rose and South White Rose extensions. The North Amethyst and South White Rose extensions produce back to the *SeaRose FPSO*[24] connected by flexible flowlines and risers. The *Searose FPSO* has an overall length of 267m, a moulded breadth of 46m and a moulded depth of 26.6m (Figure 4). It has a design draught of 18m, and a tonnage of 127,000t DWT. It has a cargo capacity of 148,200m³ of liquids and carries 3,700m³ of diesel oil which is consumed at a rate of 58.3t/d by the main engine[25]. The FPSO can store between 700,000 and 850,000 barrels of oil and it houses topside processing units, accommodations, a helideck and a turret. A mooring system connects the turret to the seabed and allows the FPSO to pivot around the turret while connected. The FPSO's turret is designed to allow the facility to disconnect from the subsea drill centres and move in the event of an emergency.

[23]Offshore Technology. "White Rose Oil and Gas Field" [Online]. Available: https://www.offshore-technology.com/projects/white_rose/

[24] Cenovus. "Operations / Offshore" [Online]. Available: https://www.cenovus.com/operations/offshore.html

[25] Ship Technology. "Searose Floating Production, Storage and Offloading (FPSO) Vessel" [Online]. Available: https://www.ship-technology.com/projects/searose/

The White Rose subsea infrastructure (wellheads, trees, manifolds etc.) are located in excavated drill centres (EDCs) that lie below the seabed to protect it from iceberg scour. The *SeaRose FPSO* has been strengthened to withstand a 100,000t iceberg.

Figure 4. The *SeaRose FPSO* Source: Cenovus

1.4 Hebron

Exxon Mobil Canada Properties (ECMP) is the operator and majority owner (35.5%) of the Hebron field with co-venturers Chevron Canada Limited (29.6%), Suncor Energy (21%), Equinor Ltd. (9%), Nalcor Energy - Oil and Gas Inc. (4.9%). The Hebron field is located in the Jeanne d'Arc Basin approximately 350 kilometres southeast of St. John's, NL. The field was first discovered in 1980 and commenced production in 2017.

The Hebron field is producing oil using a stand-alone concrete GBS designed to withstand the local conditions including sea ice, icebergs and harsh meteorological and oceanographic conditions. The platform consists of three components including the topsides, a GBS and an OLS. The GBS has a height of 122 metres, a base diameter of 130 metres and can store approximately 720,000 barrels of crude oil (Figure 5). The GBS supports an integrated topsides deck that includes accommodations for up to 220, and facilities to perform drilling and production for up to 150,000 barrels/day. The OLS has a total crude handling capability of 5400 cubic metres/hr and consists of a 24-inch, 6 km concrete coated pipeline with an anchor assemble and hose system to transfer oil to shuttle tankers. [26]

[26] ExxonMobil Canada, (2015). "Hebron" [Online]. Available: https://www.hebronproject.com/

Figure 5. The Hebron Platform Source: CAPP

2 DEVELOPMENT PROJECTS

The NL offshore has seen significant exploration activity in recent years which has been primarily focused within two basins, the Flemish Pass Basin and the Jeanne d'Arc Basin where all four currently producing projects are located. There is one development project being constructed a) the West White Rose Project and another potential development project awaiting a sanction decision b) the Bay du Nord Project.

2.1 The West White Rose Project

Cenovus Energy is the leading proponent of the West White Rose Project (68%), along with partners Suncor Energy (26%) and Nalcor Energy Oil and Gas Inc. (5%). The Project was put on hold in September 2020 pending a review due to delays caused by the suspension of major construction activities due to the COVID-19 pandemic and the operator's capital re-prioritization. On September 8, 2021 Cenovus announced plans to restructure ownership of the White Rose project and its satellite extensions, contingent on the approval to restart the West White Rose Project. The project is 60% complete, however most construction remains on hold while Cenovus determines a path forward.[27] Should the project proceed, Cenovus will reduce its stake in the original field to 60% from 72.5% and to 56.375% from 69.875% in the satellite extensions. Suncor will take a larger stake in the project should the West White Rose Project proceed. A decision is expected to be made by mid-2022. The West White Rose project will be located within the White Rose field in the Jeanne d'Arc Basin. The project will use a Concrete Gravity Structure (CGS) with a fixed drilling rig producing back to the *SeaRose FPSO* (Figure 6).

West White Rose is designed to produce light crude oil with lower greenhouse gas emissions intensity than other currently producing North American crude oil projects at an expected peak capacity of 75,000 barrels of oil per day.

[27] Cenovus. Website: https://cenovus.com

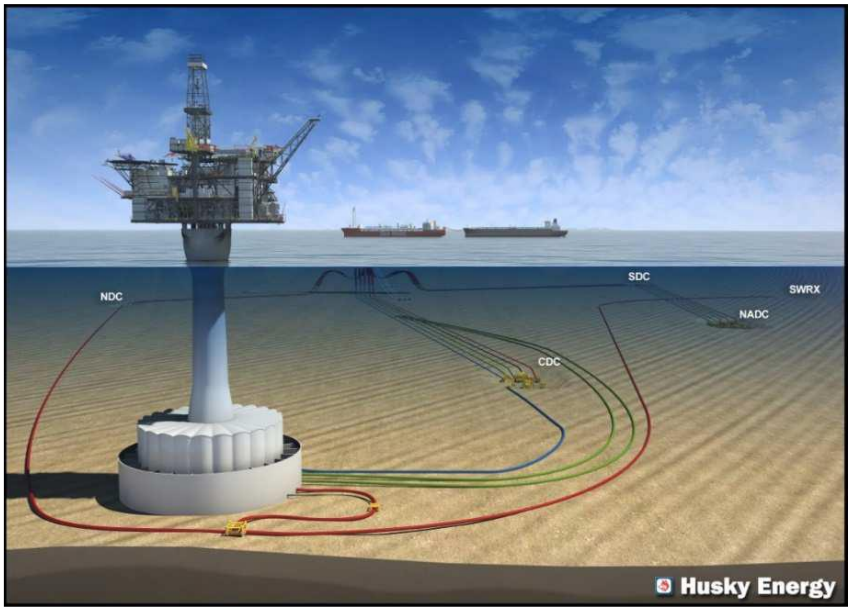

Figure 6. The proposed West White Rose Project Source: Cenovus

2.2 Bay du Nord Project

Equinor Ltd. is the majority owner of the Bay du Nord project (65%) along with co-owner Cenovus Energy (35%). The Bay du Nord project consists of three light oil discoveries in the Flemish Pass Basin located 500 km east of St. John's, NL in water depths of approximately 1,200 m, with recoverable reserves estimated to be about 300 million barrels of oil.

The overall development concept comprises subsea installations tied back to a (FPSO) for storage and offshore offloading to shuttle tankers (Figure 7).

Equinor and the other project owner have decided to defer the Bay du Nord development project to make the project more robust for low commodity prices. The project will continue its planning and develop an adjusted work programme according to new timelines[28].

[28] Equinor, (2020). "The Bay du Nord project" [Online]. Available: https://www.equinor.com/en/where-we-are/canada-bay-du-nord.html

Figure 7. The proposed Bay du Nord Project *Source: Equinor Canada*

3 EXPLORATION PROJECTS

There are currently nine exploration drilling projects also in various stages offshore Eastern NL including:

1. Equinor Canada Ltd. – Flemish Pass (2018-2028)
2. Cenovus (formerly Husky Energy) – Jeanne d'Arc and Flemish Pass (2018-2025)
3. ExxonMobil Canada Properties – Eastern Newfoundland (2018-2030)
4. CNOOC Intl. – Flemish Pass (2018-2028)
5. BP Canada – Orphan Basin (2017-2026)
6. ExxonMobil Canada Properties – Southeastern Newfoundland (2020-2029)
7. Chevron Canada – West Flemish Pass (2021-2030)
8. Suncor Energy – Tilt Cove (licence awarded January 2019)
9. BHP Exploration Canada – Eastern Newfoundland (licences awarded January 2019)

APPENDIX 2

EQUIPMENT INVENTORY

The following provides additional details on the collective response capability of the NL offshore Operators by listing the equipment available for each tier of response. A brief overview of the Response Organizations ECRC and OSRL as well as the GRN is also provided.

1 TIER 1

Tier 1 capability is comprised of locally available resources that are necessary to handle relatively minor spills that can typically be resolved within a few hours or days and/or provide an initial response to larger spills. Table 1 lists the Operators' Tier 1 equipment for local response capability. The operator-owned equipment and resources are maintained offshore on the installation or supply vessel. The inventory includes three Single Vessel Sweep Systems (SVSS) designed to contain and recover oil in the offshore environment. These systems are deployed from one vessel and utilize a jib arm to guide and support boom forming a U-shaped sweep to contain and collect the oil, and a skimming unit to collect the oil that concentrates within the apex of the boom (Figure 1). This inventory also includes the ancillaries and hydraulic power units (HPU) that are required to operate these systems. Also included in the Tier 1 inventory are iSphere tracker buoys which are designed specifically to track and monitor oil slicks while providing essential real-time sea surface temperature data and GPS positional data. The robust design allows the buoy to be deployed from a vessel or an oil platform with a standard operating life of approximately 6-12 months[29]. Support vessels also carry Tier 1 Kits that contain a variety of items for spill response, including a document package and reference binders, iSphere tracker buoy kit, sorbents and sorbent boom system (Figure 2), tools, PPE, wildlife carcass collection and sampling equipment, oil sampling equipment and dispersant effectiveness kits. Table 3 lists the Tier 1 Equipment capability on board support vessels on charter. ECRC conducts vessel-based response equipment maintenance and inventory checks as well as training of crew members on offshore support vessels and the training of Response Contractors. The Mutual Emergency Assistance Agreement between the Operators allows them to share equipment and resources during a response.

Table 1. Tier 1 Equipment Inventory for Producing Operators[30]

Offshore Producing Operators' Tier 1 Equipment Inventory		
Equipment Type	**Name**	**Quantity**
Sweep System	Buckley SVSS (Gen 2)	1
Sweep System	Buckley SVSS (Gen 3)	2

[29] METOCEAN TELEMATICS. Website: https://www.metocean.com/shop/metocean-systems/oil-spill-tracking/

[30] Itemized inventory list for producing operators provided by Eastern Canada Response Corporation and modified by CAPP to remove inventory that forms part of the inventory, but is not spill response equipment.

Sweep System	DESMI SVSS	2
HPU	SVSS HPU	2
Tracker Buoys	iSphere	4 (*note: additional tracker buoys in each Tier 1 kit as noted below)*
Tier 1 Kit	On Vessel	*12+

Tier 1 Kit Inventory

Item	**Quantity**
Documents	
Tracker Buoys (iSphere)	1
Oil Spill Response Plan (From Operator)	1
SVSS / DESMI Speed-Sweep Procedures	1
Tier 2 Procedures	1
Seabird Observation Pane	3
CWS Permit	1
Peterson Field Guide	1
Reference Binder	
Seabird Observation Forms	1
Tracker Buoy Procedures	1
Seabird Poster	1
Seabird Photo Album	1
Observers Card (TAR/Flock Size)	1
NOAA Observer's Guide	1
Sorbent Boom Poster	1
Oil Spill Tracker Buoy	
Tracker Buoy	1
Deployment Procedures	1

Sorbent Boom System	
Sorbent Boom	12 Bags - 4 Lengths of boom/Bag
5/8" Poly Rope	2 x 500 feet
Oil Snare	10 Bags
Sorbent Pads	3 Bundles
Storage Cube	2
Save-All Tarp	2
Totes and Lids	
Cube Liner Bag	14
Galvanized Chain	1
3/8" Galvanized Shackles	10
Tyvek Suits	36
Yellow Chemical Suits	24
Cotton Gloves	12 Pairs
Ansell Snorkle gloves	12
Boot covers	36
Boot wash protective bottoms	12
Wildlife Carcass Collection	
Dip Net	1
Seabird Boxes	5
Oil & Wildlife Sampling Kit	
Rod and Reel	1
Small Pelican Cases	2
Tool Box	1
Extension Arm	1
Bottle Clamp	1

Tamper Proof Evidence Bags	24
Chain of Custody	8
Tie Wraps	24
Nitrile Gloves	12 Pairs
Sample Bottles	24
Sample Bottle Labels	24
Sampling Float	2
Float Bridles and Swivels	5
Pre-Cut Sorbent Pads	24
Tier 1 Dispersants Effectiveness Kits	
Documents	
Water sample data record	10
Water dispersant monitoring observer log	10
Field effectiveness test procedure	3
Supplies	
100ml glass bottle (Oil Sample)	3
Clear glass jars metal lids	6
3ml Pipettes	10
Digital Thermometer	1
Graduated Cylinder	1
20 Liter plastic pail with lid	1
Tamper proof evidence / Sample bags	10
Sample bottle labels	10
Sample bottle storage case	1
Goggles	2
Nitrile gloves (XL)	12

Tamper tags	10
Other Items	
Berm - 26" x 50" x 6" c/w 23" x 48" x 2" grate 18	1
1/4 Rubber Matts (3'x50')	1
Boot scrubber floor mount	1

Figure 1. SVSS deployed from support vessel *Source: CAPP*

Figure2. Sorbent boom system *Source: CAPP*

2 TIER 2

Tier 2 capability is comprised of regional capability in the wider area or country necessary to supplement Tier 1 resources, including general equipment and specialized tools and services, for responses to more significant spills that may continue for several days or weeks. Table 2 lists the offshore Operators' collective capability for Tier 2 response. This includes one DESMI Speed Sweep 1500 SVSS (two additional are stored offshore) and two Norwegian Standard Systems, each consisting of a 400m Norlense 1200 self-inflating boom and TransRec 150 skimmer, which are considered the largest available in the world in terms of sea state. ECRC manages the shore-based Tier 2 oil spill response equipment maintenance and storage on behalf of the Operators. Table 3 lists the Tier 2 capability on board support vessels on charter. Operator-owned equipment can be augmented by ECRC-owned equipment and resources that are maintained onshore in St. John's, NL through a service agreement if required. An inventory of ECRC equipment can be found on the ECRC website http://www.ecrc-simec.ca/en/equipment/.

Table 2. Tier 2 Equipment Inventory

Offshore Operators Tier 2 Equipment		
Equipment Type	**Name**	**Quantity**
Sweep System	DESMI Speed Sweep 1500 SVSS	1
Boom	Norlense 1200 Boom	2
Skimmer	TransRec 150 Skimmer System	2 (with weir and HiVisc simmer heads)
HPU	Lamor HPU	2

Figure 3. DESMI Speed Sweep *Source: DESMI.com*

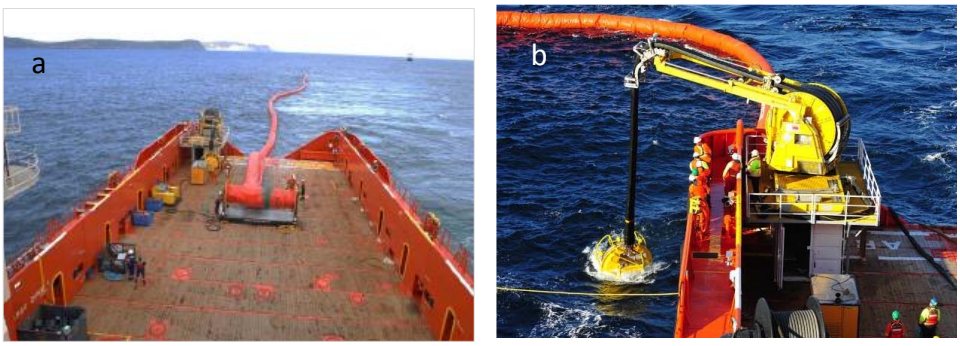

Figure 4.a Norlense Boom and 4.b TransRec Skimmer *Source: Exercise Synergy 2018 Report*

Table 3. Tier 2 Response Capability on board Vessels on Charter

Operator	Vessel	General Info	Oil Spill Response Info															
		Owner/ Operator	Tier I	ISphere	SVSS	SVSS Hydraulics	Tier 2 Procedure Drawings	ISO Mounts[C] (Tier II Gear)	Tier 2 Fit test	Ships Hydraulics installed T2	Oil Recovery Class	ORO Tank Capacity (m^3)	Dispersant Pump Details	Dispersant Tank (Size)	# Dispersant Deck Connections	oil Spill Radar	FLIR System Y/N	Copy of ORO Manual
Production																		
HMDC HEBRON	Avalon Sea	Secunda	Yes	Yes	Yes - DESMI	Yes	Yes	Yes	June 29 2018	Yes	Yes	606.6	350 l/min 81.6m Head	$24m^3$	3	Sigma 6	Yes	Yes
	Atlantic Heron	Atlantic Towing	Yes	Yes	Yes - DESMI	Yes	Yes	Yes	July 4 2018	No	Oil Rec SPS	885.52	417 l/Min	$9m^3$	2	Yes	Yes	Yes
	Atlantic Shrike	Atlantic Towing	Yes	Yes	Yes - DESMI	Yes	Yes	Yes	July 9 2018	No	Oil Rec SPS	885.52	417 l/Min	$9m^3$	2	Yes	Yes	Yes
	Paul A. Sacuta	Atlantic Towing	Yes	Yes	Yes - DESMI	Yes	Yes	Yes	Dec 11th 2018	No	Oil Rec SPS	442	417 l/Min	$9m^3$	2	Yes	Yes	Yes
	Atlantic Griffon	Atlantic Towing	Yes	Yes	Yes - DESMI	Yes	Yes	Yes	June 28 2018	No	Oil Rec SPS	885.52	417 l/Min	$9m^3$	2	Yes	Yes	Yes
Suncor	Siem Pilot	Siem Pilot	Yes	Yes	Yes	Yes	Yes	Yes	Jan 15 2018	No	Yes	1809.5	No	No	No	No	No	Yes
	Maersk Nexus	Maersk	Yes	yes	yes	Yes	yes	yes	Dec 13th 2018	No	yes	1028.8	No	No	No	No	No	Yes
Husky	Scandi Vinland	DOF	Yes	Yes	Yes	Yes	Yes	Yes	Pt1 Jan 2020	NA	OILREC	858.9	No	No	No	No	No	Yes
	Maersk Cutter	Maersk	Yes	Yes	Yes	Yes	Yes	Welded	No	No	Yes	1056.9	No	No	No	No	No	Yes
Exploration																		
Equinor	Atlantic Kingfisher	Atlantic Towing	Yes	yes	Yes	Yes	No	No	NA	NA	Yes[B]	1100	No			No	No	NA
	Siem Diamond	Secunda Canada	Yes	Yes	No	No	No	No	NA	NA	OilRec	2270						
	Horizon Star	Horizon Maritime	Yes	Yes	No	No	No	No	NA	NA	OilRec	1180						

3 TIER 3

Tier 3 capability is comprised of national or international capability necessary for responses to major spills that require substantial additional resources due to incident scale, complexity and/or impact potential and which may continue for weeks or months. The Operators may call in additional national resources through ECRC who can cascade equipment and personnel from across eastern Canada if required. ECRC is required to maintain equipment and resources to respond to a marine spill of up to 10,000 tonnes of oil and can also access additional equipment and resources through Mutual Aid

Agreements with the three other certified Response Organizations in Canada including WCMRC in British Columbia, ALERT in Saint John, New Brunswick and PTMS in Point Tupper, Nova Scotia. The Operators also have a service agreement with OSRL which allows them to access international resources. Through OSRL, offshore operators have access to the Subsea Well Intervention Service (SWIS). This service is the result of a global initiative by oil and natural gas companies to develop intervention equipment that can be deployed around the world in the event of a subsea well control incident. SWIS provides offshore operators with access to capping systems, available in four locations around the world, which enable industry to cap most subsea oil wells in water depths up to 3,000 metres. Other tools that will be accessible through SWIS include a containment toolkit that allow hydrocarbons to flow from a wellhead to the surface in a safe and controlled way, ready for storage or disposal, if well shut-in is not possible. OSRL is a part of the Global Subsea Response Network [31]. Both ECRC and OSRL are members of the Global Response Network (GRN) which enables them to access equipment, processes and personnel from other oil spill response organizations in Canada and internationally. Table 4 lists the websites for details on the extensive inventories of ECRC and OSRL and provides websites for the Mutual Aid Partners.

Table 4. Tier 3 Equipment Inventories

Offshore Operators Tier 3 Equipment	
ECRC Mutual Aid Partners • ALERT • PTMS (Point Tupper Marine Services) • WCMRC	http://www.ecrc-simec.ca/en/equipment/ https://www.alertinc.ca/ (no website) http://wcmrc.com/preparedness/equipment/
OSRL	https://www.oilspillresponse.com/services/member-response-services/equipment-list/
GRN	https://globalresponsenetwork.org/

3.1 ECRC

ECRC (operating as ECRC-SIMEC) is certified by Transport Canada as a Response Organization under the *Canada Shipping Act, 2001 (CSA, 2001)*. As a certified Response Organization, ECRC can provide arrangements to ships and oil-handling facilities that require an arrangement for spill response under Canadian Law. ECRC owns specialized equipment and maintains contracts with spill response contractors, consultants and specialists. ECRC has regional response capability in three Regions across

[31] OSRL. "Services" [Online]. Available: https://www.oilspillresponse.com/services/

Canada including the Great Lakes, Quebec, and Atlantic and has a response area extending from the Rockies eastward, south of 60 degrees North Latitude. Response Centres house equipment inventories including specialized containment boom, oil skimmers, boats of various sizes and functionality, storage barges from 50 to 2900 tonnes, communications equipment and all the support equipment needed to keep them operational. ECRC inventories are supplemented by equipment available from local contractors and ECRC has a training a program to train spill responders in the safe and effective operation of the equipment. In addition to its own management staff, ECRC also has access to management resources that are critical to good decision-making at the time of a spill including a pool of consultants from across North America as well as the resources that have been developed in partnership with government authorities[32].

3.2 OSRL

Oil Spill Response Limited (OSRL) is the largest international industry-funded cooperative which exists to respond to oil spills wherever in the world they may occur, by providing preparedness, response and intervention services. OSRL membership represents the majority of global oil production. OSRL offers preparedness services through consultancy and support focused on oil spill management, training and exercises, equipment readiness and contingency planning. They also provide equipment for subsea response including well capping and containment equipment, subsea incident response toolkit, and offset installation kits. OSRL is part of a global network of subsea specialists providing an integrated capability for response planning and emergency response[33].

3.3 GRN

Global Response Network (GRN) is a network of response organizations and world leading specialists in oil spill response. The intent of the network is to pool knowledge and experience from around the world to promote higher standards, greater consistency and a more effective response to spills worldwide. The GRN members work collaboratively, exchanging operating information, sharing response techniques and identifying best practice[34].

[32] ECRC-SIMEC. Website: http://www.ecrc-simec.ca/en/
[33] OSRL. "About Oil Spill Response Limited" [Online]. Available: https://www.oilspillresponse.com/about-osrl/
[34] Global Response Network. Website: https://globalresponsenetwork.org/