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December 1, 2010

Mr. Eric Theriault  
Advisor, Environmental Affairs  
Canada-Nova Scotia Offshore Petroleum Board  
6th Floor, TD Centre  
1791 Barrington Street  
Halifax, Nova Scotia B3J 3K9

Dear Mr. Theriault:

**Re: Deep Panuke Offshore Gas Development  
Condition 25: Production Environmental Protection and Compliance  
Monitoring Plan**

Please find attached Encana's Environmental Protection and Compliance Monitoring Plan (EPCMP) (DMEN-X00-RP-EH-90-0002.03U) for the Deep Panuke production operations.

If you have questions, please contact me at (902) 492-5437.

Yours truly,  
EnCana Corporation

A handwritten signature in black ink, appearing to read "Jeff Hurley", is written over a faint, larger version of the signature.

Jeff Hurley  
EHSQ Manager  
Deep Panuke Project

/mt



# Deep Panuke

Rev.	Date	Reason for Issue	Prepared	Checked	Checked	Approved	Approved		
03U	2010-12-01	Issued for Use	M. Thillet	D. Morykot	D. Young	J. Hurley	H. Farrell		
02R	2010-11-19	Issued for Review	M. Thillet	D. Morykot	D. Young	D. Riffe	H. Farrell		
01R	2010-10-29	Issued for Review	M. Thillet	D. Morykot	D. Young	D. Riffe	H. Farrell		
<b>Title</b>		<b>Production Environmental Protection and Compliance Monitoring Plan (EPCMP)</b>							
					<b>DM – EN – X00 – RP – EH – 90 – 0002. 03U</b>				
		Proj	Orig	Loc	Info	Disc	Sys	Sheet	Rev

REVISION LIST	
REVISION	DESCRIPTION OF CHANGES
01R	Initial draft sent out for review
02R	Second draft sent out for review
03U	Finalized for submission to regulators

HOLDS AND INPUT STATUS		
HOLD NO.	ACTION	REMARKS
HOLD 1	<i>Offshore Waste Treatment Guidelines</i> (CNSOPB, C-NLOPB, NEB)	These guidelines are currently undergoing revision; latest draft version has been used for the development of this document. References to the <i>OWTG</i> will be updated, as required, once the guidelines are finalized.
HOLD 2	Information on biocide that may be discharged in sewage and the concentrations to be discharged to the sea	To be provided in this document when the information becomes available
HOLD 3	Deep Panuke automatic maintenance operation system	Details on this system to be provided in this document when the information becomes available

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## ABBREVIATIONS

AFFF	Aqueous Film Forming Foams
ALARP	As Low As Reasonably Practicable
CALA	Canadian Association for Laboratory Accreditation
CAMS	Comprehensive Air Management System
CAPP	Canadian Association of Petroleum Producer's
CCO	Chief Conservation Officer
CEAA	Canadian Environmental Assessment Act
CEPA	Canadian Environmental Protection Act
CH <sub>4</sub>	Methane
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
COOGER	Canada Offshore Oil and Gas Environmental Research
CO <sub>2</sub>	Carbon Dioxide
CRP	Corporate Responsibility Policy
CSR	Comprehensive Study Report
CWS	Canadian Wildlife Services
DFO	Department of Fisheries and Oceans
DND	Department of National Defense
DNV	Det Norske Veritas
EC	Environment Canada
ECA	Encana Corporation
ECM	Environmental Compliance Monitoring
EEMP	Environmental Effects Monitoring Plan
EHSMS	Environment, Health and Safety Management System
EHSQ	Health, Safety, Environment and Quality
EPA	Environmental Protection Agency
EPCMP	Environmental Protection and Compliance Monitoring Plan
EPP	Environmental Protection Plan
ESRF	Environmental Studies Research Funds
FAC	(CNSOPB's) Fisheries Advisory Committee
GHG	Greenhouse Gases

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IATA	International Air Transport Association
ICSS	Instrumented Control and Safety System
LAT	Lowest Astronomical Tide
LFE	Large Final Emitter
mg/L	Milligrams Per Litre
M&NP	Maritimes and Northeast Pipeline
MPA	Marine Protection Area
MSDS	Material Safety Data Sheet
NEB	National Energy Board
NORM	Naturally Occurring Radioactive Material
NO <sub>x</sub>	Nitrous Oxide
NPRI	National Pollutant Release Inventory
OCSG	Offshore Chemicals Selection Guidelines
OIW	Oil in Water
OWTG	Offshore Waste Treatment Guidelines
PFC	Production Field Centre
PLONOR	Posing Little Or NO Risk to the environment
ppm	Parts Per Million
ROV	Remote Operated Vehicles
SARA	Species at Risk Act
SBM	Single Buoy Moorings Inc.
SCC	Standards Council of Canada
SOEP	Sable Offshore Energy Project
SOPEP	Shipboard Oil Pollution Emergency Plan
SPANS	Seafood Producers Association of Nova Scotia
TDG	Transportation of Dangerous Goods
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WHMIS	Workplace Hazardous Materials Information System Regulations
WMP	Waste Management Plan

## 1 SCOPE

This Environmental Protection and Compliance Monitoring Plan (EPCMP), describes the environmental protection measures and processes, and compliance monitoring requirements applicable to the production operations phase of the Deep Panuke offshore gas development. The EPCMP has been prepared in accordance with the most recent version of the *Offshore Waste Treatment Guidelines (OWTG)* (CNSOPB, C-NLOPB, NEB, [HOLD 1]), other regulatory requirements and Encana Corporation's (hereafter referred to as Encana) Environment, Health, Safety, and Quality (EHSQ) policies, procedures and expectations. The EPCMP addresses routine and abnormal conditions and emergencies that can reasonably be anticipated to take place on the Production Field Centre (PFC) platform and associated subsea facilities and pipelines.

The EPCMP will act as an environmental roadmap for the management of Deep Panuke production operations throughout the life of the project. It will be updated as required to reflect changes in regulatory requirements, requirements from Encana's Environment, Health and Safety (EHS) Management System, or enhancements in environmental protection/mitigation technologies. The EPCMP outlines specific environmental requirements and also provides direction to other critical Encana policies, plans and procedures that must be followed to ensure that the environmental aspects of the Deep Panuke's operations are well managed. As such, this EPCMP, along with associated procedures, has been developed to provide detailed guidance, in particular for Deep Panuke project personnel (including contractors), on methods of eliminating or minimizing and mitigating adverse environmental effects during production operations. To ensure the successful implementation of environmental protection procedures, this EPCMP includes a clear description of the roles and responsibilities of all personnel having environmental responsibilities. This description will provide clear direction related to accountability, lines of communication and reporting relationships.

An important aspect of the EPCMP is environmental compliance monitoring (ECM), which ensures compliance with all regulatory requirements and environmental commitments made by Encana. Encana will use ECM to monitor performance standards developed for the project. ECM will primarily involve monitoring for conformance with the discharge limits identified in the *OWTG* and targets set by Encana.

This Plan is composed of the following main sections:

- Section 3: Organization and responsibilities;
- Sections 4, 5 and 6: EHS management;
- Section 7: Basis for the plan – an outline of Encana's environmental commitments;
- Section 8: Offshore waste streams and associated protection measures, compliance monitoring and reporting;
- Section 9: Chemical management;
- Sections 10 and 11: Support vessels and helicopters operations;
- Section 12: Spills and unauthorized discharges;
- Section 13: Special situations and operations;

- 
- Section 14: Critical environmental systems – an introduction to critical maintenance requirements;
  - Section 15: Onshore production activities;
  - Section 16: Environmental effects monitoring; and
  - Section 17: Communications with outside interest groups.

Section 8 on Offshore Waste Streams and Associated Protection Measures and Compliance Monitoring describes the major waste streams from the Deep Panuke project. For each stream, it provides information on the system, the objective or discharge limit, specific protection methods that must be followed to ensure effective environmental management, compliance monitoring requirements of the CNSOPB and external reporting requirements.

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## 2 PROJECT SUMMARY

The Deep Panuke project is located offshore, approximately 250 km southeast of Halifax, Nova Scotia, approximately 45 km to the West of Sable Island in an approximate water depth of 44 metres (see Figure 2.1).

The project involves offshore production, processing and transport via a nominal 559 mm (22 inch) sales gas quality pipeline to an interconnection with the Maritimes & Northeast Pipeline (M&NP) facilities near Goldboro, Nova Scotia. The M&NP main transmission pipeline delivers to markets in Canada and the Northeast United States. The condensate produced offshore is treated and used as fuel on the PFC.

The Deep Panuke project facilities consist of a PFC which includes a hull and topsides facilities, four subsea production wells, a disposal well and associated subsea flowlines and control umbilicals, a gas export pipeline (GEP) to shore, and support vessel and helicopter operations.

Deep Panuke is a sour gas reserve with raw gas containing approximately 0.18 mol % (i.e. 1,800 ppm) hydrogen sulphide ( $H_2S$ ). The offshore processing system consists of separation, compression (inlet and export), gas sweetening, gas dehydration, gas dewpointing (via Joule-Thompson), condensate sweetening and stabilization, and produced water treatment and disposal. Once  $H_2S$  and carbon dioxide (acid gas) have been removed from the raw gas stream to acceptable levels, the acid gas is injected into a dedicated disposal well underground.

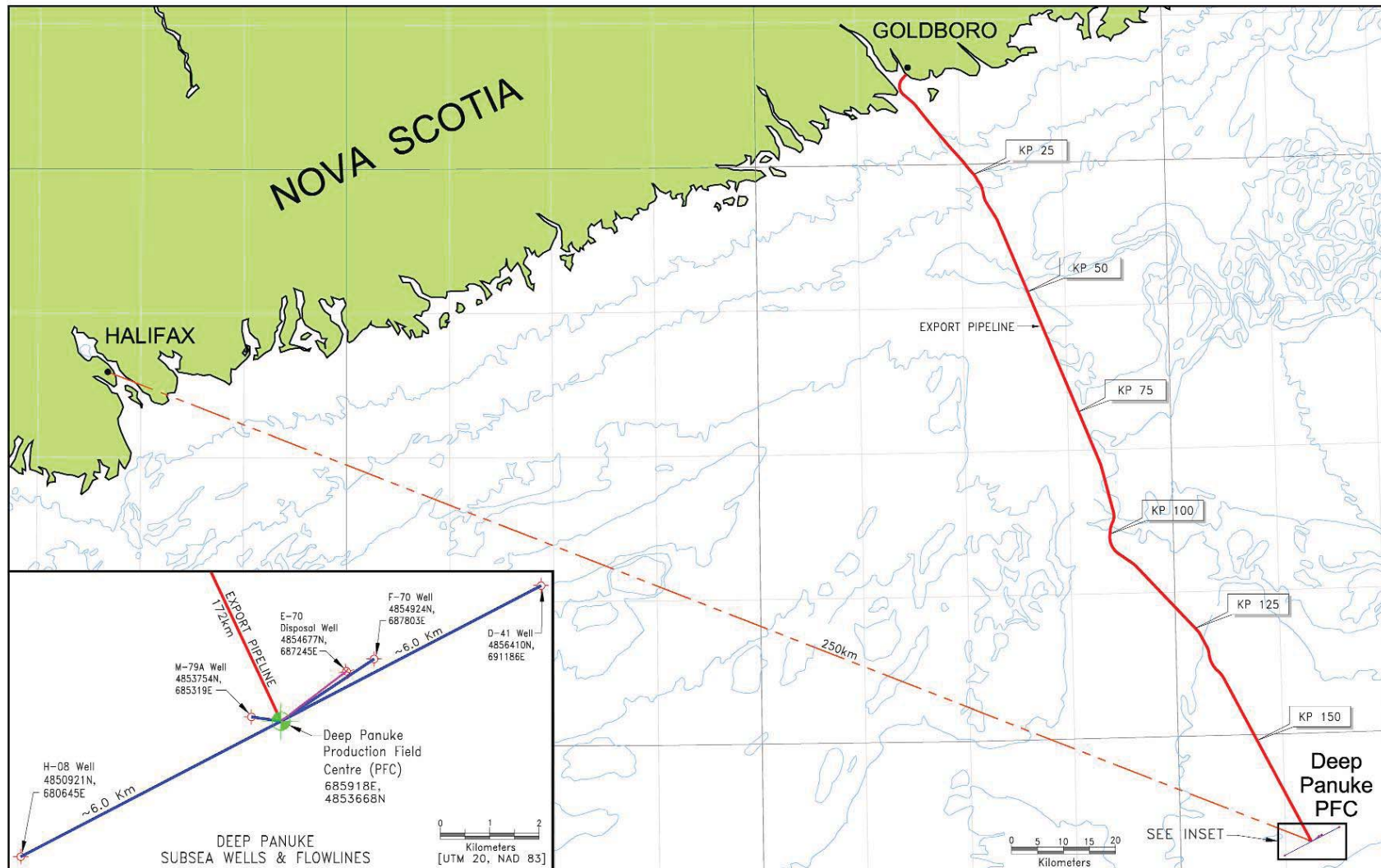


Figure 2.1 Deep Panuke Field Centre Layout

### 3 ORGANIZATION AND RESPONSIBILITIES

#### 3.1 Organization Structure

In November 2007, Encana entered into an agreement with Single Buoy Moorings Inc. (SBM) for the engineering, procurement, fabrication, installation and commissioning of the Deep Panuke PFC. In addition to the provision of the PFC, SBM will provide personnel to help ensure a smooth transition from the development phase into the project's production phase, and will be responsible for the long-term operations of the production facilities, including logistics.

During the production operations phase at Deep Panuke, Encana will remain the operator of record but SBM will own and operate the production facility and oversee day-to-day field operations, as directed by Encana, including production, marine, helicopter and onshore logistics.

Key positions for the implementation of this EPCMP are provided in Table 3.1

**Table 3.1 EPCMP Responsibilities during the Production Operations Phase**

Designate	EPCMP Responsibility
Encana VP Atlantic Canada	<ul style="list-style-type: none"> <li>Overall accountability for EHSQ for Deep Panuke operations</li> </ul>
Encana EH&S Lead	<ul style="list-style-type: none"> <li>Manages environmental performance for Deep Panuke operations</li> </ul>
Encana Regulatory/Environment Lead	<ul style="list-style-type: none"> <li>Environmental performance monitoring and assessment</li> <li>Regulatory liaison, including provision of compliance monitoring data reports to regulatory agencies</li> </ul>
Encana Operations Manager	<ul style="list-style-type: none"> <li>Ensures implementation of EPCMP requirements in offshore production operations and onshore support services</li> </ul>
Encana Offshore Reps	<ul style="list-style-type: none"> <li>Monitor implementation of EPCMP requirements offshore</li> </ul>
SBM Offshore Installation Manager	<ul style="list-style-type: none"> <li>Manage offshore facilities' compliance with EPCMP</li> <li>Validate and audit operational procedural compliance</li> </ul>
SBM EHS/Regulatory Compliance Lead	<ul style="list-style-type: none"> <li>Assessment of EPCMP conformance</li> <li>Compliance data monitoring and compilation</li> </ul>
SBM Offshore Safety Advisor	<ul style="list-style-type: none"> <li>Assist in implementation of EPCMP requirements offshore</li> </ul>

All Encana and SBM personnel will have access to the EPCMP through the local corporate intranet.

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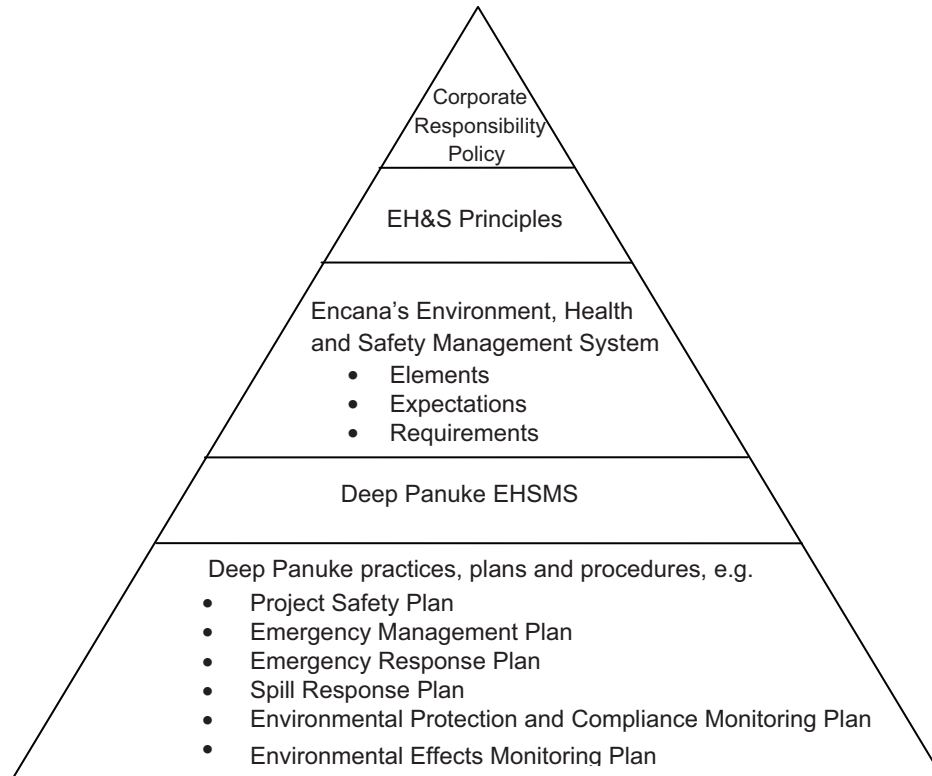
#### **4 MANAGEMENT OF CHANGE**

Changes to this plan will only be effected following SBM/Encana's Deep Panuke management of change procedure for production activities and with the approval of the regulators. No substantive revisions that affect the functional commitments will be effected until such changes are formally approved by the regulators and a revision to the Plan is issued.

## 5 ENVIRONMENT, HEALTH AND SAFETY MANAGEMENT

### 5.1 Environmental Management Framework

Deep Panuke's environmental management framework is shown in Figure 5.1. A description of Encana's Corporate Responsibility Policy, EH&S Principles and Environment, Health and Safety Management System is provided in the Deep Panuke Environment, Health & Safety Management System (EHSMS), DMEN-X00-RP-EH-00-0009, and the environmental components of that framework are summarized below.



**Figure 5.1 Encana's Deep Panuke Environmental Management Framework**

#### 5.1.1 Corporate Responsibility Policy

With respect to the environment, in its Corporate Responsibility Policy (CRP), Encana has committed to the following:

- safeguarding the environment and operating in a manner consistent with recognized global industry standards in environment, health, and safety;
- striving to make efficient use of resources, to minimize its environmental footprint, and to conserve habitat diversity and the plant and animal populations that may be affected by its operations; and
- striving to reduce its emissions intensity and increase its energy efficiency.

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### **5.1.2 Corporate EHS Principles**

Encana's EHS Principles, established to guide the implementation of the CRP commitments, include the following environmental principles:

- We safeguard the environment and contribute to the well-being of the communities in which we live and operate.
- We maintain EnCana's commitment to clear, honest and respectful dialogue with stakeholders.
- We strive to make efficient use of resources, minimize our environmental footprint, and conserve habitat diversity and the plant and animal populations that may be affected by our operations.
- We strive to reduce our emissions intensity and increase our energy efficiency.
- We integrate EnCana's Environment, Health and Safety Management System into all parts of our business.
- We comply with applicable laws, regulations, and industry standards.
- We identify, assess and manage EH&S risks throughout our business.
- We ensure each employee, contractor and third-party service provider understands their EH&S responsibilities, is trained to meet them, and is monitored for compliance.
- We establish EH&S objectives, regularly measure our progress, and strive to continually improve our EH&S performance.

### **5.1.3 Corporate EHS Management System**

The Encana EHS Best Practice Management System is a corporate-wide safety and environmental management system designed to guide all levels of employees, contractors and sub-contractors in achieving the desired level of EHS performance. It is made of ten elements that are applicable to all operating entities, each having defined expectations and requirements. In particular, under Element 5, Conducting our Business Responsibly, Expectation 5.2 stipulates that "*Environmental practices exist to safeguard the environment and ensure environmentally sound performance throughout the lifecycle of the asset or operation*".

## **5.2 Relation to Other Deep Panuke Plans**

This EPCMP was developed in conjunction with other Deep Panuke environmental-related plans, which are listed in Table 5.1. These documents were/will be developed as separate documents and continually revised in consultation with applicable regulatory agencies. Inherent in the environmental management system is the provision for continual improvement, and adaptability to allow the system to respond to environmental challenges so that predicted and actual effects are managed effectively.

**Table 5.1 Other Deep Panuke Environmental-Related Plans**

<b>Other Deep Panuke Environmental-related Plans</b>	<b>Description and Connection to EPCMP</b>
Deep Panuke EHSMS (DMEN-X00-RP-EH-00-0009)	<p>Provides guidance to the project team, including contractors, in implementing the requirements from Encana's corporate EHS plan to the Deep Panuke project.</p> <p>Builds upon Encana's corporate EHSMS and reflects East Coast offshore-specific requirements, including applicable regulations, guidelines and practices.</p>
SBM HSEP Manual for Deep Panuke Operations	SBM's HSE Management System and HSE procedures for Deep Panuke production operations.
Deep Panuke Emergency Management Plan (DMEN-X00-PR-OP-00-0001)	<p>Contains specific provisions for the notification, assessment and response to environmental incidents.</p> <p>Provide emergency response command and control functions for both onshore and offshore emergency situations and covers foreseeable emergencies during all phases of the Deep Panuke project lifecycle.</p>
SBM Emergency Response Arrangements Manual	Provides SBM's emergency response procedures for Deep Panuke production operations.
Encana Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008)	<p>Subset of the Deep Panuke Emergency Management Plan</p> <p>Provides guidance to respond to offshore spills that may result from Deep Panuke operations activities</p> <p>Includes planning considerations, response, and spill environmental effects monitoring</p>
Encana Codes of Practice for Sable Island, the Gully, and Country Island (see Appendix 1)	Outlines Encana's voluntary commitments to protect these special areas

<p>Encana Deep Panuke Production Offshore Environment Effects Monitoring Plan (EEMP) (DMEN-X00-RP-EH-90-0003)</p>	<p>Describes environmental effects monitoring activities for the Deep Panuke operations phase.</p> <p>Will take into account:</p> <ul style="list-style-type: none"> <li>• environmental effects predictions in the approved Deep Panuke 2006 Environmental Assessment and 2007 Comprehensive Study Report;</li> <li>• ongoing findings of the EEM program;</li> <li>• mitigation measures for various effects (if any) ; and</li> <li>• issues that may arise regarding environmental sustainability.</li> </ul> <p>Specific programs to address these issues will be developed in consultation with the regulatory authorities having jurisdiction in such matters. This planning process will be facilitated by the CNSOPB, using the “Environmental Effects Monitoring Coordination Framework (April 12, 2005)”, which was developed by CNSOPB, DFO and EC in consultation with CEAA.</p>
<p>Encana’s Environmental Protection Plan/Environmental Effects Monitoring Plan – Onshore Pipeline (DMJW-O00-RP-EH-91-0001)</p>	<p>Describes the protection and monitoring measures that will be implemented for the onshore portion of the Deep Panuke pipeline during production operations. Plan was developed and first implemented during the construction of the onshore facilities and has been filed with the NEB.</p>
<p>SBM Waste Management Plan for Deep Panuke</p>	<p>Provides details on the waste management system to be implemented for waste generated offshore and sent to shore for treatment and/or disposal during Deep Panuke production activities</p>
<p>SBM Chemical Management Plan for Deep Panuke</p>	<p>Provides more details on the chemical management system to be implemented during Deep Panuke production activities</p>
<p>Work Procedures from the SBM Deep Panuke PFC Operations Manual</p>	<p>Provide details of specific work procedures related to production activities, including (but not limited to):</p> <ul style="list-style-type: none"> <li>• Volume 2 (Utilities), Section 1.0 – Power Generation and Distribution</li> <li>• Volume 2 (Utilities), Section 3.0 – Seawater System</li> <li>• Volume 2 (Utilities), Section 4.0 – Marine Diesel Oil System</li> <li>• Volume 2 (Utilities), Section 8.0 – Bilge and Ballast System</li> <li>• Volume 2 (Utilities), Section 9.0 – Sewage System</li> <li>• Volume 2 (Utilities), Section 10.0 – Dirty Oil System</li> <li>• Volume 2 (Utilities), Section 12.0 – Helifuel Package</li> <li>• Volume 4 (Process), Section 3.0 – Produced Water</li> <li>• Volume 4 (Process), Section 12.0 – Flares</li> <li>• Volume 4 (Process), Section 13.0 – Drains</li> <li>• Volume 4 (Process), Section 16.0 – Laboratory</li> </ul>
<p>SBM’s Marine &amp; Logistics Manual DMSB-X00-OM-OP-94-0040</p>	<p>Describes work procedures associated with marine and logistics operations</p>

SBM's Helicopter Operations Code of Practice for Deep Panuke PFC (DMSB-X00-RP-OP-00-0087)	Describes work procedures associated with helicopter operations
SBM's Platform Operations Training and Competence Philosophy (DMSB-X00-RP-OP-00-0074) and Deep Panuke PFC Training Plan (DMSB-X00-RP-OP-00-0089)	Outline training requirement for Deep Panuke production operations

**5.3 Design Risk Assessments**

Hazard and risk assessments will be used to support and coincide with good engineering practices, industry codes of practice, and informal safety reviews. Formal risk assessments are a primary method to determine the following:

- design basis for environmental and safety-related systems and equipment; and
- performance criteria for the production facility, its systems and sub-systems.

All facets of facilities design and operation that affect safety and the environment will be assessed with consideration of the following potential events/undesirable outcomes:

- interface problems between equipment and systems;
- abnormal conditions not envisioned during design; and
- human error in design, operation and maintenance.

A fundamental objective is to reduce the risks to personnel and the environment to as low as reasonably practicable (ALARP).

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## 6 ORIENTATION, TRAINING AND SUPPORT

Providing targeted assistance to employees and contractors is essential to ensuring that they understand how to work in a safe and environmentally responsible manner. To that end, both Encana and its contractors provide appropriately targeted orientation and training programs and materials to assist personnel fulfill their responsibility to work in a safe and environmentally responsible manner consistent with Deep Panuke policies. This training is normally provided prior to the commencement of work on the Deep Panuke facilities; however, it may be necessary for some job specific training to occur “on the job” in order to be effective. Training requirements for the Deep Panuke operations are outlined in SBM’s Platform Operations Training and Competence Philosophy (DMSB-X00-RP-OP-00-0074) as well as the Deep Panuke PFC Training Plan (DMSB-X00-RP-OP-00-0089).

As part of its operations, Encana will ensure that relevant personnel and contractors have received training in the following, as required:

- Encana’s Corporate Responsibility Policy;
- potential significant environmental aspects and impacts of their work activities;
- EMS roles and responsibilities;
- waste management; and
- emergency preparedness and spill response.

As appropriate, Encana and its contractors provide job specific technical, EH&S induction training and orientations.

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## 7 BASIS FOR THE PLAN

During the project's regulatory review process, which included an environmental assessment at the comprehensive study level under the *Canadian Environmental Assessment Act* as well as a public hearing pursuant to the CNSOPB and NEB application processes, Encana made environmental protection and management commitments related to production operations. In addition, the CNSOPB and NEB have imposed conditions on their approvals of the project relevant to environmental protection and compliance.

The basis for this EPCMP is the CNSOPB and the NEB regulatory approval processes as well as the comprehensive study process for the Deep Panuke project; Encana's EHS policy and procedures and other relevant regulatory requirements are also inputs to this plan.

### 7.1 Encana Environmental Commitments

The environmental commitments made by Encana during the 2006-2007 regulatory approval process which are relevant to production operations are provided in Appendix 2, along with the sections of this EPCMP where each commitment is addressed.

### 7.2 Conditions of Project Approval

Table 7.1 below outlines the conditions placed on the CNSOPB and NEB approvals of the Deep Panuke project relevant to the production operations phase as well as the sections of this EPCMP where each condition is addressed.

**Table 7.1 Environmental Conditions of CNSOPB & NEB Approvals for the Operations Phase of the Deep Panuke Project**

Decision Conditions	Relevant Section(s) of EPCMP
<p><b>CNSOPB Condition 21:</b> The Proponent shall comply with all commitments, mitigation and follow-up measures related to the portion of the Project within the Nova Scotia offshore area that are identified in the 2007 CSR for the Deep Panuke project, including those adopted from the 2002 CSR.</p>	7.1, 7.3
<p><b>CNSOPB Condition 25:</b> A minimum of 45 days prior to commencement of either installation of Project components, or drilling of new wells, Proponent shall submit an EPP, acceptable to the Board's CCO.</p>	7.3
<p><b>CNSOPB Condition 26(a) :</b> Proponent shall implement an EEM Program for Project life cycle. EEM Program shall be submitted a min. of 45 days prior to commencement of either drilling of new wells or installation of Project components.</p>	16.0
<p><b>CNSOPB Condition 26(b) :</b> Once production has begun, no later than March 31 of each year, Proponent shall submit its EEM results for the previous year, and shall update its EEM Program taking into account both EEM results of previous year and environmental effects predictions contained in 2002 CSR and 2007 CSR.</p>	16.0
<p><b>NEB Condition 21:</b> File with Board 3 copies of its Emergency Preparedness and Response Manual (EPRM) for both Onshore &amp; Offshore pipeline segments, at least 30 d prior to submission of Leave to Open application(s). In preparing its EPRM, ECA shall refer to Board letter dated 24 April 2002 entitled Security and Emergency Preparedness Programs addressed to all oil and gas companies with facilities under jurisdiction of NEB. ECA shall regularly review and file updates to program, as necessary, with Board.</p>	7.3, 5.0, 12.0
<p><b>NEB Condition 25:</b> EnCana shall file with the Board annually, unless the Board otherwise directs, a report describing exposed segments of the Offshore pipeline. The report shall, for the entire length of the pipeline, include the following information as a minimum: a) a description of the monitoring methodology used; b) a description of all exposed pipeline segments and free spans, including the location, length, sea bottom geology, water depth and any associated issues; c) a description of observed coating or pipeline damage; d) proposed changes to the pipeline monitoring program; and e) as appropriate, proposed mitigative measures and follow-up actions with regards to proposed pipeline exposure and free spanning conditions.</p>	7.3, 5.0, 16.0

### 7.3 Regulatory Framework

Table 7.2 outlines the key environmental statutes and guidelines to which the Deep Panuke operations are subject.

**Table 7.2 Environmental Statutes and Guidelines Most Relevant to Deep Panuke Operations**

<b>Statute or Guideline</b>	<b>Responsible Regulatory Agency</b>
<i>Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act</i>	CNSOPB
<i>Nova Scotia Offshore Petroleum Drilling and Production Regulations</i>	CNSOPB
<i>Nova Scotia Offshore Petroleum Installations Regulations</i>	CNSOPB
<i>Canada - Nova Scotia Oil and Gas Spills and Debris Liability Regulations</i>	CNSOPB
<i>Draft Drilling and Production Guidelines</i>	CNSOPB, C-NLOPB
<i>Draft Environmental Protection Plan Guidelines</i>	CNSOPB, C-NLOPB
<i>Offshore Waste Treatment Guidelines</i>	CNSOPB, C-NLOPB, NEB
<i>Guidelines Respecting the Selection Of Chemicals Intended to be Used in Conjunction with Offshore Drilling &amp; Production Activities on Frontier Lands</i>	CNSOPB, C-NLOPB, NEB
<i>Offshore Physical Environmental Guidelines</i>	CNSOPB, C-NLOPB, NEB
<i>Compensation Guidelines Respecting Damage Relating to Offshore Petroleum Activity</i>	CNSOPB, C-NLOPB
<i>Guideline for the Reporting and Investigation of Incidents</i>	CNSOPB, C-NLOPB
<i>Canadian Environmental Protection Act and Regulations</i>	Environment Canada
<i>Migratory Birds Convention Act and Regulations</i>	Environment Canada
<i>Fisheries Act and Regulations</i>	Fisheries and Oceans Canada
<i>Oceans Act and Regulations</i>	Fisheries and Oceans Canada
<i>Canada Shipping Act 2001 and Regulations</i>	Transport Canada
<i>International Marine Dangerous Goods Regulations under IMO</i>	Transport Canada
<i>Marine Occupational Safety and Health Regulations</i>	Transport Canada and Labour Canada
<i>Navigable Waters Protection Act and Regulations</i>	Transport Canada
<i>Transportation of Dangerous Goods Act and Regulations</i>	Transport Canada
<i>Hazardous Products Act and Regulations</i>	Health Canada
<i>Pest Control Products Act and Regulations</i>	Health Canada
<i>Workplace Hazardous Materials Information System Regulations</i>	Nova Scotia Department of Government Services

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## 8 OFFSHORE WASTE STREAMS AND ASSOCIATED PROTECTION MEASURES AND COMPLIANCE MONITORING

Wherever possible, the volumes of wastes generated during production operations and the quantity of substances of potential environmental concern contained in these waste streams will be minimized. The environmental protection measures outlined in this section are based on Encana's and SBM's best management practices to prevent or reduce the generation and/or discharge of waste into the environment. Waste materials will be reused and recycled where possible, with disposal being used as a last resort.

In addition, this section outlines the basic compliance monitoring requirements associated with Deep Panuke operations to enable monitoring of compliance with the *Offshore Waste Treatment Guidelines* (OWTG) (CNSOPB, C-NLOPB, NEB [HOLD 1]) and ongoing improvements in environmental performance.

The Deep Panuke management team will work with functional group representatives to ensure that waste minimization objectives are established at relevant functions and levels within the Deep Panuke's operations to facilitate the continual improvement of environmental performance. Within one year of First Gas, waste reduction/minimization targets will be developed and performance against those targets will be monitored annually thereafter.

As per Section 87 of the *Drilling and Production Regulations*, an annual environmental report will be submitted to the CNSOPB by March 31 of each year and will include a summary of any environmental incidents (including exceedances of operational discharge limits), discharges that occurred, waste material that was produced, and a discussion of efforts undertaken to reduce pollution and waste material. In addition, as per the OWTG [HOLD 1], Encana will periodically review and update its strategy to control and reduce greenhouse gas emissions and will report the results to the Board.

The following sections provide a description of the various waste streams resulting from Deep Panuke production activities, including monitoring and reporting requirements, as required.

### 8.1 Offshore Production Waste Streams

#### 8.1.1 Introduction

The OWTG specify a variety of authorized waste discharges that are subject to compliance measurement, monitoring and/or reporting for specific parameters. Appendix 3 of this Plan includes a production operator's guide to the latest version of the OWTG for easy reference, which summarizes discharge limits, protocols for measurement and reporting requirements for both routine and upset conditions.

Although the OWTG represent the minimum standard for treatment, monitoring and reporting of authorized discharges, under some conditions, Encana will strive to perform better than the requirements outlined in the guidelines when practicable.

As well as a basis for compliance and reporting, the various parameters monitored pursuant to the OWTG allow Encana to conduct the following:

- check and verify performance efficiencies of mitigative measures and treatment systems;
- identify problem areas so that appropriate corrective measures can be taken; and

- 
- help interpret data from Encana's offshore production Environmental Effects Monitoring (EEM) program.

Wastes not authorized for offshore discharge will be sent to shore for appropriate treatment and disposal.

Those waste streams that are directly relevant to Deep Panuke production operations are discussed below.

### ***8.1.2 Summary of Offshore Waste Streams***

Table 8.1 below includes a summary of waste streams resulting from the Deep Panuke production activities. Figure 8.1 shows a schematic of the discharge points for the various waste streams, which are located in the south-east leg of the PFC.

**Table 8.1 Summary of Operational Offshore Waste Streams from the Deep Panuke Project**

PFC System	Discharge Phase (Solid, Liquid, Gas)	Collected & Treated (Yes/No)	Regulated Under OWTG and/or OCSG (Yes/No)		Substances Discharged	Authorized Discharge	Discharge Points	Compliance Monitoring Limits	Compliance Monitoring Measurements	Reporting <sup>3</sup>	EPCMP Section
			OWTG <sup>1</sup>	OCSG <sup>2</sup>							
Flare and Vent / Power Generators	Gas	No	Yes	No	GHG, VOC, SOx, NOx	Yes	Flare stack / Generator exhausts	No	N/A	<ul style="list-style-type: none"> <li>• NPRI <sup>4</sup></li> <li>• GHG for LFE (CEPA) <sup>5</sup></li> <li>• Air contaminants under CAMS (as applicable) <sup>6</sup></li> <li>• Periodic review of GHG strategy <sup>7</sup></li> </ul>	8.10
Produced Water Treatment	Liquid	Yes	Yes	Yes	Oil in water, treatment, reservoir chemicals, methanol	Yes	Seawater discharge caisson @ 26m below LAT	<ul style="list-style-type: none"> <li>• 30-day volume weighted average OIW: 30 mg/L <sup>7,8</sup></li> <li>• 24-hr average OIW: 44 mg/L <sup>7</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Oil in water measured at least every 12 hr using Standard Methods for the Examination of Water and Wastewater, 20th Edition, 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons</li> <li>• Chemical characterization (twice yearly) and toxicity testing (yearly)</li> </ul>	<ul style="list-style-type: none"> <li>• Exceedances <sup>9</sup></li> <li>• Oil and methanol data (monthly) <sup>7</sup></li> <li>• Produced water characterization (chemical/toxicity) (annual) <sup>7</sup></li> <li>• Chemical use report (annual) <sup>10</sup></li> </ul>	8.5
Deck & Machinery	Liquid	Yes	Yes	Yes	Oil in Water	Yes	Seawater discharge caisson @ 26m below LAT	• 15 mg/L OIW <sup>7</sup>	<ul style="list-style-type: none"> <li>• For each batch discharge, effluent from open drains tank sampled and run through on-line analyzer to warn of off-spec water during discharge</li> <li>• Manual sample tested according to Standard Methods for the Examination of Water and Wastewater, 20th Edition, 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons to confirm oil content was below 15 mg/L</li> </ul>	• Exceedances <sup>9</sup>	8.4
Ballast (vessels only)	Liquid	No	No	No	Seawater	Yes	Ballast ports	• 15 mg/L OIW <sup>11</sup>	• N/A (ballast water segregated; only clean water discharged)	• As per <i>Ballast Water Control and Management Regs (Canada Shipping Act)</i>	8.3
Bilge	Liquid	Yes	Yes	No	Oil in water	Yes	Open drains system (seawater discharge caisson @ 26m below LAT)	• 15 mg/L OIW <sup>7,11</sup>	• Feeds into open drains system	• Exceedances <sup>9</sup>	8.2
Seawater System	Liquid	No	Yes	No	Seawater, residual chlorine	Yes	Seawater discharge caisson @ 26m below LAT	• Max residual chlorine: 2 mg/L <sup>12</sup>	<ul style="list-style-type: none"> <li>• Lab analysis of residual chlorine levels (likely weekly and for expected changes in residual chlorine levels)</li> <li>• Validation in accordance with American Public Health Association's Standard Methods for the Examination of Water and Wastewater, 20th Edition.</li> </ul>	• Exceedances <sup>13</sup>	8.6
Sewage and Grey Water Treatment	Liquid	Yes	Yes	No	Aerobically digested sewage, grey water, residual chemicals [HOLD 2]	Yes	Sewage discharge pipe @ 10 m below LAT	No	N/A	No	8.7
Subsea trees	Liquid	No	Yes	Yes	Glycol-based hydraulic fluid	Yes	Hydraulic valves at seafloor	No	N/A	<ul style="list-style-type: none"> <li>• Discharged fluid volumes or tonnage (monthly) <sup>7</sup></li> <li>• Chemical use report (annual) <sup>10</sup></li> </ul>	8.8
NORM	Liquid, Solid	Yes	Yes	No	NORM	Case by case authorization	Sent to shore <sup>14</sup>	No	N/A	No	13.2
Other Hazardous and Non-Hazardous Wastes	Liquid, Solid	Yes	Yes	Yes	None	No	Sent to Shore	N/A	N/A	• Section 87 of CNSOPB <i>Drilling and Production Regulations</i> (annual)	8.9

- Notes:**
- (1) OWTG – *Offshore Waste Treatment Guidelines* (CNSOPB, C-NLOPB, NEB, [HOLD 1])
  - (2) OCSG – *Offshore Chemical Selection Guidelines for Drilling & Production Activities on Frontier Lands* (CNSOPB, C-NLOPB, NEB)
  - (3) Reporting to the CNSOPB unless otherwise specified
  - (4) Reporting of air emissions as per the National Pollution Release Inventory (NPRI)
  - (5) Report of greenhouse gases emissions as per Environment Canada's reporting requirements for Large Final Emitters (LFEs) under the *Canadian Environmental Protection Act (CEPA)*
  - (6) Encana will comply with any new air emission reporting requirements coming up during the life of the project, e.g. potential new air contaminants requirements under the Comprehensive Air Management System (CAMS) under *CEPA*, as applicable
  - (7) As per the OWTG [HOLD 1]
  - (8) Encana's internal target for 30-day volume weighted average of oil in water is 25 mg/L; however, the OWTG [HOLD 1] limits will be used for compliance monitoring purposes
  - (9) To be reported as a spill to CNSOPB and CCG as per as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and the *CNSOPB Guidelines for the Reporting and Investigation of Incidents*
  - (10) As per the OCSG
  - (11) *Canada Shipping Act 2001* and MARPOL requirements
  - (12) Encana's internal commitment
  - (13) To be reported as an unauthorized discharge to the CNSOPB as per the *CNSOPB Guidelines for the Reporting and Investigation of Incidents*
  - (14) The PFC will be monitored in compliance with SBM's NORM Code of Practice. Sources, when identified, will require manual extraction and waste will be shipped to shore.

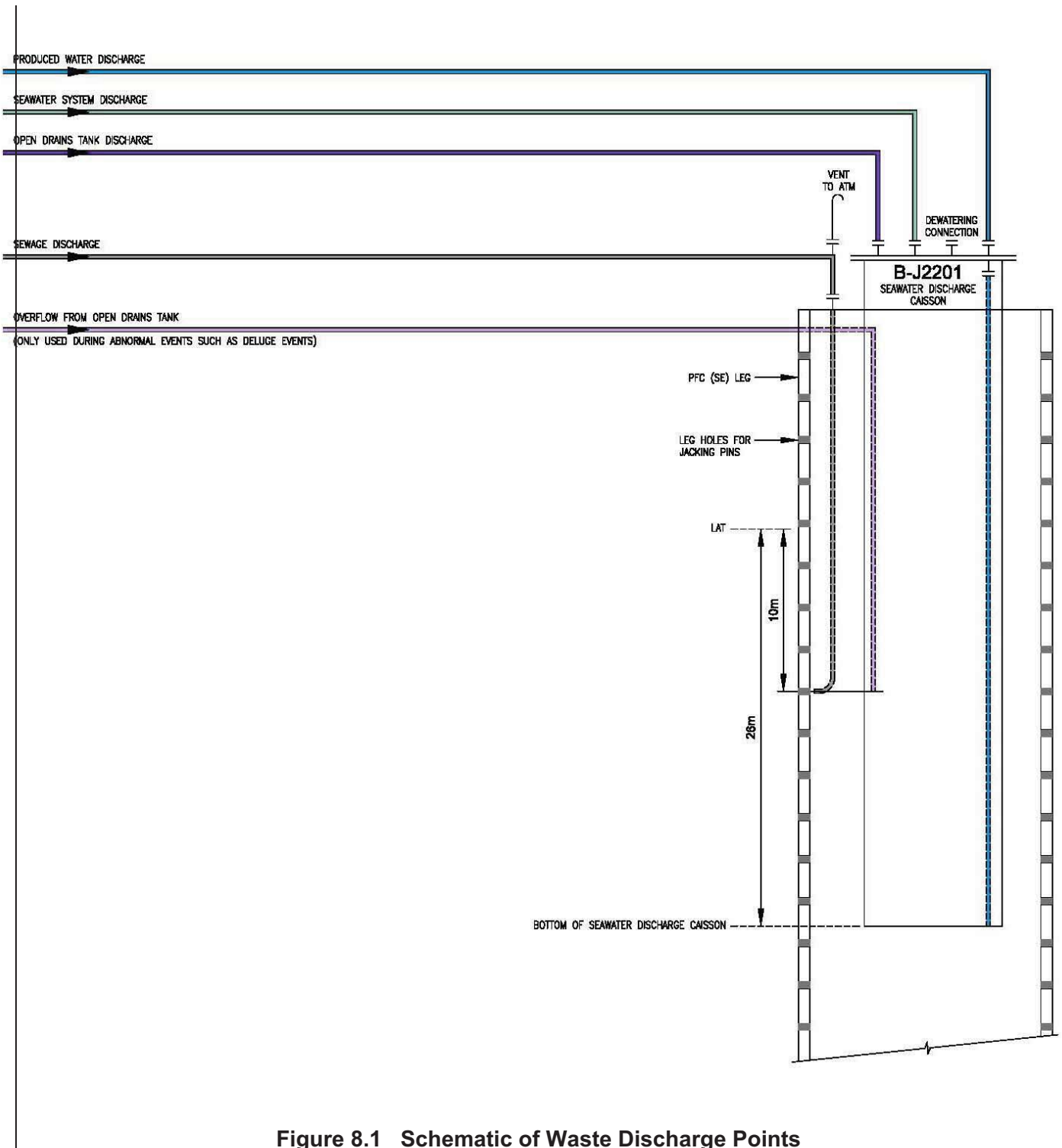


Figure 8.1 Schematic of Waste Discharge Points

### **8.1.3 Authorized Discharges Requiring Compliance Monitoring**

The various authorized discharges to the marine environment from a production installation that are subject to specific compliance monitoring requirements, include the following:

- bilge and/or ballast water;
- deck drainage including storm water that is or is likely to be subject to hydrocarbon contamination;
- produced water (potentially including well treatment fluids); and
- residual chlorine in discharged cooling water.

For effluents subject to discharge and monitoring, qualified and competent technicians will be used to conduct laboratory analyses in accordance with the OWTG. Encana will verify the implementation of these procedures through its internal audit process.

### **8.1.4 Authorized Discharges Requiring Routine Reporting but not Compliance Monitoring**

Some authorized discharges under the OWTG require regular reporting to the CNSOPB but are not subject to monitoring for compliance to specific discharge limits. These include air emissions, specifically greenhouse gases (GHGs) and volatile organic compounds (VOCs).

### **8.1.5 Authorized Discharges Not Requiring Compliance Monitoring or Routine Reporting**

Some authorized discharges identified in the OWTG, while they may be subject to specific treatment or handling criteria, are not subject to either monitoring for compliance to specific discharge limits or routine reporting. These include the following:

- sanitary and food wastes that have been macerated <6 mm particle size prior to discharge;
- drainage water from the helideck (with no hydrocarbon contamination);
- fire water (no treatment required); and
- desalinization brines (no treatment required).

### **8.1.6 Prohibited Discharges or Discharges Requiring Case by Case Authorization**

Some waste streams identified in the OWTG may not be discharged under any circumstance or if they are to be discharged, they require individual approvals from the CNSOPB Chief Conservation Officer.

Waste streams that may not be discharged under any circumstance include any substances, wastes or residues not specifically permitted for discharge under the OWTG (e.g., sludge from oil-water separator systems, waste materials and fluids from drip pans, spent lubricants, all plastics, excess or damaged supplies of chemicals, etc.). Additional information on waste treatment and disposal for these waste streams is provided in SBM's Waste Management Plan for Deep Panuke .

Waste streams requiring specific CNSOPB approval prior to discharge on a case by case basis include naturally occurring radioactive materials (NORM).

## **8.2 Bilge Discharges**

### **8.2.1 Overview**

The function of the bilge system on the PFC is to collect bilge fluids from the following sources in the hull and LQ auxiliary rooms, and route them either to bilge pump P-J1201A for discharge to the open drains system (see Section 8.4) or to the dirty oil pump P-J2301 for routing to the dirty oil tote tank:

- east/west fire pump rooms
- double bottom below south west storage area
- cofferdam west side
- hull auxiliary room
- air compressor room
- LQ auxiliary room
- emergency generator room
- double bottom below E rooms
- hull HVAC plant room
- mechanical workshop
- workshop welding and hot work
- winterized diesel oil storage area
- hull auxiliary storage area

Additional information on the management of the PFC bilge system is included in the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 8.0 – Bilge System.

Support vessels involved in the Deep Panuke project will be equipped with bilge systems. The purpose of the vessels' bilge system is to capture and contain unwanted fluids collecting in specific vessel spaces, treating those fluids and discharging any separated water overboard.

### **8.2.2 Environmental Objective**

Support vessel associated with the Deep Panuke project will adhere to shipping (e.g. *Canada Shipping Act 2001*, MARPOL) requirements for the treatment of bilge water to a residual oil concentration of 15 mg/L or less prior to discharge.

The PFC bilge water system will meet the 15 mg/L oil in water discharge requirement from the *OWTG* (see Appendix 3 for a summary of the *OWTG*).

### **8.2.3 Environmental Protection Measures**

See Section 8.4 for a description of the PFC open drains system into which the PFC bilge water system feeds.

The vessels have certified oily water separation equipment in place to manage bilge water in compliance with MARPOL and the *OWTG*. Untreated (i.e., oil concentration > 15 mg/L) bilge will not be discharged into surrounding water. Encana will ensure that oily water separation equipment is in good operating order and that its third party certification is maintained. Operation of the bilge management systems will result in the accumulation of hydrocarbon sludge in various holding tanks on the vessels, which will be taken to shore for appropriate disposal.

Vessel operators will regularly check the liquid level in all bilges and will maintain a log of all overboard discharges.

### **8.2.4 Compliance Monitoring Requirements**

The PFC bilge water system feeds into the PFC open drains system; compliance monitoring requirements for the open drains system (and therefore for the bilge water system) are described in Section 8.4.4.

### **8.2.5 Reporting**

Any discharge of bilge water exceeding 15 mg/L of oil in water will be immediately reported as a spill to the CNSOPB and the CCG as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and the CNSOPB *Guidelines for the Reporting and Investigation of Incidents* (see Section 8.11).

## **8.3 Ballast Water**

### **8.3.1 Overview**

The ballast system only pertains to the support/standby vessels involved in the Deep Panuke project and not the PFC itself. The original PFC design included a ballast system which had been intended for use during the transport and installation of the facility. Subsequent work by SBM to finalize transportation and installation procedures has made that system obsolete and the PFC ballast system will not be used.

The vessels' ballast systems are used to help maintain their integrity of by managing shear forces and bending moments to acceptable limits. The segregated ballast tanks are used exclusively for seawater ballast and have their own pumping and piping systems.

The vessels' ballast systems were designed in accordance with the requirements of MARPOL 73/78, Annex I, Regulation 13, which requires segregated ballast tanks exclusively used for the carriage of water ballast.

### **8.3.2 Environmental Objective**

Support vessel associated with the Deep Panuke project will adhere to shipping (e.g. *Canada Shipping Act 2001*, MARPOL) requirements for the treatment of ballast water to a residual oil concentration of 15 mg/L or less prior to discharge, since the vessels' segregated ballast system will avoid the discharge of any hydrocarbons to the environment.

Encana will contractually require that its vessel contractors comply with the *Ballast Water Control and Management Regulations* under the *Canada Shipping Act 2001*.

### **8.3.3 Environmental Protection Measures**

Support vessels have segregated ballast water systems and therefore no treatment system is required for discharge of ballast waters.

Only clean sea water will be pumped into and out of the ballast tanks.

When applicable, vessels will comply with the *Ballast Water Control and Management Regulations* under the *Canada Shipping Act 2001*, including provisions to replace its ballast water before entering Canadian waters.

### **8.3.4 Compliance Monitoring Requirements**

Because ballast water is segregated from bilge water and only clean water will be discharged, no specific monitoring is required.

### 8.3.5 Reporting

Because ballast water is segregated from bilge water and only clean water will be discharged, no specific reporting is required.

In addition, all vessels from the Deep Panuke projects will comply with the reporting requirements from the *Ballast Water Control and Management Regulations* under the *Canada Shipping Act 2001*.

## 8.4 Deck Drainage Water

### 8.4.1 Overview

The Deep Panuke PFC deck drainage system consists of both hazardous and non-hazardous collection manifolds being directed to a common open drains tank. The hazardous open drains system collects deck drains from the process modules, where production fluids could be present. The non-hazardous open drains manifold collects deck drainage from non-process modules, where contamination with process fluids is not a concern. Open drains from hazardous and non-hazardous areas are separated to prevent backflow of emissions from a hazardous area to a non-hazardous area.

The open drains headers from both the hazardous and non-hazardous open drains systems are routed into the “dirty” compartment of the open drains tank. The “dirty” compartment has been sized to allow sufficient retention time for hydrocarbon products to settle out and form a skim at the surface of the tank. This skim is collected with the skim pump and sent into the closed drains header. Water from the “dirty” compartment is then treated using a cartridge-style (organophilic clay type) polisher to further reduce residual amounts of hydrocarbons prior to going into the “clean” compartment of the open drains tank. A sheen analyzer at the surface of the “clean” compartment of the open drains tank triggers an alarm when the sheen level reaches 10-cm. The treated water from the “clean” compartment is then measured by an oil in water analyzer (alarm set at 15 mg/L of oil in water) and sampled for lab testing prior to being discharged overboard through the seawater discharge caisson at a depth of approximately 26 m below lowest astronomical tide (LAT). See Figure 8.2 for a schematic of the deck drainage system.

All piping and tanks within these systems will be winterized.

In the event of a deluge situation where the open drains collection boxes cannot handle a sudden increase in volume, the open drains collection boxes are equipped with overflow lines that direct excess liquid overboard.

The open drains tank is also equipped with overboard lines, situated in both the “clean” and “dirty” compartments. The intake for these overflows is located near the bottom of the tanks to ensure that the liquid overflowed overboard is water and not oil. The overflow lines are directed to the seawater discharge caisson. Overflow lines will only be used during abnormal conditions such as deluge events.

To warn personnel of an impending hazard, the liquid level in the open drains tank is monitored with level transmitters. These will trigger both a visual and an audible alarm when the level in tanks reaches a high level. When a high alarm is triggered in the tank, personnel will respond to determine cause, take corrective action and monitor the area in the vicinity of the seawater discharge caisson for signs of sheen.

Additional information on the management of deck drainage water is included in the SBM Deep Panuke PFC Operations Manual, Volume 4 (Process), Section 13.0 – Drains.

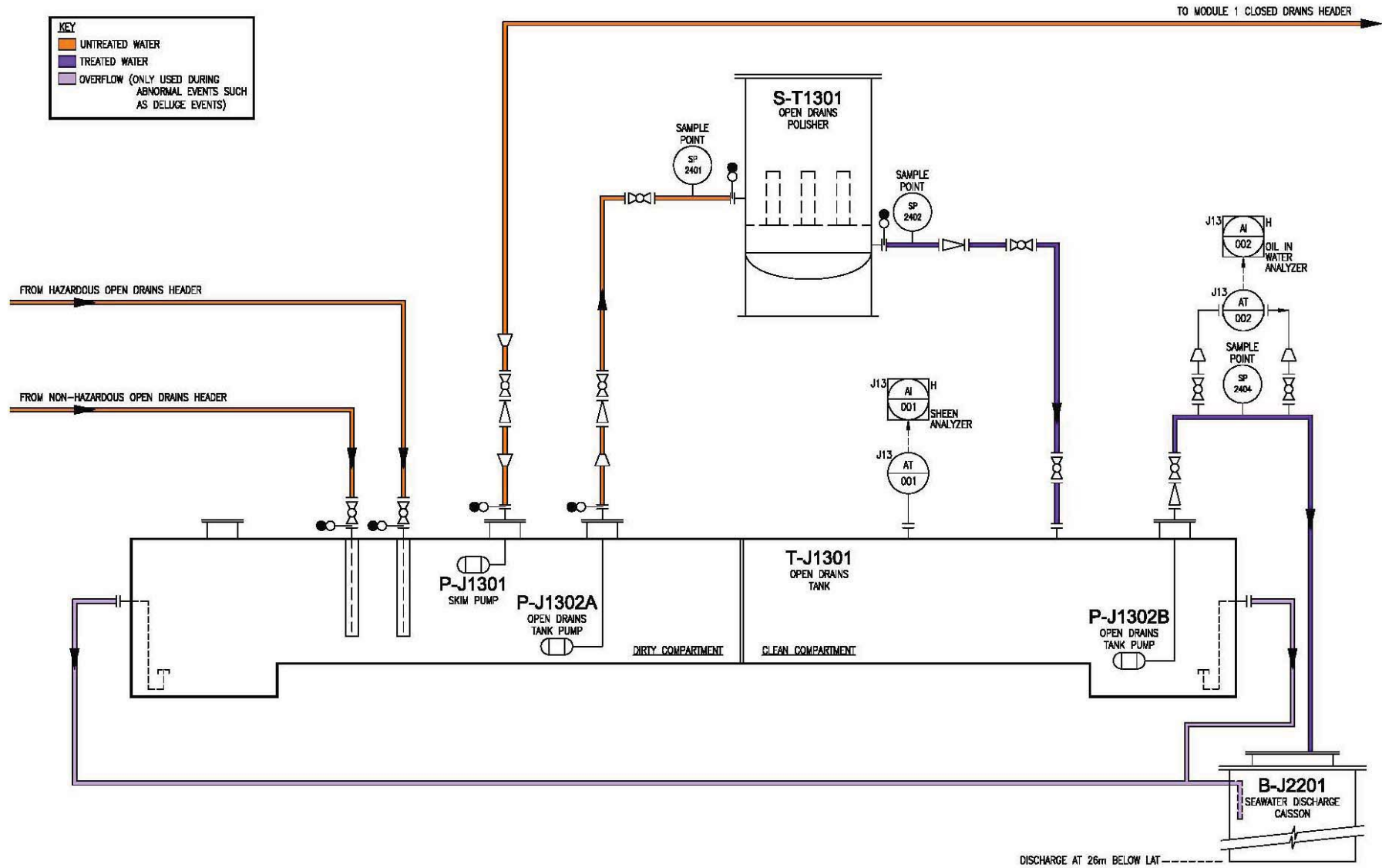


Figure 8.2 Deck Drainage System Schematic

#### **8.4.2 Environmental Objective**

Encana will meet the 15 mg/L oil in water discharge requirement for deck drainage water (see Appendix 3 for a summary of the OWTG).

#### **8.4.3 Environmental Protection Measures**

The management of deck drainage water is outlined in Section 8.4.1.

If a spill of hydrocarbons or other hazardous material occurs on the deck, it must be cleaned up immediately to minimize the risk of the material being entrained in deck drainage and potentially being lost to the marine environment.

Prior to discharging any water, the effluent will be analyzed to confirm that the oil in water concentration is less than 15 mg/L (see Section 8.4.4).

Encana will ensure that oily water separation equipment is in good operating order and its third party certification is maintained.

Deck drainage water that exceeds 15 mg/L of oil in water will be recycled to the open drains tank for further treatment or collected and transported to shore for proper treatment and disposal through an approved waste contractor.

Maintenance activities occurring outside of banded areas, where the release of hazardous materials including oil could occur, will be conducted where possible using spill collection materials (e.g., drip pans, drain plugs, absorbent pads and/or socks, etc.) to minimize the exposed area in the event of a spill or release.

#### **8.4.4 Compliance Monitoring Requirements**

For any batch discharge of treated water from the “clean” compartment of the open drains tank, the clean compartment pump will be started and the resulting effluent stream to the discharge caisson will be sampled at the sample port and run through the on-line analyzer. The analyzer will warn of any off-spec water during the discharge; and the test results from the manual sample (which might only be available after the water has been discharged) will confirm that the oil in water concentration was below 15 mg/L.

The deck drainage water sample will be analyzed in accordance with Standard Methods for the Examination of Water and Wastewater, 20th Edition, 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons, as per the OWTG (see Appendix 3 for a summary of the Guidelines). This testing will be conducted in the PFC’s onboard laboratory (as per the SBM Deep Panuke PFC Operations Manual, Volume 4 (Process), Section 16.0 – Laboratory).

#### **8.4.5 Reporting**

Any discharge of deck drainage water exceeding 15 mg/L of oil in water will be immediately reported as a spill to the CNSOPB and the CCG as per Encana’s Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and the CNSOPB *Guidelines for the Reporting and Investigation of Incidents* (see Section 8.11).

### **8.5 Produced Water**

#### **8.5.1 Overview**

The purpose of the produced water treatment system is to remove H<sub>2</sub>S and residual hydrocarbons from the produced water prior to its discharge to the ocean. The produced water system on the Deep

Panuke PFC consists of enhanced separation, treatment and disposal facilities (see the produced water system schematics in Figures 8.3 and 8.4).

Water from the inlet separator, test separator and condensate stabilizer surge drum will be routed through dedicated hydrocyclones and to the produced water downstream enhancement vessel. The hydrocyclones oil outlets will be routed to the closed drains system.

The produced water downstream enhancement vessel outlet will flow through the produced water cartridge-style (organophilic clay type) polisher(s) prior to being preheated in the produced water stripper feed preheaters. The heated water will then enter the produced water stripper.

The produced water stripper will remove H<sub>2</sub>S and will also contribute to further removing hydrocarbon content. The gas from the stripper will be routed to the stabilizer overhead compressor.

An in-line oil in water analyzer on the water outlet of the stripper will ensure that the produced water treatment facilities are optimized. The discharge stream will also be sampled on the water outlet of the stripper and analyzed to verify oil in water content values are at acceptable levels.

The produced water system will be designed for a rate of 6,360 m<sup>3</sup>/d. The oil removal design basis is to ensure a maximum of 25 mg/l of oil in water on the outlet stream. The OWTG [HOLD 1] specify that the level of hydrocarbons in produced water should not exceed the regulated limit of 30 mg/L on a 30-day rolling average (with no exceedance of 44 mg/L in 24 hours).

The produced water treatment system will have appropriate measurement, alarm and treatment capabilities. The produced water (after sampling) will go down the seawater discharge caisson and be mixed with the spent 3,340 m<sup>3</sup>/hr cooling water inside the leg prior to discharge into the ocean environment at a depth of approximately 26 m below LAT, which will further enhance dispersion.

Methanol will be added to production well fluids to prevent hydrate formation. The estimated volume of methanol to be discharged along with produced water during the first year of production is 1,000 m<sup>3</sup>; volumes of discharged methanol should decrease in subsequent years.

Additional information on the management of produced water is included in the SBM Deep Panuke PFC Operations Manual, Volume 4 (Process), Section 3.0 – Produced Water.

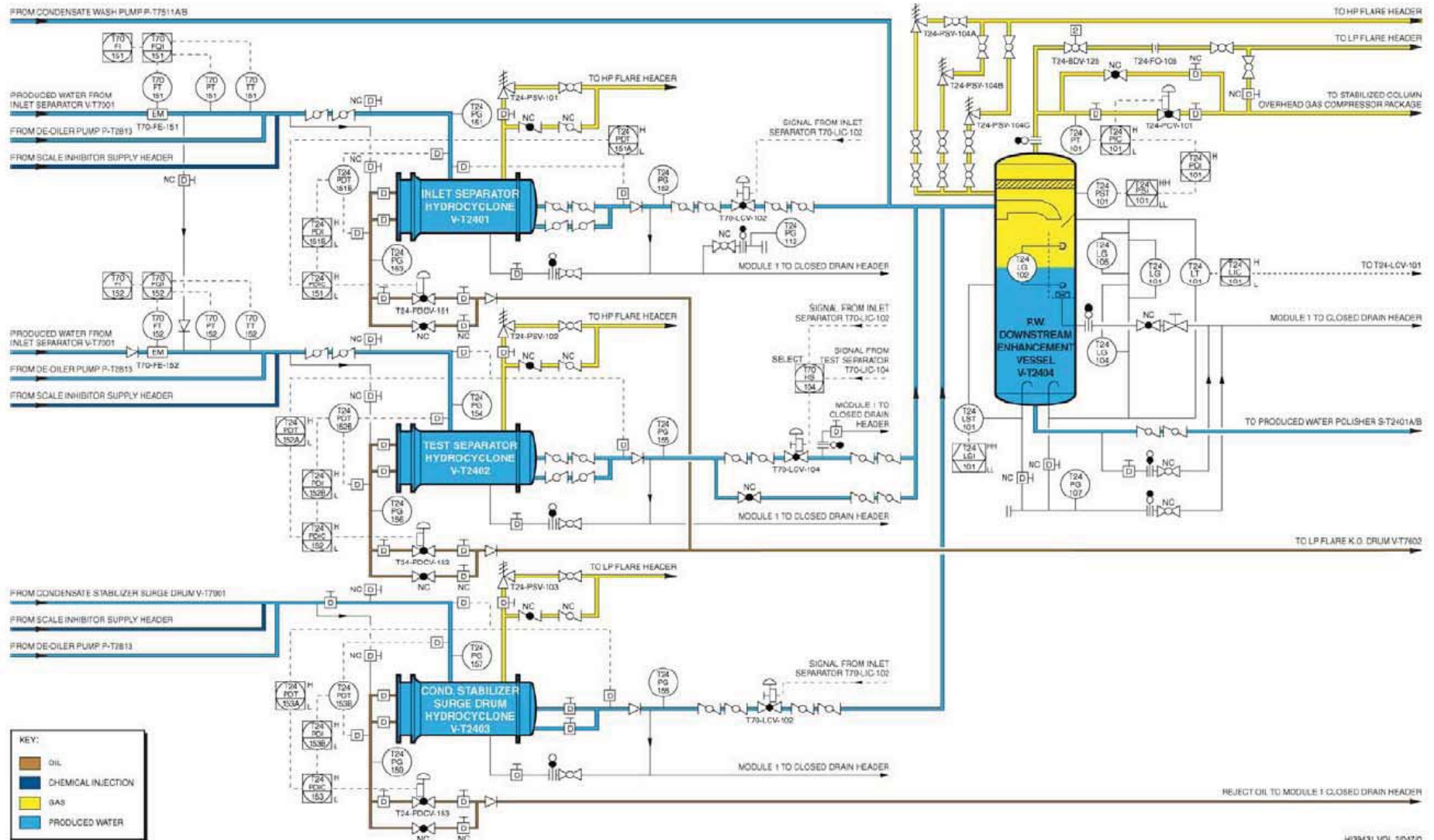


Figure 8.3 Produced Water System Schematic Part 1

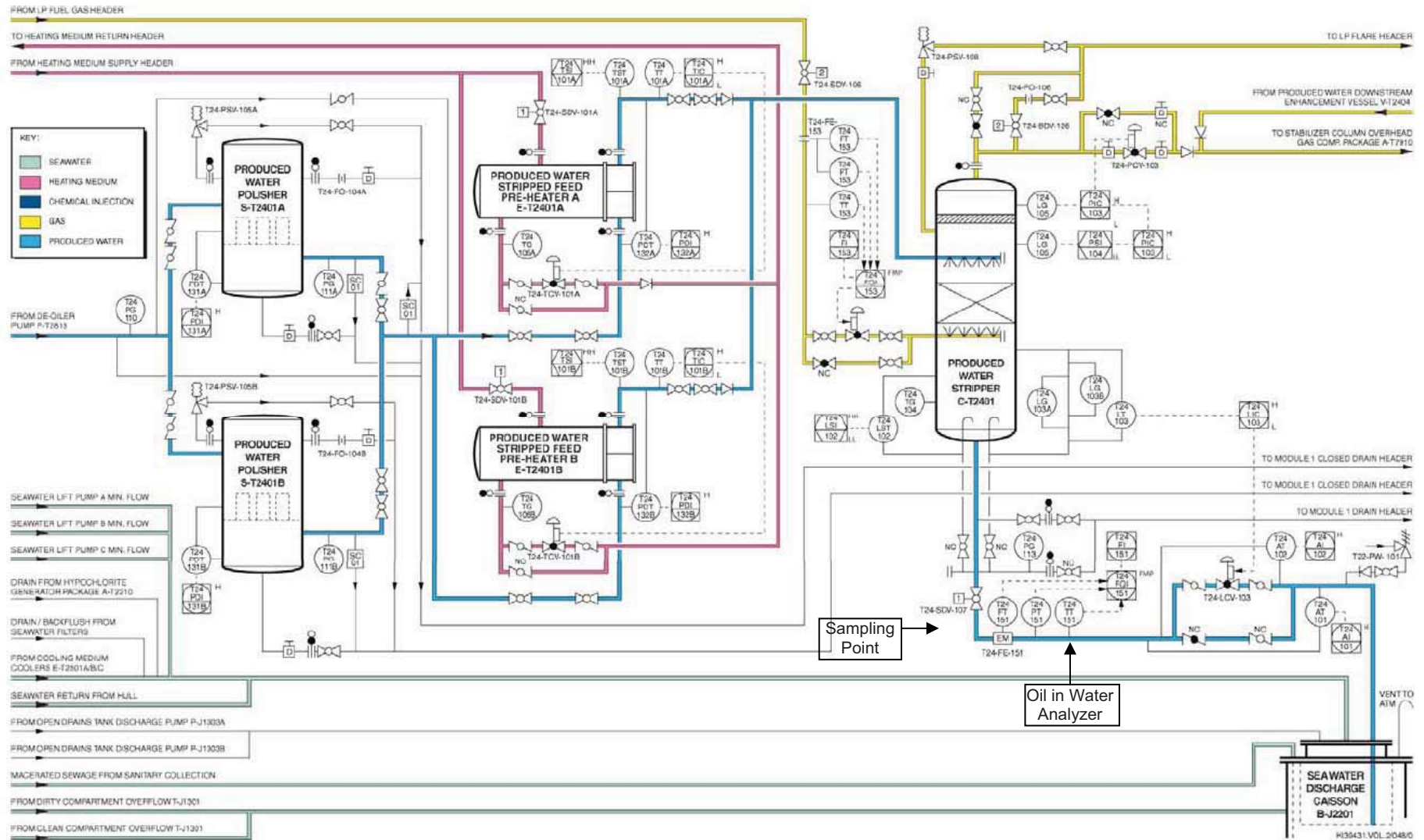


Figure 8.4 Produced Water System Schematic Part 2

### **8.5.2 Environmental Objective**

Encana's target is to meet the following oil in water discharge requirements for produced water.

- 30-day weighted average does not exceed 25 mg/L of oil in discharged produced water (Note: this is lower than the threshold required by the OWTG [HOLD 1], which is 30 mg/L for the 30-day weighted average of oil in water – the OWTG threshold will be used for exceedance reporting purposes as per Section 8.5.5); and
- 24-hour arithmetic average does not exceed 44 mg/L of oil in discharged produced water, as per the OWTG [HOLD 1] (see Appendix 3).

### **8.5.3 Environmental Protection Measures**

The management of oil in water in produced water discharges is controlled through the PFC's produced water treatment system (see Section 8.5.1). Encana's design standard of <25 mg/L is less than the OWTG maximum of 30 mg/L.

Detection of off-spec produced water (i.e. >25 mg/L) will instigate an audible alarm in the instrumented control and safety system (ICSS). Produced water will be monitored according to the OWTG (see Section 8.5.4) and Encana will trend and monitor monthly data to ensure Deep Panuke discharges are in compliance with the project's own target and the OWTG.

Every effort will be made to ensure that the produced water treatment system functions as designed. In case of an exceedance of oil in produced water, Encana/SBM will work to remediate the issue as quickly as possible and will keep the CNSOPB informed about their progress.

Methanol, which will be added to discharged produced water to prevent hydrate formation, has been screened and rated as "accepted for use and discharge" according to the *Offshore Chemical Selection Guidelines*. It has a PLONOR (Posing Little or No Risk to the Environment) rating, which is the least hazardous category.

### **8.5.4 Compliance Monitoring Requirements**

Produced water will be monitored in compliance with the OWTG [HOLD 1] (see Appendix 3 for a summary of the OWTG), including:

- Oil in Water (twice daily):

The concentration of oil in water in discharged produced water will be measured at least every 12 hours via the sampling point on the water outlet of the produced water stripper; i.e. downstream of the last treatment unit and upstream of the discharge location (prior to mixing with cooling water). The sampling port is designed to facilitate collection of a representative sample. A volume weighted 30-day rolling average will be calculated daily. Sampling and analysis will be completed in accordance with Standard Methods for the Examination of Water and Wastewater, 20th Edition, 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons. In addition to the sampling program, the in-line oil in water analyzer will provide supporting oil in water measurement data.

- Chemical Characterization (twice yearly):

The chemical composition of produced water will be analyzed twice yearly for the components listed in Table 8.2 below.

**Table 8.2 Components to be Tested for Produced Water Chemical Characterization**

aluminum	cobalt	nitrogen	tin
ammonia	copper	phosphorus	total petroleum hydrocarbons
antimony	iron	salinity	uranium
arsenic	lead	selenium	vanadium
barium	magnesium	silver	zinc
boron	mercury	strontium	
cadmium	molybdenum	sulphur	
chromium	nickel	thorium	

Sampling and analysis will be completed in accordance with Determination of Trace Elements in marine Waters by On-line Chelation Preconcentration and Inductively Coupled Plasma – Mass Spectrometry (EPA Method 200.10), Mercury Cold Vapor Extraction (EPA Method 245.1) and total petroleum hydrocarbons via gas chromatography – mass spectrometry. This chemical characterization program, to the greatest degree practicable, will draw upon sampling programs conducted for reservoir monitoring purposes.

- Toxicity Testing (annually):

During the same period as one of the twice yearly chemical characteristic tests, the aquatic toxicity of the produced water will be tested using the sea urchin fertilization test method, Biological Test Method: Fertilization Assay Using Echinoids (Sea Urchins and Sand Dollars) (Environmental Protection Directorate Report No. EPS 1/RM/27, Environment Canada, 1993), and at least two other bioassay tests (e.g., early life stage of fish, bacteria, algal species, etc.).

Additional information on the PFC laboratory procedures is included in the Deep Panuke PFC Operations Manual, Volume 4 (Process), Section 16.0 – Laboratory.

Additional initiatives such as participation in research activities related to produced water toxicity will be undertaken as part of Deep Panuke's environmental effects monitoring program (see Section 16).

### **8.5.5 Reporting**

Any discharge of produced water exceeding the limits specified in the OWTG [HOLD 1] (i.e., 30 mg/L for 30-day weighted average or 44 mg/L for 24-hour arithmetic average) will be immediately reported as a spill to the CNSOPB and the CCG as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and the CNSOPB *Guidelines for the Reporting and Investigation of Incidents* (see Section 8.11).

The individual sample values, 24-hour performance metric, and total volume of produced water discharged, for each day of discharge will be reported to the CNSOPB on a monthly basis.

The results of the twice yearly chemical composition characterization in produced water and of the annual aquatic toxicity test for produced water will be reported to the CNSOPB on a yearly basis.

The volume and average concentration of methanol added to discharged produced water to prevent hydrate and/or ice formation will be reported as part of the monthly produced water reporting (as per the OWTG [HOLD 1]). The volume of discharged methanol will also be reported through the normal process for reporting chemical usage (see Section 9.1.5).

## 8.6 Seawater System

### 8.6.1 Overview

The PFC seawater system supplies and distributes treated seawater for hull and topsides systems. Three seawater lift pumps will pump seawater from approximately 15 m below LAT. Each 50% pump has a design flow rate of 1670 m<sup>3</sup>/h. The pumps deliver seawater, ranging from approximately 1°C to 15°C, to the seawater filter/strainers.

The filtered seawater will provide water to the fresh water generation packages, the cooling medium coolers, the hypochlorite generator, and the facility wash down stations.

A hypochlorite generator package generates chlorine ions to protect the seawater and firewater systems from bacteria and mussel growth. The seawater will be returned to the sea through the seawater discharge caisson at 26 m below LAT. The pump suction and caisson return will be located at opposite ends of the facility to prevent re-circulation.

Additional information on the management of the Deep Panuke PFC seawater system is included in the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 3.0 – Seawater System.

### 8.6.2 Environmental Objective

The amount of hypochlorite injected during normal operations will be controlled to ensure that the total residual chlorine in discharged seawater does not normally exceed 0.25 mg/L. During specific bloom periods, it may be required to shock dose the system to a higher concentration resulting in residual chlorine levels of up to 2 mg/L for a short duration.

### 8.6.3 Environmental Protection Measures

The management of residual chlorine in seawater discharges is controlled through the PFC's seawater system (see Section 8.6.1).

Residual chlorine in the effluent stream will be determined by manual sampling (see Section 8.6.4). The sampling and analysis will allow operator intervention to ensure that the desired levels of residual chlorine are met.

### 8.6.4 Compliance Monitoring Requirements

Desalination brine recovered from the production of potable water may be discharged without treatment (OWTG [HOLD 1]).

Encana will monitor residual chlorine discharges by conducting regular lab analysis of residual chlorine levels; likely weekly and in case any changes are made to the system that could affect residual chlorine levels (as per the SBM Deep Panuke PFC Operations Manual, Volume 4 (Process), Section 16.0 – Laboratory). Validation will be completed in accordance with American Public Health Association's Standard Methods for the Examination of Water and Wastewater, 20th Edition (or as amended or updated).

### 8.6.5 Reporting

Any discharge of residual level of chlorine exceeding 2 mg/L will be reported within 24 hours to the CNSOPB as an unauthorized discharge as per the CNSOPB *Guidelines for the Reporting and Investigation of Incidents* (see Section 8.11).

## 8.7 Sewage Discharge

### 8.7.1 Overview

#### Grey Water

The grey water treatment system collects and disposes of the waste from the living quarters' (LQ) wash basins and showers, various drain points from the galley, laundry sink and washing machines.

Drain lines from the accommodation, galley and laundry areas feed into the black/grey water tanks where the combined drain solids and fluids are then routed by gravity into a macerator (based on a maximum particle size 6 mm as per the OWTG) and pump unit and pumped overboard via the sewage discharge pipe at 10 m below LAT.

#### Black Water

The black water system collects and disposes of sanitary waste from the toilets located in the LQ and the hospital.

Black water from each area is collected and manifolded into a black water drain line which leads under gravity into a macerator (designed to chop up the sewage into particles to speed up the treatment process) and then into a sewage treatment unit for processing. The sewage tank is divided into three separate chambers for primary and secondary aeration, settling and disinfection of the sewage. Information on any biocide that may be discharged in sewage and the concentrations to be discharged to the sea will be provided in this document when the information becomes available [HOLD 2]. The treated effluent is then discharged overboard through the sewage discharge pipe at 10 m below LAT.

Additional information on the management of sewage and grey water is included in the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 9.0 – Sewage System.

### 8.7.2 Environmental Objective

Encana will meet the 6 millimetres or less macerated particle size requirement for sewage and food wastes prior to discharge (see Appendix 3 for a summary of the OWTG).

### 8.7.3 Environmental Protection Measures

Sewage discharges are managed through the PFC's sewage treatment system (see Section 8.7.1). Sewage will only be discharged after maceration of entrained solids to a particle size of < 6 mm (grey water) or processing through a sewage treatment unit (black water).

The Area Operator will regularly walk the sewage treatment system to visually inspect for leaks, damage and any system abnormalities.

Kitchen food waste will be disposed of either through the food waste disposer (garburator) and grey water system or through the domestic solid waste stream that is collected and shipped to shore.

To ensure proper operation of the sanitary black water systems, non-biodegradable materials and hazardous materials that could affect aerobic bacteria will not be deposited into toilets.

### 8.7.4 Compliance Monitoring Requirements

There are no specific compliance monitoring requirements for sewage and grey water waste discharges pursuant to the OWTG.

Adherence to the above noted protection measures are assured through routine audits.

### 8.7.5 Reporting

There are no regulatory reporting requirements associated with this waste stream.

## 8.8 Hydraulic Fluid from Subsea Tree Valves Activation

Subsea valves are operated with a glycol-based hydraulic fluid (Oceanic HW443R). To open these valves, hydraulic fluid is supplied via subsea umbilicals. To close the subsea valves, hydraulic fluid is discharged, reducing the pressure on the valves and allowing them to close. Each of the subsea trees has 10 hydraulically controlled valves.

Activation of the subsea tree valves is expected to occur only during planned or emergency shutdowns of the wells. The total volume of hydraulic fluid released to the ocean from all the subsea tree valves is expected to vary between approximately 0.25 m<sup>3</sup> and 1.5 m<sup>3</sup> per year depending on the number of well shutdowns required.

The hydraulic fluid Oceanic HW443R has been screened and rated as “accepted for use and discharge” according to the *Offshore Chemical Selection Guidelines*. The risk of impact from this hydraulic fluid is minimal due to the low volume of the releases and because this product is of low toxicity, biodegradable and does not bioaccumulate.

As per the OWTG [HOLD 1], on a monthly basis, a report of the systems discharging these fluids, and the associated discharged fluid volumes or tonnage will be prepared and submitted to the Board. The volumes of hydraulic fluid discharged in association with this subsea work will also be reported through the normal process for reporting chemical usage (see Section 9.1.5).

## 8.9 Other Hazardous and Non-Hazardous Waste

### 8.9.1 Overview

As part of its production operations, the Deep Panuke PFC will generate both hazardous and non-hazardous wastes that require special handling and disposal. The generation, handling, transfer, disposal and documentation of all waste materials will be conducted in strict compliance with all applicable regulations and codes of practice.

All liquid and solid wastes generated offshore not mentioned in the previous sections, including waste oil (handled as per the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 10.0 – Dirty Oil System), sludge, spent lubricants and all plastic material along with excess or damaged supplies of chemicals will be reused and/or recycled, or alternatively recovered to the degree practicable and transferred to shore for re-use, recycling or disposal at an approved facility.

Liquid and solid wastes will be segregated and disposed of in accordance with local bylaws. All applicable provincial and federal regulations for the transport and handling of waste materials, including *Workplace Hazardous Materials Information System Regulations (WHMIS)* and *Transportation of Dangerous Goods (TDG) regulations* will also be adhered to. Additional information on the handling of liquid and solid waste generated offshore and sent to shore for treatment and/or disposal is provided in SBM’s Waste Management Plan for Deep Panuke.

### 8.9.2 Environmental Objective

Encana is committed to managing and disposing of hazardous and non-hazardous waste in compliance with all applicable regulations and codes of practice. Waste materials will be reused and recycled where possible, with disposal being used as a last resort.

### **8.9.3 Environmental Protection Measures**

Hazardous and non-hazardous waste management is completed in accordance with SBM's Waste Management Plan for Deep Panuke. Please refer to this document for specific information on waste identification, storage and segregation, handling methods, shipments for disposal, and record keeping.

No waste materials are to be dumped into the sea from any installation or vessel contracted to or owned by Encana unless such dumping is considered necessary in a life-threatening situation. The only exceptions to this rule arise from the legally sanctioned discharges from a production or drilling installation pursuant to the OWTG or the operations of a vessel in accordance with the *Canada Shipping Act 2001* and international law.

### **8.9.4 Compliance Monitoring Requirements**

Regular audits will be carried out on waste production, storage, treatment and disposal in accordance with SBM's Waste Management Plan for Deep Panuke. These audits will confirm that wastes are being handled in a safe and environmentally responsible manner at reasonable cost. Performance will be audited against legal requirements and internal management practices to ensure the best possible techniques are used to minimize impacts on the environment.

### **8.9.5 Reporting**

The quantities and fate of waste disposal for the project will be recorded in a database. An annual environmental report including information on waste produced during production operations will be submitted to the CNSOPB by March 31 of each year as per Section 87 of the *Drilling and Production Regulations*.

## **8.10 Air Emissions**

### **8.10.1 Overview**

The main air emissions of concern are greenhouse gases (e.g., carbon dioxide, methane and nitrous oxide) and volatile organic compounds (VOCs). However, it is recognized that some of the Deep Panuke systems will also emit sulphur oxides. The key air emissions sources include the following:

- Flaring:

Greenhouse gases and VOCs are released to the atmosphere through the combustion of flammable vapour and liquid. All planned releases will either be done by low-pressure or high-pressure flaring, to reduce the incidence of releasing raw methane and other reservoir gases to atmosphere. All flare systems are designed to reduce radiation heat flux and to remain smokeless over the full operating range. Additional information on the management of the flare system is included in the SBM Deep Panuke PFC Operations Manual, Volume 4 (Process), Section 12.0 – Flares.

- Power Generation:

Greenhouse gases (GHG) and VOCs are released during the combustion of fuels in power generators. The main power generators are four 33% solar Titan turbines. These turbines are tri-fuel machines and therefore able to be operated with gas, condensate (liquid hydrocarbon) or diesel as the fuel. Condensate will be the fuel of choice for power generation. The emergency generator, fire water pump generators and essential systems generator are all internal combustion engines powered by diesel fuel. Additional information on power generation is included in the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 1.0 – Power Generation and Distribution.

### **8.10.2 Environmental Objective**

GHG emissions are a global issue; therefore, Encana manages its GHG emissions at the corporate level. A corporate approach to GHG reductions allows Encana to target the largest and most cost effective reduction opportunities across the organization. Nevertheless, Encana will consider all reasonable opportunities to maintain GHG emissions ALARP during production and operation within the constraints of the location (i.e., offshore) and facility safety.

### **8.10.3 Environmental Protection Measures**

Encana has focused its efforts on reducing GHG, SO<sub>2</sub> and VOC emissions from the production phase of its operations. Mitigation measures include the following:

- under normal operations, H<sub>2</sub>S and CO<sub>2</sub> (collectively known as acid gas) will be removed from the raw gas stream and injected into a dedicated disposal well underground.
- waste heat recovery units on all turbine exhausts;
- four-stroke compression ignition engines were selected when possible; and
- high efficiency flare tip.

Encana will develop flare mitigation procedures aimed at reducing, where practical, the temporary and localized emissions and potential effects associated with flaring events, in particular during production start up. Procedures will specify the following:

- go/no go zones for vessels;
- safety gear and procedures on board platforms and vessels;
- visibility and other weather requirements;
- real-time requirements to monitor the efficiency of the flare and downwind effects;
- reporting requirements to document the safe conduct of the work and potential improvements; and
- notification procedures for shipping, staff, and environmental staff.

Encana will regularly re-evaluate the design of the Deep Panuke project to determine if additional measures can be incorporated into, or existing systems replaced, to reduce the amount of GHG, SO<sub>2</sub> and VOCs discharged from the installation, if technically and economically feasible.

### **8.10.4 Compliance Monitoring Requirements**

There are no specific compliance monitoring requirements for air emissions that apply to the Deep Panuke's operations at this time.

Consumption of fuel (diesel, condensate and gas) through flaring, power generation and engines will be recorded and air emissions will be calculated and compiled into monthly emission reports issued by SBM. Calculations will be made in compliance with CAPP's Global Climate Change Voluntary Challenge Guide.

### **8.10.5 Reporting**

EnCana will adhere to provisions of the National Pollution Release Inventory (NPRI) with respect to reporting emissions from the Deep Panuke project to the atmosphere.

Encana will also report GHG emissions as per Environment Canada's reporting requirements for Large Final Emitters (LFEs) under the *Canadian Environmental Protection Act (CEPA)*.

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Encana will comply with any new air emission reporting requirements coming up during the life of the project, e.g. potential new air contaminants requirements under the Comprehensive Air Management System (CAMS) under *CEPA*, as applicable.

In addition, as per the *OWTG* [HOLD 1], Encana will periodically review and update its strategy to control and reduce greenhouse gas emissions and will report the results to the Board.

### **8.11 Exceedances and Sheens**

As per the *OWTG* [HOLD 1], any introduction into the natural environment of any substance outside the operational limits described in this EPCMP constitutes “pollution”, and is an “incident”, within the meaning of the *Drilling and Production Regulations*, and should be reported to the CNSOPB as per the *Guidelines for the Reporting and Investigation of Incidents*. As a result, the following reporting will be implemented:

Any exceedance of an operational limit mentioned in this EPCMP for an oily discharge (bilge, ballast, deck drainage and produced water) will be immediately reported as a spill to the CNSOPB and the CCG as per Encana’s Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and the CNSOPB *Guidelines for the Reporting and Investigation of Incidents*. Any sheens generated as a result of these exceedances (or other spills) will be reported as part of the spill incident notification.

If sheens are observed during normal operating conditions (i.e. discharges within operational criteria, no oily product spilled to the ocean), Encana will immediately notify the CNSOPB and the CCG for information purposes (such sheen occurrences will not be reported as spills or incidents).

Any exceedance of an operational limit mentioned in this EPCMP for a non-oily discharge (e.g. residual chlorine level) will be reported within 24 hours to the CNSOPB as an unauthorized discharge as per the CNSOPB *Guidelines for the Reporting and Investigation of Incidents*.

The type and number of exceedances of operational discharge limits will be summarized as part of the reporting required under Section 87 of the *Drilling and Production Regulations* (see Section 8).

## 9 CHEMICAL MANAGEMENT

### 9.1.1 Overview

Various chemicals are used on the Deep Panuke PFC to support production operations. New and waste chemicals are stored at various locations throughout the PFC, including but not necessarily limited to the laboratory, banded lay down areas, storage tank systems and chemical storage lockers.

### 9.1.2 Environmental Objectives

Encana will use the safest and most environmentally friendly chemical products when practicable and will manage its chemical materials responsibly to ensure there are no unwanted use or release of chemicals into the marine environment.

### 9.1.3 Environmental Protection Measures

The offshore chemical management system as called for under the *Guidelines Respecting the Selection of Chemicals Intended to be Used in Conjunction with Offshore Drilling & Production Activities on Frontier Lands* (CNSOPB, C-NLOPB, NEB) (commonly referred to as the *Offshore Chemical Selection Guidelines* (OCSG)) is a contaminant source control program. Its objective is to ensure that chemicals transported offshore to support production operations have been chosen to minimize their potential short and long term effects on the marine environment.

SBM's Chemical Management Plan for Deep Panuke includes chemical management guidelines that reflect regulatory and Encana's EHSMS requirements, such as:

- a general commitment to use the safest and most environmentally friendly chemical products when practicable, and to minimize volumes of chemicals stored on the PFC, used and discharged;
- screening of all relevant chemicals expected to be discharged to the water through the most recent version of the OCSG to ascertain allowable discharge rates, their impact on the environment and/or determine other precautionary measures to be incorporated;
- compliance with the most recent guidance published under CEPA, including information gathering requested under EC's New Chemical Management Plan 1 (e.g., the industry challenge program) as well as potential chemical-specific risk management measures resulting from that initiative (e.g., virtual elimination, performance agreements);
- chemical handling, transportation and disposal requirements, such as TDG and WHMIS; and
- development of a chemical management database for the project to track information such as product description (including MSDS) and use, supplier, chemical selection/approval process (including maximum allowable discharge rates when applicable), safety considerations and training requirements, maximum stock on hand and storage requirements, transport requirements, disposal requirements, volumes used and discharged, etc.

Additional guidance on disposal of chemicals is provided under the waste management section of the EPCMP (Section 8.0).

Encana will contractually require that its contractors comply with these commitments and will verify compliance through periodic monitoring and auditing.

Screening of chemicals for production operations is done onshore by Encana's chemical supply contractors in accordance with the latest version of the OCSG and verified by Encana. This screening provides control points that ensure at the chemical supply contractor level and at the offshore supply

<sup>1</sup> [http://www.ec.gc.ca/CEPARRegistry/subs\\_list/dsl/s1.cfm](http://www.ec.gc.ca/CEPARRegistry/subs_list/dsl/s1.cfm)

shore base that only chemicals that have been approved for use are shipped to the Deep Panuke production field. Only those chemicals that have gone through this chemical screening process will be placed on the Deep Panuke “approved chemical list for offshore” and be allowed to be used at the Deep Panuke production field.

Use of chemicals will comply with the most recent guidance published under the *Canadian Environmental Protection Act (CEPA)*, including information gathering requested under EC’s New Chemical Management Plan (for chemicals on the Domestic Substances List) as well as potential chemical-specific risk management measures resulting from that initiative.

Chemicals used as part of production operations will only be used for the purpose for which they are intended and waste or surplus chemicals will be returned to shore for either proper disposal or return to the chemical supplier as appropriate.

All chemicals and hazardous materials used during production operations should be handled in accordance with the Material Safety Data Sheet (MSDS) for the product. Up-to-date (i.e., less than three years old) MSDS will be available for all hazardous materials used offshore and they will be accessible to any employee or contractor who may come in contact with the material. Only personnel trained in dangerous goods and/or hazardous materials will handle these types of materials.

Containers and storage tanks of hazardous materials and dangerous goods will be labelled in accordance with TDG regulations and/or WHMIS. All laboratory chemicals on the PFC will be labelled and stored in accordance with good laboratory practice as outlined by the Canadian Association for Laboratory Accreditation (CALA) or the Standards Council of Canada (SCC).

Every reasonable effort will be made to prevent chemical contamination on decks, which could be entrained into deck drainage. Drums and totes of production chemicals onboard the PFC will be stored inside bunded areas that are capable of containing leaks and spills from containers. Containers and/or tanks used for storing hazardous materials will be kept closed when not in use to minimize the chance of spill or foreign debris entering the tank.

To reduce the risk and magnitude of a chemical spill on the PFC, the quantities of chemicals stored onboard will be minimized where possible to only what is required for production.

Areas used to store chemical materials will be inspected on a regular basis to identify potential problems (e.g., leaking or damaged containers, improper segregation, etc.). Equipment, valves, and potential areas where hydrocarbon or chemicals could leak will be assessed to determine the need for secondary containment.

Spills of chemical substances on the PFC or support vessels are to be contained and cleaned up immediately. If an event occurs that results in the release of a hydrocarbon or chemical product into the marine environment, response activities will be conducted in accordance with Encana’s Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

#### **9.1.4 Compliance Monitoring Requirements**

There is no compliance monitoring requirements associated with this activity.

#### **9.1.5 Reporting**

Encana will maintain a list of chemicals approved for offshore use according to the OCSG and will maintain an inventory of the production chemicals used at the Deep Panuke offshore production field. Encana will prepare and submit annually to the CNSOPB a report that outlines each chemical used in the past year, including the hazard rating, quantity used, and its ultimate fate as per the OCSG.

Any unplanned discharges of chemicals to the marine environment will be reported as spills and/or unauthorized discharges as per Section 12.5 of this EPCMP.

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## 10 VESSEL OPERATIONS

Support and stand-by vessel operations are governed by:

- *Canada Shipping Act 2001* requirements;
- MARPOL requirements; and
- Encana's Marine & Logistics Operations Manual.

Routine discharges of bilge and ballast water from support vessels are described in Section 8.2 and 8.3, respectively.

Transfers of fuels between vessels and the PFC are addressed in Section 10.1 below.

### 10.1 Bulk Diesel Fuel Transfers

#### 10.1.1 Overview

Diesel will be used as fuel for the emergency generator, firewater pumps, lifeboats, and back up fuel for main power generation.

Diesel fuel will be shipped to the facility onboard a supply vessel and offloaded via a hose station to the diesel storage tank. The stored diesel will be processed through the diesel oil purifier and directed to the diesel service tank. Diesel service pumps provide the motive force to transfer the diesel to the end users.

#### 10.1.2 Environmental Objective

Encana's objective is to ensure that bulk transfers of fuel between support vessels and the PFC are carried out in strict compliance with procedures and any spills of materials being transferred are avoided.

#### 10.1.3 Environmental Protection Measures

Routine preventive maintenance will be conducted on fuel oil system components (e.g., overfill alarms, valves, fittings, pumps, transfer lines, hoses, etc.) to ensure equipment is in good working order.

Prior to beginning of transfer of fuel, operations personnel will check liquid levels, flows (including direction of transfer), pressures and temperatures throughout the system. In addition, they will confirm that monitoring devices and alarm systems are fully operational and pumps and transfer lines are working properly.

During fuel transfer operations from supply vessels, mitigation measures will be implemented to minimize the risk of spill, including continuous monitoring by operations personnel; inspection of the system for leaks, damage and/or abnormalities; watches on the deck; use of float collars on hoses; communication between the PFC and the vessel crew, etc.

The Production Supervisor will maintain all records relating to bulk transfers.

Spill response materials will be available in the transfer area.

If an event occurs that results in the release of a fuel into the marine environment, response activities will be conducted as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

Additional information on fuel transfer procedures is included in the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 4.0 – Marine Diesel Oil System.

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**10.1.4 Compliance Monitoring Requirements**

There is no compliance monitoring requirements associated with this activity.

**10.1.5 Reporting**

Any spills to the marine environment will be immediately reported to the Canadian Coast Guard and the CNSOPB as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

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## 11 HELICOPTER OPERATIONS

Normal helicopter operations offer little environmental risk. The key manageable environmental risk associated with helicopter operations offshore is associated with refuelling at the platform and the risk of spillage of fuel during refuelling or in transport of fuel to the helipad from its storage location on the Deep Panuke PFC. This issue is addressed in Section 11.1 below.

### 11.1 Handling of Helifuel

#### 11.1.1 Overview

All helicopter operations are conducted in strict adherence to Transport Canada and International Aviation requirements. Transport of potentially hazardous materials is carried out in compliance with International Air Transport Association (IATA) and TDG requirements.

The aviation fuel system provides aviation fuel to the helideck for fuelling helicopters for the transport of personnel to and from the Deep Panuke PFC.

#### 11.1.2 Environmental Objective

Encana's objective is to avoid any loss of fuel from the helideck into the marine environment during normal operations.

#### 11.1.3 Environmental Protection Measures

To ensure safety of operators, drainage from the helideck is routed directly overboard without treatment. However, all spills and releases of helifuel and other hazardous materials in this area will be minimized wherever possible.

The aviation fuel storage area will conform to the requirements of Transport Canada publication TP4414 – Helicopter facilities on ships, and will be designed to contain spillage. Drainage from the aviation fuel-dispensing unit is collected into the hazardous open drains system.

On the PFC, the tote tanks are:

- equipped with a dipstick to allow the level in the tank to be measured prior to commencing refuelling to ensure that the tanks are not overfilled;
- equipped with a vacuum breaker to prevent damage if the tank runs dry;
- sampled for compatibility from the bottom of the tanks;
- connected to a common manifold by a flexible hose that has quick connect dry-break couplings at either end to limit spillage; and
- stored in a supporting frame/skid that is equipped with a drain pan (or 'save-all') that serves to contain small quantities of fuel in the event of spill or leak. The frame/skid is connected to the hazardous open drains system to collect larger spills of fuel should they occur. Grounding clamps are installed on the tank frame/skid to dissipate static charge.

Helifuel is transported in portable tanks that are sealed in place in the bunded area where one tank at a time is connected to the refuelling pump. Prior to effecting fuelling operations, the tanks must be allowed to settle for a period of six hours or more prior to use.

Prior to fuelling, the tank, piping, hose and controls are inspected. A hose bonding wire must also be connected to the helicopter airframe.

Fuel pumping is controlled from the helideck by the individual dispensing fuel into the helicopter.

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The helicopter is usually not located in an area of the helideck where drains directly to the sea are present during refuelling operations.

During fuelling operations, a fuel sample must be taken and declared acceptable by the Pilot in Command before fuelling commences and after fuelling is completed. The fuel sample must be retained until the helicopter has landed onshore.

The transfer skid is equipped with a pump emergency stop to shut down the refuelling package.

Spill containment materials for minor hydrocarbon spills must be available and fire fighting precautions must be in place at the helideck during helicopter refuelling operations.

Where safe to do so, spills of aviation fuel on the helideck are to be contained and cleaned up immediately. If an event occurs that results in the release of a helifuel into the marine environment, response activities will be conducted as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

Additional information on the helifuel system and refuelling activities is included in the SBM Deep Panuke PFC Operations Manual, Volume 2 (Utilities), Section 12.0 – Helifuel Package; and Section 9.0 of the Helicopter Operations Code of Practice (DMEN-X00-PR-OP-90-0002), respectively.

#### ***11.1.4 Compliance Monitoring Requirements***

There is no compliance monitoring requirement associated with this activity.

#### ***11.1.5 Reporting***

Any helifuel spills to the marine environment will be immediately reported to the Canadian Coast Guard and the CNSOPB as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

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## 12 SPILLS AND UNAUTHORIZED DISCHARGES

### 12.1 Overview

As mentioned in Section 8.11, exceedances of limits for operational discharges will be reported as spills or unauthorized discharges. In addition, during normal production operations, condensate, diesel, and other oil and chemical products are handled; therefore, there is a potential for a spill or unauthorized discharge on board the PFC/vessels or into the marine environment. There could also be unauthorized discharges of air emissions (e.g. halocarbon release)<sup>2</sup>.

### 12.2 Environmental Objective

Encana's objective is to have no spills of hydrocarbons or other unauthorized discharges to the environment and to contain any spills to the decks of PFC or support vessels where they can be cleaned up safely and effectively.

### 12.3 Environmental Protection Measures

#### 12.3.1 Batch Spills of Hydrocarbons or Chemicals

Encana's priority is to prevent spills before they occur through the design and installation of physical engineering controls (e.g., banded areas, leak detection systems/alarms, isolation devices, shutdown systems, etc.) and the effective implementation of work practices and procedures (e.g., hazardous materials handling procedures, equipment maintenance procedures, etc.).

All equipment used for the storage and transfer of petroleum products and other hazardous materials will be inspected regularly.

If an event occurs that results in the release of hydrocarbon product into the marine environment, response activities will be conducted as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

Spills of hydrocarbons or chemical substances on the PFC or support vessels are to be contained and cleaned up immediately as per the support vessels' Shipboard Oil Pollution Emergency Plans (SOPEP) and SBM's Emergency Response Arrangements Manual for Deep Panuke. Typically, in the event of a spill or release:

- attempt to stop the source of the flow, if it is safe to do so;
- immediately call for assistance;
- contain source of pollutant;
- render the area secure, if it is safe to do so;
- implement emergency response reporting procedures as appropriate;
- clean up the spill using sorbents, if possible and safe to do so; and
- report the spill internally to ensure investigation and corrective and/or future preventive action.

Spill kits will be accessible onboard the PFC/support vessels and will be located in high risk areas, such as storage areas and transfer points.

Operational personnel will be appropriately informed of emergency procedures and trained to effectively implement them. Encana will ensure that key field personnel receive practical instruction in

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<sup>2</sup> Definitions of "spill" and "unauthorized discharge" as per the CNSOPB's *Guideline for the Reporting and Investigation of Incidents*

marine and on deck spill response procedures, including the use of spill response equipment. In addition, Encana will participate in annual emergency response exercise including spill response activities.

### **12.3.2 Spills of Hydraulic Fluid from ROV Operations**

Encana will use a remotely operated vehicle (ROV) to support Deep Panuke production activities. The work class ROV will be available on permanent basis during the production operations phase. The ROV will be stored on one of the two long-term support vessels.

As part of these operations, the potential exists for the release of hydraulic fluid into the marine environment resulting from a hose leak or rupture.

Although the level of risk to the marine environment and seabirds is low because of the very small volumes of such spills, the fact that they typically occur underwater and that ROV hydraulic fluids are practically non toxic to aquatic organisms, Encana will manage these releases of hydraulic fluids from ROV operations by:

- conducting ongoing routine maintenance on the ROV to minimize the likelihood of hose leak or rupture;
- monitoring hydraulic fluid loss by watching fluid compensator levels;
- treating any releases that result in a surface expression as a spill; and
- maintaining auditable records of all hydraulic fluid consumption on for ROV operations.

### **12.3.3 Halocarbon Releases**

The use and handling of ozone-depleting substances and their halocarbon alternatives are regulated by Environment Canada through the *Federal Halocarbon Regulations* under the *Canadian Environmental Protection Act* for the refrigeration, air-conditioning, fire-extinguishing, and solvent systems under federal jurisdiction.

The following are general requirements under these regulations:

- any halocarbon release contained in a refrigeration, air-conditioning or fire extinguishing system (or in the containers and devices associated with such systems) is prohibited, except as stated in the regulations;
- releases must be reported orally or in writing within the deadlines set out in the Regulations (for releases greater than 100 kg - within 24 hours after the release is detected; for releases of 10 – 100 kg, report twice annually, no later than 30 days after January 1 and July 1; and
- some halocarbons (e.g. CFC, Halon, HBFC, HCFC, etc) can only be used if authorized by a permit from Environment Canada under these regulations.

## **12.4 Compliance Monitoring Requirements**

There is no compliance monitoring requirements associated with spills and unauthorized discharges.

## **12.5 Reporting**

Any unauthorized discharges will be reported to the CNSOPB as per the *Guideline for the Reporting and Investigation of Incidents*.

Any spills to the marine environment will be immediately (i.e. within 24 hours) reported to the Canadian Coast Guard and the CNSOPB as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and as per the CNSOPB's *Guideline for the Reporting and*

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*Investigation of Incidents.* Pipeline spills will also be reported to the National Energy Board (NEB) as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008).

Halocarbons releases must also be reported to Environment Canada as per the *Federal Halocarbon Regulations* (see Section 12.3.3).

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## 13 SPECIAL SITUATIONS AND OPERATIONS

### 13.1 Fire Suppression Systems

Dedicated piped deluge and aqueous film-forming foams (AFFF) distribution systems have been provided in all topsides areas where the risk of significant fire has been identified. AFFF are based on combinations of fluoro-chemical surfactants, hydrocarbon surfactants and solvents. Because of its chemical constituents and toxicity, releases of AFFF into the marine environment should be minimized where possible. However, as this is a life and facility safety system, in the event of an emergency situation, discharges to the marine environment will not be prevented or minimized if that action compromises personnel or installation safety.

Because life and facility safety takes precedence in the event that deluge or AFFF fire suppression systems are activated there is a reasonable risk that hydrocarbons from banded areas or simply as a result of equipment and deckwash may be released to the environment. Hence, any release of hydrocarbons entrained overboard to the marine environment will be immediately reported to the Canadian Coast Guard and the CNSOPB as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008) and as per the CNSOPB's *Guideline for the Reporting and Investigation of Incidents*.

As part of fire suppression system testing, training and certification, no AFFF will be intentionally released to the marine environment. All AFFF released during system testing will be contained and disposed of through a licensed waste contractor.

### 13.2 Naturally Occurring Radioactive Material

NORM is material containing radioactive elements, such as radioactive uranium, thorium and potassium, and any of their decay products, such as radium and radon. These elements at the naturally occurring low levels pose no risk to human health or the environment, but when substances containing NORM are processed, the NORM can be concentrated through precipitation in processing equipment (e.g., scale material), resulting in concentrations that could potentially pose a hazard to human health or the environment.

The potential exists that through the processing of gas and condensate, radioactive elements may precipitate into production equipment onboard the Deep Panuke PFC.

Encana will report the occurrence or probability of NORM to the CNSOPB as early as possible in order to initiate discussion on available disposal options.

The PFC will be monitored in compliance with SBM's NORM Code of Practice and following guidance from the Health Canada (2000) *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials* (NORM).

NORM sources, when identified, will require manual extraction and waste will be shipped to shore for disposal by a licensed/authorized waste disposal company.

### 13.3 Bird Handling

There may be a need for project personnel to handle seabirds and, from time to time, other bird species usually associated with terrestrial environments. These birds may land ("pitch") on the PFC or other vessels to rest or because they are in distress. Dead birds may also be found on the decks.

Live birds that are clearly resting on the platform and not in any apparent distress or oiled should be left alone and not harassed as they will eventually leave of their own accord.

Some birds that arrive on the PFC or other vessels may require handling or assistance. Birds that arrive on the installation and are in obvious distress or are oiled or dead will be handled in accordance with the Williams and Chardine (1999) protocol (see Appendix 4). This procedure describes how to deal with live or dead birds safely and responsibly from both a humane and legal perspective. Birds requiring assistance are to be treated humanely at all times and under no circumstances are birds to be harassed.

Encana will maintain a current bird handling permit from the Canadian Wildlife Service (CWS) during the production operations phase of the Deep Panuke project. A report of birds “salvaged” onboard the project’s vessels will be submitted annually to CWS and to the CNSOPB.

Encana will immediately (i.e. within 24 hours) notify CWS if a dead bird or an oiled bird is found during Deep Panuke operations. Any oiled bird will immediately be reported to the Canadian Coast Guard Operations Centre. In case of a mass stranding (more than five dead birds in a 24-hr episode), or an oiled bird, the CNSOPB will also be contacted. Dead birds will be identified, recorded and disposed of at sea unless they are oiled (see Section 13.3.1 below for oiled birds). Please see Figure 13.1 for a detailed flowchart of bird handling procedures for Deep Panuke operations.

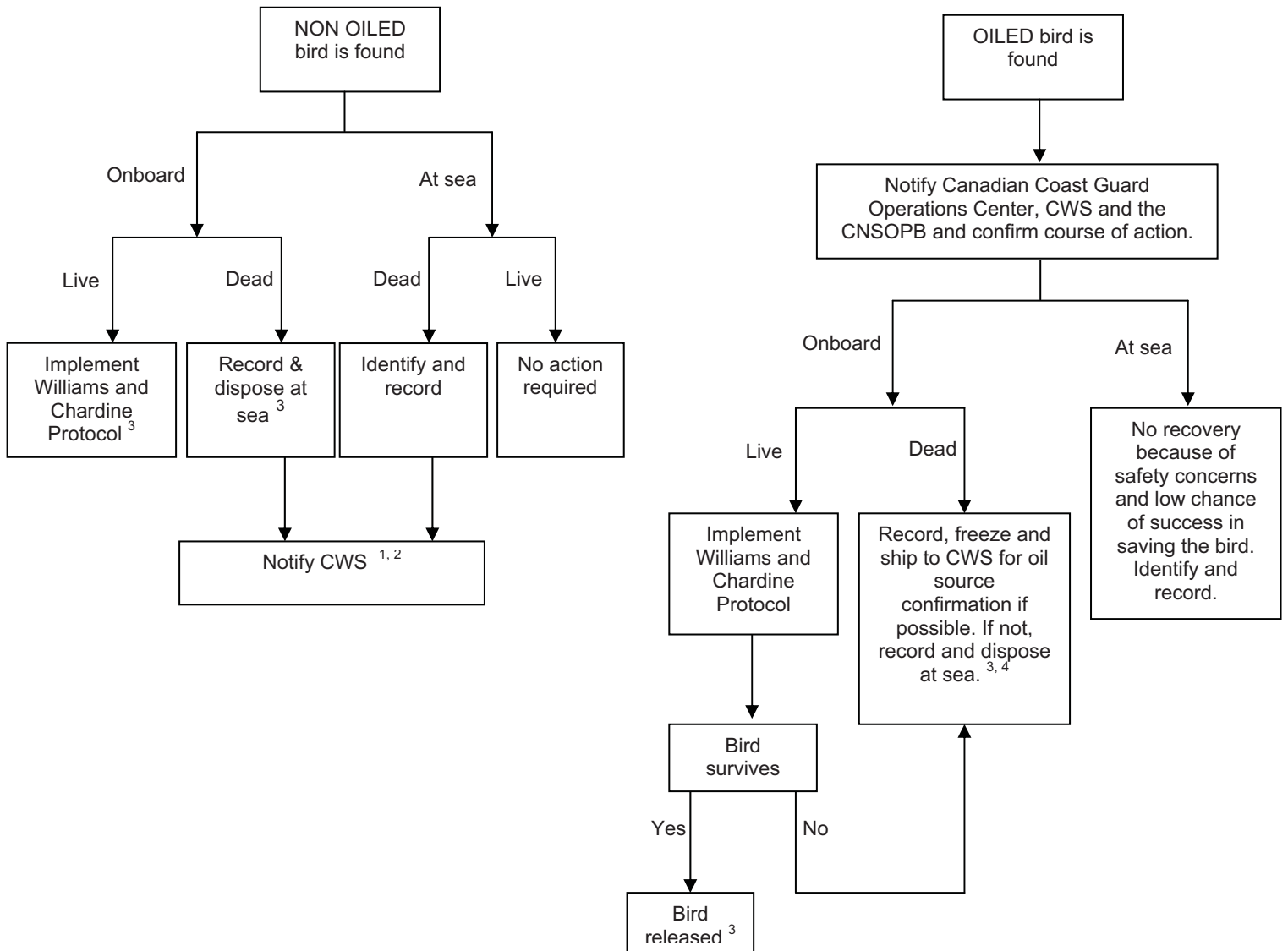
### **13.3.1 Oiled Birds**

It is very unlikely that an oiled bird will be found at sea during Deep Panuke operations because of spill prevention practices and the difficulty to identify oiled birds in the water (small dark spot on dark water). In the unlikely event that an oiled bird were found at sea during production activities, Encana would not attempt to recover it because of safety concerns associated with an overboard recovery operation and the unlikelihood to save a live oiled bird if it can be recovered (onshore rehabilitation can cause distress to marine birds with no guarantee of successful re-entry into the breeding population, especially in Canada where waters are generally cold and the species generally affected do not respond well to cleaning).

If a live oiled bird is found onboard the PFC/support vessels during the program, the protocol developed by Williams and Chardine (1999) for storm petrels (Appendix 4) will be implemented. If the bird dies or if any dead oiled birds is found onboard the vessels, the bird will be frozen and shipped to the CWS office in Dartmouth for confirmation of origin of the oil contamination, if logistics permits (CWS will be contacted beforehand). If shipping to shore is not possible, the bird will be disposed at sea.

Encana will immediately (i.e. within 24 hours) notify the CNSOPB, the Canadian Coast Guard Operations Center and CWS if an oiled bird (dead or live) is identified during the program and will confirm the course of action with them.

Dedicated beached bird surveys on Sable Island would only be implemented in the event of a catastrophic spill in which a large number of birds were expected to be oiled and oiled birds were expected to arrive on the island. Such an occurrence is deemed extremely unlikely based on spill dispersion modeling conducted in the 2006 Deep Panuke Environmental Assessment (Volume 4). However, Encana will co-fund ongoing beached bird surveys conducted on Sable Island approximately ten times per year as part of long-term environmental effects monitoring.



<sup>1</sup> If during non business hours or if during business hours and CWS has not responded within 2 hours of being contacted via cell phone and email, AND in case of 10 dead birds or more in a 24-hr episode, then notify Canadian Coast Guard Operations Centre

<sup>2</sup> Also notify the CNSOPB in case of mass stranding (more than five dead birds in a 24-hr episode)

<sup>3</sup> Birds handled during operations will be included in Encana’s yearly Seabirds Salvage Permit report submitted to Environment Canada under the *Migratory Bird Act* and to the CNSOPB

<sup>4</sup> Oiled birds will be shipped to Canadian Wildlife Service, Environment Canada, 45 Alderney Drive, 16th Floor, Dartmouth, N.S. B2Y 2N6. CWS will be contacted beforehand.

**Figure 13.1 Bird Handling Flowchart**

### 13.4 Physical Environmental Monitoring Program

The PFC will be equipped with a suite of meteorological and oceanographic sensors and processing equipment that will collect data (e.g. wind, air temperature, barometric pressure, sea temperature, rain, clouds, visibility, currents and waves) as required under the *Offshore Physical Environmental Guidelines*. As per RQF 023 approved by the CNSOPB, routine ice management observing and reporting functions will not be conducted for the Deep Panuke project, and the ocean current data will be collected by a Wavex radar.

### 13.5 Biofouling Control

Encana will monitor biofouling of the subsea structures (i.e. wellhead protection structure, subsea isolation valve, PFC), flowlines and gas export pipeline during scheduled underwater ROV inspection surveys.

Marine growth will be controlled with hydrojetting if the equivalent marine growth thickness exceeds the design criteria.

An environmentally-friendly antifouling coating (low-leaching 90/10 copper nickel alloy containing no organic biocides) will be used on the spool pieces tying the riser pipe on the PFC to the subsea pipeline and flowlines.

Sodium hypochlorite will be used to control biofouling of firewater pump intakes, seawater lift pump intakes and sewage discharge caisson.

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## 14 CRITICAL ENVIRONMENTAL PROTECTION SYSTEMS

Encana recognizes that there are various critical systems and processes on board the Deep Panuke PFC that contribute to environmental protection. For these systems and processes to be effective, proper installation, operation and maintenance activities must be well defined and executed. Deep Panuke will have an automatic maintenance operation system, which will measure the continued integrity and ensures the on-going suitability of all identified safety and environmental critical systems. This will be achieved through the use of defined performance standards that document functional requirements of each critical system and their relevant inspection, maintenance and test activities.

Specific details on the Deep Panuke automatic maintenance operation system will be included in this EPCMP when they become available [HOLD 3].

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## 15 ONSHORE PRODUCTION ACTIVITIES

Encana's Environmental Protection Plan/Environmental Effects Monitoring Plan – Onshore Pipeline (DMJW-O00-RP-EH-91-0001) describes the protection and monitoring measures that will be implemented for the onshore portion of the Deep Panuke pipeline during production operations.

In addition, a separate Wetland Monitoring Plan has been submitted to Nova Scotia Environment and Environment Canada describing Encana's proposed three-year wetland monitoring program.

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## 16 ENVIRONMENTAL EFFECTS MONITORING

### 16.1 Production Operations Phase Environmental Effects Monitoring

Encana will conduct an Environmental Effects Monitoring (EEM) program to evaluate the effects of production operations on the environment near the Deep Panuke PFC and associated pipelines. This monitoring program will commence in 2011. Existing sampling data previously collected in the area will be used as baseline data.

The monitoring program is described in detail in the Deep Panuke Production Offshore Environmental Effects Monitoring Plan (EEMP) (DMEN-X00-RP-EH-90-0003) that will go through a review and approval process by the appropriate regulatory agencies prior to the commencement of fieldwork. The EEMP will be developed and reviewed on an ongoing basis with the support from independent subject matter technical experts contracted by Encana as required.

The data from EEM activities will be provided to the relevant regulatory agencies through the CNSOPB. This reporting is typically done in the context of the annual EEM report required by the CNSOPB. The annual cycle of data collection is analyzed and used to determine EEM requirements for the following year. EEM reports will be made publically available (see Section 17).

As part of its continual improvement process, the results of the EEM program will be used by Encana to evaluate the effectiveness of its environmental protection programs and waste stream treatment systems. It is also recognized that the findings from Encana's and other operators' environmental effects monitoring programs inform the five-year reviews of the OWTG.

### 16.2 Spill Environmental Effects Monitoring

Environmental effects monitoring for spills will be implemented as per Encana's Deep Panuke Offshore Spill Response Plan (DMEN-X00-PR-EH-00-0008), which describes the criteria that would trigger such a program, the specific monitoring activities involved and monitoring resources.

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## 17 COMMUNICATIONS WITH OUTSIDE INTEREST GROUPS

Encana committed to communicating environmental effects monitoring results information to the public during the environmental review process for the Deep Panuke project. Encana also regularly consults with interest groups and the public in the context of developing environmental protection plans for its new programs in the Nova Scotia offshore area. Furthermore, in the event of an incident with significant actual or potential environmental harm, the public will be informed in the context of the Deep Panuke Emergency Management Plan.

Encana will submit annually a summary report of its environmental effects and compliance monitoring program, which will be shared with the public. In addition, Encana will report on results of environmental effects monitoring and compliance to representatives of fisheries interests at meetings of the CNSOPB Fisheries Advisory Committee (FAC).

### 17.1 Interactions with the Fishing Industry

Encana has, and will continue to, work to minimize any interference with fisheries interests operating in the Nova Scotia offshore area. This will be done through various means including, but not necessarily limited to, the following:

- routine advisories, where appropriate, of major operational changes through Notices to Shipping/Mariners;
- continued communications through the CNSOPB FAC;
- direct consultations with potentially impacted fisheries interests as required to discuss plans and issues of mutual interest and concern;
- implementation of attributable damage compensation as required; and
- enforcement of a safety zone around the Deep Panuke facilities.

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**APPENDIX 1 Encana's Codes of Practice for Sable Island, the Gully MPA and  
Country Island**

# code of practice for Country Island

Encana has developed, as part of its environmental protection planning, a code of practice to protect the uniqueness and integrity of the Roseate tern colony of Country Island (see attached map). While the focus is on Country Island, the code will also serve to protect nearby seabird colonies. This code is not a regulatory requirement and is indicative of Encana's environmental stewardship philosophy and corporate policies. This code of practice applies to all Encana activities.

Country Island is a 19 ha island, located approximately 8km offshore from Goldboro, Nova Scotia (45°06'N, 61°32'W). The island hosts a sizeable breeding colony of Common and Arctic terns and has provided a nesting opportunity for the endangered Roseate tern (*Sterna dougallii*) for many years. The Roseate is the tern species most at risk in northeastern North America. There are about 4000 pairs in the northeastern United States and 120–150 pairs in Atlantic Canada, mostly in one or two colonies, including approximately 53 pairs on the Country Island complex.

Country Island has been identified as critical habitat for the Roseate tern by Environment Canada in the Recovery Strategy for the Roseate tern in Canada (2006) under the Species at Risk Act. This designation includes the entire terrestrial habitat of the island as well as aquatic habitat extending 200 m seaward from the mean high tide line.

## **As part of its environmental stewardship with respect to Country Island:**

- Encana will not fly over, disembark or approach within 2km (one nautical mile) of Country Island (which encompasses the Roseate tern designated critical habitat) unless it is required for purposes of safety or safe operation of a vessel or aircraft or as part of an approved environmental monitoring program
- Encana will include discussion of this code of practice in its environmental awareness training program for its personnel. Encana intends this code to be a living document and will review and update it as required. This code of practice is also publicly available on the Encana website [www.encana.com/contractor/expectationspractices](http://www.encana.com/contractor/expectationspractices).

# code of practice for the Gully Marine Protected Area

Encana has developed, as part of its environmental protection planning, a code of practice to protect the uniqueness and integrity of the Gully Marine Protected Area (MPA) (see attached map). This code is not a regulatory requirement and is indicative of Encana's environmental stewardship philosophy and corporate policies. This code of practice applies to all Encana activities.

The Gully is a large submarine canyon approximately 40 km east of Sable Island on the edge of the Scotian Shelf. It is unique among canyons of the Eastern Canadian margin because of its depth, steep slopes and extension back into the continental shelf. The Gully contains a rich diversity of marine habitats and species, including deep-sea corals and the endangered northern bottlenose whale (*Hyperoodon ampullatus*). The area is nationally and globally acknowledged as an important and exceptional marine habitat.

The Gully has been designated by the Federal Department of Fisheries and Oceans as a MPA under the Oceans Act in 2004, and comprises an area of 2,364 km<sup>2</sup>. The MPA regulations prohibit the disturbance, damage, destruction or removal of any living marine organism or habitat within the Gully. The MPA contains three management zones, each providing varying levels of protection based on conservation objectives and ecological sensitivities. The regulations also control human activities in areas around the Gully that could cause harmful effects within the MPA boundary. Encana is represented on the Gully Advisory Committee chaired by DFO.

## As part of its environmental stewardship with respect to the Gully MPA:

- Encana will not conduct activities inside the Gully MPA. In addition, no vessels are permitted within the Gully MPA and aircraft in regular transit to and from any vessels, drilling units, or facilities are restricted to flying at a height of at least 500 m. These restrictions apply unless it is required for purposes of safety or safe operation of a vessel/aircraft or as part of an approved environmental monitoring program.
- Encana will include discussion of this code of practice in its environmental awareness training program for its personnel. Encana intends this code to be a living document and will review and update it as required. This code of practice is also publicly available on the Encana website [www.encana.com/contractor/expectationspractices](http://www.encana.com/contractor/expectationspractices).

# code of practice for Sable Island

Encana has developed, as part of its environmental protection planning, a code of practice to protect the uniqueness and integrity of Sable Island (see attached map). This code is not a regulatory requirement and is indicative of Encana's environmental stewardship philosophy and corporate policies. This code of practice applies to all Encana activities.

Sable Island is approximately 41 km in length and is located 290 km southeast of Halifax. The Island is composed of sand and is the only emergent portion of the Sable Island Bank. It supports a fragile ecosystem consisting of diverse flora and fauna; the best known components being the feral horses, seal populations, the rare Ipswich (Savannah) sparrow (*Passerculus sandwichensis princeps*) and the endangered Roseate tern (*Sterna dougallii*).

Sable Island access and activities are currently administered by the Canadian Coast Guard pursuant to the Sable Island Regulations under the Canada Shipping Act. It is also protected by Environment Canada's Migratory Bird Sanctuary Regulations under the Migratory Birds Convention Act. Nesting tern colonies on the island have also been designated by Environment Canada as critical habitat for Roseate terns under the Species at Risk Act. In May 2010, the governments of Canada and Nova Scotia announced that they will take the necessary steps to designate Sable Island as a national park under the Canada National Parks Act. Encana is represented on the Sable Island Stakeholder Advisory Committee chaired by DFO. The Sable Island Green Horse Society website contains additional information on Sable Island [www.greenhorsesociety.com](http://www.greenhorsesociety.com).

## As part of its environmental stewardship with respect to Sable Island:

- Encana will not conduct activities within 2km (one nautical mile) of Sable Island. All Encana activities on Sable Island must receive approval from Encana senior management and the Canadian Coast Guard, and will comply with all applicable guidelines, including the Canadian Coast Guard Visitors Guide to Sable Island [www.ccg-gcc.gc.ca/folios/00039/docs/SableIslandVisitorsGuide-eng.pdf](http://www.ccg-gcc.gc.ca/folios/00039/docs/SableIslandVisitorsGuide-eng.pdf).
- Encana vessels and aircraft are not permitted within 2km (one nautical mile) of the Island. However, this restriction does not apply in the case of an emergency situation, for access required as part of an approved environmental monitoring program or for special trips approved by the Canadian Coast Guard.
- Encana will include discussion of this code of practice in its environmental awareness training program for its personnel. Encana intends this code to be a living document and will review and update it as required. This code of practice is also publicly available on the Encana website [www.encana.com/contractor/expectationspractices](http://www.encana.com/contractor/expectationspractices).



# Encana Codes of Practice Reference Map

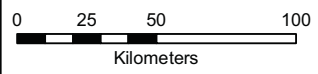
### Map Features

Land

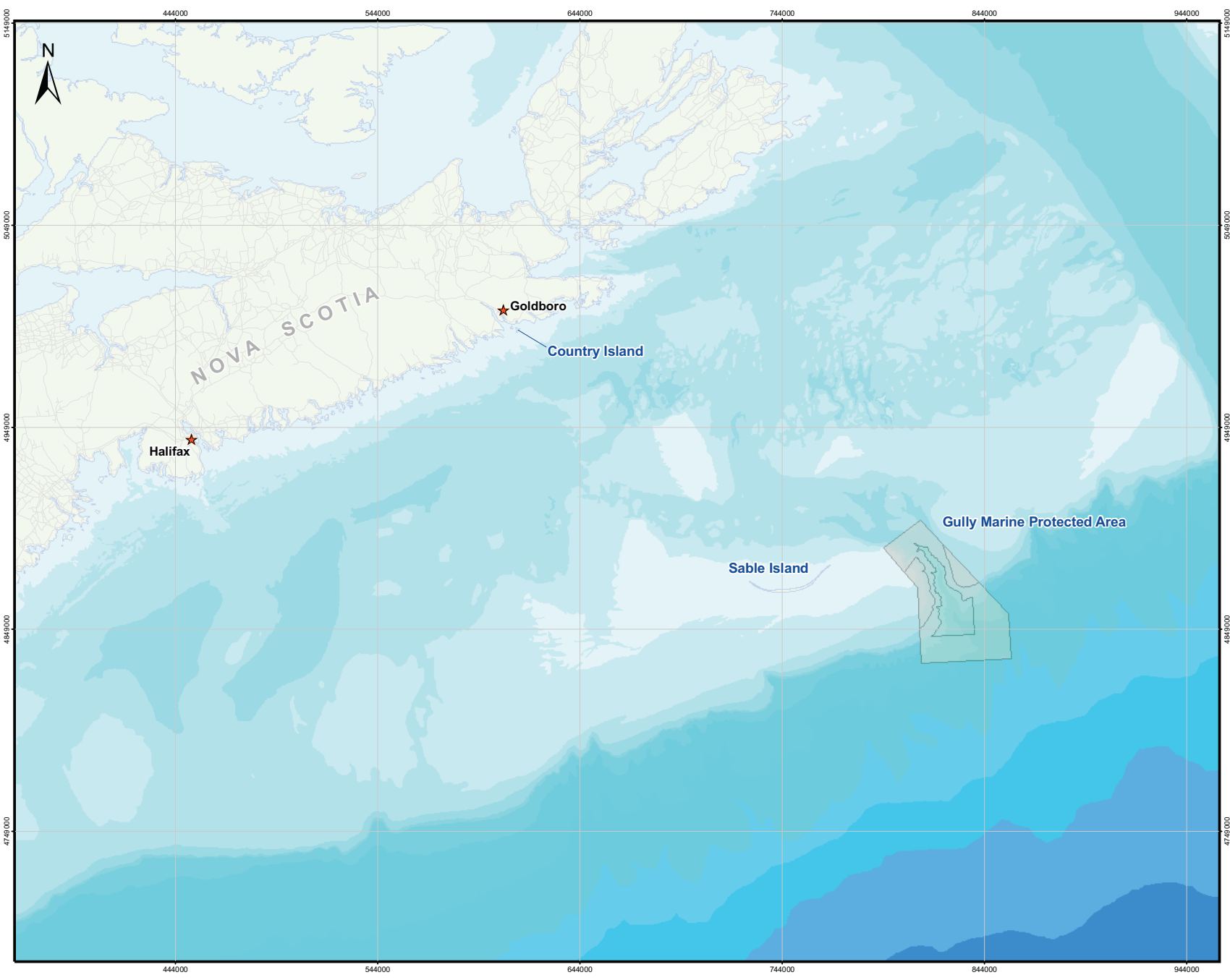
### Bathymetry (m)

#### DEPTH

- 0 - 50
- 51 - 100
- 101 - 200
- 201 - 400
- 401 - 500
- 501 - 1000
- 1001 - 2000
- 2001 - 3000
- 3001 - 3500
- 3501 - 4000
- 4001 - 4500
- 4501 - 5000
- 5001 - 5500



Map Parameters  
Projection: UTM-NA D83-Z20  
Scale 1:1,750,000  
Date: November 2010



**APPENDIX 2 Environmental-Related Regulatory Commitments with Respect to Deep Panuke Operations**

#	Regulatory Commitment	Regulatory Doc. Ref.	Relevant Section of EPCMP
<b>1</b>	<b>GENERAL (ALL/SEVERAL PROJECT PHASES)</b>		
	<b>Regulatory Framework</b>		
1.1	<ul style="list-style-type: none"> <li>Project activities will be conducted in accordance with all applicable laws and regulations.</li> </ul>	2002 CSR	7.3, 5.0
1.2	<ul style="list-style-type: none"> <li>Encana will adhere to the <i>Nova Scotia Offshore Petroleum Regulations</i> or other international standards as deemed acceptable to the Certifying Authority (CA) and the CNSOPB.</li> </ul>	2002 CSR Revised Vol 4	7.3
1.3	<ul style="list-style-type: none"> <li>All Project equipment will meet industry standards and be certified as safe and fit for its intended use. Equipment will be operated and maintained in accordance with documented procedures, with regular inspection and maintenance programs.</li> </ul>	2002 CSR	5.0
1.4	<ul style="list-style-type: none"> <li>Once final engineering design has been completed, appropriate regulatory agencies will be contacted to identify specific permitting requirements, if any.</li> </ul>	2002 CSR	7.3
1.6	<ul style="list-style-type: none"> <li>The CA's Certificate of Fitness will include the offshore export pipeline and facilities up to the M&amp;NP custody transfer station. There are no Project elements which are excluded under the CA's Scope of Work.</li> </ul>	IR No. NEB-ECA-1.1	7.3
1.7	<ul style="list-style-type: none"> <li>Encana will contractually require that its contractors comply with the <i>Ballast Water Control and Management Regulations</i> under the <i>Canada Shipping Act</i>.</li> </ul>	IR No. CNSOPB-ECA-EA-Env-006/2007 CSR (pg 192)	7.3, 8.3
	<b>EHS/Quality Plans and Procedures</b>		
1.9	<ul style="list-style-type: none"> <li>Encana's following documents will be followed for the Deep Panuke Project:                             <ul style="list-style-type: none"> <li>Corporate Responsibility Policy;</li> <li>EHS Statement of Principles;</li> <li>Environment, Health, and Safety Best Practices Management System; and</li> <li>Deep Panuke EHS Management System Guidance Manual.</li> </ul> </li> </ul>	Vol 4 (pg 8.2 and 9.1)	5.0
1.10	<ul style="list-style-type: none"> <li>Encana will provide copies of applicable management system documentation (and revisions) to the appropriate regulatory authorities for review.</li> </ul>	2002 CSR	5.0
1.11	<ul style="list-style-type: none"> <li>Environmental performance will be reviewed at least annually during the life of the Project.</li> </ul>	2002 CSR	5.0
1.13	<ul style="list-style-type: none"> <li>Encana's EPP, Emergency Management Program, Operations and Maintenance Programs, and Construction and Safety Manuals will include measures to address any issues identified as a result of Encana's surveys or discussions with DND.</li> </ul>	2007 CSR (pg 196)	5.0
1.14	<ul style="list-style-type: none"> <li>A Project Safety Plan (PSP) will be developed and implemented that will ensure efficient and safe activities in all Project phases. The Safety Plan includes environmental risk assessments that will affect the design of the Project and develop the best design option to minimize environmental impact. The Project Safety Plan will be built upon a "Hazards and Effects Management Process" (HEMP).</li> </ul>	IR No. CNSOPB-ECA-EA-Env-006/2007 CSR (pg 192)	5.0

#	Regulatory Commitment	Regulatory Doc. Ref.	Relevant Section of EPCMP
1.16	<ul style="list-style-type: none"> <li>Encana’s current Alert Emergency Response Contingency Plan - AERCP provides emergency response command and control functions for both onshore and offshore emergency situations, and is currently being used in its East Coast operations activities. The AERCP will be replaced by the Deep Panuke Emergency Management Plan (DPEMP) for all potential malfunctions and accidents for the Deep Panuke Project in compliance with applicable guidelines. This includes response to onshore pipeline releases including those potentially accompanied by fire and subsequent forest fire.</li> </ul> <p>This plan will specifically address the minimization of blowout potential. Procedures will be developed to respond to a blowout that will include warning and alarm systems. These procedures will be based on the conservative assumptions (<i>i.e.</i>, most protective) from the air quality analysis.</p>	2002 CSR and Vol 2 (10.2)	5.0
1.17	<ul style="list-style-type: none"> <li>Developing emergency response plans that deal with severe weather, taking into account the possibility of short forecast lead times for tropical cyclones transitioning to extratropical cyclones, and explosively deepening extratropical cyclones, that could result in rapid increases of wind speed and/or wave height to severe levels.</li> </ul>	2007 CSR (pg 193)	5.0
1.18	<ul style="list-style-type: none"> <li>The Sable Island Emergency Contingency Plan will be adhered to.</li> </ul>	2002 CSR	5.0
1.19	<ul style="list-style-type: none"> <li>Encana’s Spill Response Plan will be submitted to the appropriate regulators for review and approval. It will contain detailed measures for preparing for and responding to spills, including the use of clean-up equipment, training of personnel, and identification of personnel to direct cleanup efforts, lines of communication and organizations that could assist cleanup operations. All spills will be reported routinely to regulatory authorities as per Spill Response Plan Notifications.</li> </ul>	2002 CSR and Vol 2 (9.4)	5.0, 12.0
1.20	<ul style="list-style-type: none"> <li>The Encana Spill Response Plan has been submitted to Environment Canada and DFO for review and comment. Encana will put measures in place to manage small and large spills and resulting slicks. Encana will ensure that the plan is acceptable to Regional Environmental Emergencies Team before construction commences. Based on consultations with Environment Canada, Encana will ensure the spill response plan and other related management plans includes provisions for minimizing the potential for birds to be impacted by accidental releases and any resulting sheens or slicks.</li> </ul>	2002 CSR: A&E	7.3, 5.0, 12.0
1.21	<ul style="list-style-type: none"> <li>Encana is committed to consulting with CWS on emergency response for dealing with oiled birds. Encana employees and contractors will adhere to a CWS-approved protocol for handling injured or stranded birds on vessels and offshore platforms. Encana acknowledges the Williams and Chardine (1999) protocol and potential permitting requirements.</li> </ul>	2002 CSR: A&E	7.3, 5.0, 13.3
1.22	<ul style="list-style-type: none"> <li>The Deep Panuke Spill Response Plan (DPSRP) will be developed prior to beginning installation activities, once information on the specifications of vessels, barges, etc. to be used is known and the work scope is better defined</li> <li>A draft version of the DPSRP will be provided to the regulators at that time for review, followed by a final version incorporating feedback received from internal and external parties. The anticipated table of contents [for the DPSRP] is shown in Appendix G of the EA Report (Volume 4).</li> </ul>	IR No. NEB-ECA-2.6	5.0, 12.0

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
1.23	<ul style="list-style-type: none"> <li>Encana will review and update its Hydrogen Sulphide Contingency Plan and Spill Response Plan for construction and operations of the Deep Panuke Project.</li> </ul>	2002 CSR	5.0
1.24	<ul style="list-style-type: none"> <li>Encana will, in consultation with key regulators (CNSOPB, DFO and Environment Canada) and key stakeholders, develop onshore and offshore construction EPPs to address Project construction, drilling, production and decommissioning. The EPP will reflect the commitments made in the CSR and regulatory conditions of approval. The EPP will be strictly adhered to.</li> </ul> <p>The Deep Panuke EPP will be developed in consultation with the CNSOPB and key regulatory authorities, such as DFO and Environment Canada, during detailed engineering design prior to the commencement of Deep Panuke installation activities.</p>	2002 CSR and Vol 2 (9.6)/ IR No. NEB-ECA-2.6/ IR No. EC-ECA-1.15	7.3
1.25	<ul style="list-style-type: none"> <li>The operational EPP will contain chemical handling and storage procedures to ensure all fuel, chemicals and wastes will be handled in a manner that minimizes or eliminates routine spillage and accidents.</li> </ul>	2002 CSR	9.0
1.26	<ul style="list-style-type: none"> <li>Encana will review the results of the current ESRF study of effects of oil sheens on birds once they are published and implement any required changes to the EPP.</li> </ul>	Vol 4 (pg 11-10)/ 2007 CSR (pg 193)	5.0, 12.0, 16.0
1.27	<ul style="list-style-type: none"> <li>As part of its EPP, Encana will implement environmental protection measures to mitigate potential impacts from Project activities, including the use of chlorine for the treatment of biological growth in cooling water.</li> </ul>	2002 CSR: A&E	8.6
1.29	<ul style="list-style-type: none"> <li>A Waste Management Plan (WMP) will be developed (as part of the EPP) to address all phases of the Project. The goal of the plan will be to minimize offshore waste and identify mitigative measures. The WMP will contain provisions for waste and wastewater treatment.</li> </ul>	2002 CSR	5.0, 8.7, 8.9
1.30	<ul style="list-style-type: none"> <li>To the extent reasonably practical, both the volumes of wastes being discharged and the concentration of contaminants in the environment will be minimized.</li> </ul>	2002 CSR	5.0, 8.7, 8.9

#	Regulatory Commitment	Regulatory Doc. Ref.	Relevant Section of EPCMP
1.31	<ul style="list-style-type: none"> <li>• The Deep Panuke EPP will include chemicals management guidelines [referred to as a Chemical Management Plan in the approved 2002 CSR] that will reflect regulatory and Encana's own EHS Management System requirements, such as:               <ul style="list-style-type: none"> <li>• A general commitment to use the safest and most environmentally friendly chemical products [or the most environmentally appropriate as per the <i>Offshore Waste Treatment Guidelines</i>], and to minimize volumes of chemicals stored on the PFC, used and discharged;</li> <li>• Screening of all chemicals expected to be discharged to the water through the most recent version of the CNSOPB Offshore Chemical Selection Guidelines (OCSG) to ascertain allowable discharge rates, their impact on the environment and/or determine other precautionary measures to be incorporated;</li> <li>• Compliance with the most recent guidance published under the <i>Canadian Environmental Protection Act (CEPA)</i>, including information gathering requested under EC's New Chemical Management Plan (for chemicals on the Domestic Substances List) as well as potential chemical-specific risk management measures resulting from that initiative;</li> <li>• Chemical handling, transportation and disposal requirements, such as TDG and WHMIS;</li> <li>• Development of a chemical management database for the Project to track information such as product description (including MSDS) and use, supplier, chemical selection/approval process (including maximum allowable discharge rates when applicable), safety considerations and training requirements, maximum stock on hand and storage requirements, transport requirements, disposal requirements, volumes used and discharged, etc.</li> </ul> </li> </ul> <p>We intend to present this information as a section of our EPP (not as a separate plan). Encana will contractually require that its contractors comply with these commitments and will verify compliance through periodic monitoring and auditing.</p>	2002 CSR/ IR No. EC-ECA-1.10/ EC Clarifications/ 2007 CSR (pg 98)	9.0, 8.9,
1.32	<ul style="list-style-type: none"> <li>• Encana has adopted Codes of Practice for Sable Island, Country Island, and the Gully. The Codes of Practice for Sable Island, the Gully MPA and Country Island were updated in October 2006.</li> </ul> <p>[Note: The Codes of Practice were updated to reflect administrative changes to these Special Areas (e.g. designation of the Gully MPA, change of management for Sable Island, designation of Country Island as "critical habitat" for Roseate terns under SARA, etc); however, the protection measures outlined in the 2002 Codes of Practice have not changed.]</p> <p>Encana will update the Code of Practice for Sable Island as required to reflect changes to the administration or management of Sable Island, new information on the critical habitat of Species at Risk, or revisions to Encana's maintenance and operations procedures with respect to its facilities, which may impact Sable Island.</p>	2002 CSR Revised Vol 4/ IR No. EC-ECA-1.27/ 2007 CSR (pg 193)	5.0, 14.0
1.33	<ul style="list-style-type: none"> <li>• Flaring mitigation procedures will be included in the Offshore EPP. Encana will review the Offshore EPP with Environment Canada.</li> </ul>	2002 CSR: A&E	5.0, 8.11

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
1.34	<ul style="list-style-type: none"> <li>• No Project related vehicles will be driven through wetlands or watercourses. Codes of practice around these sensitive habitats will be developed and described in the Project EPP. Where wetlands cannot be avoided through final pipeline routing:               <ul style="list-style-type: none"> <li>• vehicle use in wetlands will be required for pipeline placement (i.e. trenching, pipelaying); however, traffic will be limited to necessary machinery that are project-related; otherwise, these vehicles will be kept out of wetlands.</li> <li>• ATVs will not be permitted within the wetland during construction or normal operations.</li> <li>• Work room, access roads and laydown areas will be organized, where feasible, to minimize impacts from equipment movement and material storage.</li> <li>• Direct and indirect damage to the wetland will be monitored.</li> </ul> </li> </ul>	Vol 4 (pg 11-10)/ IR No. DFO-ECA-6/ 2007 CSR (pg 194)	15.0
1.35	<ul style="list-style-type: none"> <li>• In the event that Encana's activities damage the environment or cause others to suffer loss or damage, Encana will address its liability through compliance with legislated compensation schemes.</li> </ul>	2002 CSR	7.3, 5.0
1.36	<ul style="list-style-type: none"> <li>• Encana agrees with the submission of Mr. Hunka, on behalf of the Native Council, that the commitment to compensate for actual loss or damage caused by Encana should extend to loss of hunting, fishing and gathering opportunities with respect to the Aboriginal peoples of Canada as contemplated in Section 165(3) of the Accord Act.</li> </ul>	Transcripts 5725	17.0
1.37	<ul style="list-style-type: none"> <li>• With respect to compensation for loss or damage to fishing or aquaculture gear or vessels, Encana will adopt the CNSOPB <i>Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity</i> (March 2002).</li> </ul> <p>In addition, Encana has committed to compensate and indemnify licensed participants in the fishing industry to the extent that the Deep Panuke Project may cause them damage or loss including consequential damages during normal fishing operations. This includes damage or loss caused the export pipeline, or by other Encana activities carried out beyond the 500-m safety zone.</p>	2002 CSR Revised Vol 4/ IR No. NCNS- ECA-3/ Transcripts 376- 377, 5714, 5719	7.3, 17.0
1.38	<ul style="list-style-type: none"> <li>• Encana is prepared to cover possible losses to the fishing industry resulting from any equipment Encana has on the ocean floor (during normal fishing operations) as long as the equipment is there, i.e. effectively in perpetuity for the pipelines.</li> </ul>	Transcripts 2124- 2128	7.3, 5.0, 17.0

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
1.39	<ul style="list-style-type: none"> <li>• Encana agrees to have items one, two, four, five, six and seven of the SPANS Principles of an Agreement (Evidence Submitted January 29, 2007) (see Appendix 1) being conditions of approval, with the following clarification:               <ol style="list-style-type: none"> <li>1. Gear and Vessel Loss and Damage - A program specific to Encana to compensate the fisheries industry for any damage to gear or vessels caused by Encana as an alternative to making a claim through the CNSOPB or the court.</li> <li>2. 500m radius Safety Zone - Analysis of historical fisheries data for areas immediately surrounding the platforms (within the proposed mandatory safety zone) indicates that these areas have not been economically significant or, in the case of a new quahog fishery, can be accessed with minimal impact. The fisheries industry will not request compensation for loss of access to these areas.</li> <li>4. Operational Impacts Beyond the 500m-radius Safety Zone - Encana recognizes its responsibility to protect the fisheries industry from economic loss resulting from operational impacts beyond the 500m radius Safety Zone, even if such loss is the result of activities permitted under law or by regulations (e.g. impacts caused by discharges including drill cuttings). Although Encana will endeavour to prevent or mitigate any such impacts, it will compensate the fisheries industry fully and fairly for any actual economic loss incurred as a result of Encana activities.</li> <li>5. Pipelines - If fisheries interactions with pipelines (whether trenched or not) occur, Encana will indemnify the fisheries industry for any damage to the pipeline and resulting consequential damages, as well as compensate the fisheries industry for any damage to or loss of fishing gear. Encana will also compensate the fisheries industry for any actual economic loss that is incurred as a result of temporary or ongoing de facto loss of fishing grounds as a result of pipelines, or economic loss associated with exclusion zones which may need to be established for pipelines. If the fisheries industry decides to fish with bottom trawls and drags in areas of untrenched pipelines, Encana will first be given the opportunity to decide whether it wishes to undertake further trenching.</li> </ol> <p>Encana agrees in principle to continuing liaison with offshore fishing industries to discuss and address issues of mutual concern as they arise. Encana does not, however, feel it is necessary to establish a new committee to address this continuing liaison. The CNSOPB Fisheries Advisory Committee is an appropriate forum for such a liaison.</p> <p>[Note: the NS Petroleum and Fisheries Liaison Group may be a more appropriate venue]</p> </li> </ul>	Transcripts 744, 5723-5724	17.1
1.40	<ul style="list-style-type: none"> <li>• In the event of an interaction between the Project and a fishery it would be managed through a combination of measures, which could include Notice to Mariners, the use of fisheries observers, and consultation with local fishers.</li> </ul>	2002 CSR	17.1
1.41	<ul style="list-style-type: none"> <li>• Independent and trained observers representing fishing interests will conduct marine bird and mammal observations on Deep Panuke facilities and vessels beyond that required by law, as determined necessary by Encana.</li> </ul>	2002 CSR	17.1

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
1.42	<ul style="list-style-type: none"> <li>Encana will place fishing industry observers strategically on key construction vessels (e.g., the pipelay vessel; during pile-driving) or vessels used for spill clean-up and monitoring to mitigate interaction with fishing vessels:</li> <li>Encana has utilized observers from Oil and Gas Observer Program (OGOP) Ltd. to fulfill these roles in the past and anticipates continued use of its services, especially with respect to mitigation of interactions with fishing vessels, subject to contract renewal following a tender process.</li> </ul>	Vol 4 (pg 9-28)/ IR No. SPANS-ECA-9/ Transcripts 905-907	17.1
1.43	<ul style="list-style-type: none"> <li>Prior to the Project proceeding, Encana will develop an Environmental Monitoring Plan following the intent of the CNSOPB EEM Framework. [Encana will Implement proactive maintenance procedures and environmental monitoring programs that are in compliance with environmental standards during operations].</li> </ul>	2002 CSR/ 2007 CSR (pg 197)	7.1, 5.0, 16.0
1.44	<ul style="list-style-type: none"> <li>Encana will develop a scientifically-sound Environmental Effects Monitoring (EEM) program to detect and assess Project-induced changes in the environment, providing essential feedback to operational managers to provide an early warning mechanism, so that necessary changes can be made to operational activities or discharges. EEM goals will be defined and the program designed through the regulatory approvals process, and consultation with the CNSOPB, regulators (DFO and Environment Canada, Canadian Wildlife Services), species experts from academia and stakeholders. The EEM plan will be made available to regulators for review prior to commencement of fieldwork. The results of the EEM program will be reviewed on an annual basis and adaptations to the program will be made as necessary.</li> </ul> <p>The EEM plan will be developed during detailed engineering design prior to the commencement of Deep Panuke installation activities.</p> <p>The table of contents for the EEM program is shown in Appendix G of the EA Report (Volume 4).</p>	2002 CSR/ 2002 CSR: A&E/ Vol 2 (9.5)/ IR No. NEB-ECA-2.6/ IR No. CNSOPB-ECA-EA-Env-005/ IR No. EC-ECA-1.21	7.1, 5.0, 16.0
1.45	<ul style="list-style-type: none"> <li>As part of Encana's EEM Plan, predicted effects will be verified and any unforeseen effects will be adaptively managed in accordance with standard environmental assessment practice and follow-up requirements.</li> </ul>	IR No. DFO-ECA-5/7	7.1, 5.0, 16.0
1.46	<ul style="list-style-type: none"> <li>Encana is committed to making EEM results publicly available and supports the archiving of environmental monitoring data in a regional database.</li> </ul>	2002 CSR	7.1, 5.0, 16.0
1.47	<ul style="list-style-type: none"> <li>Follow-up monitoring will include potential toxicity, fate and environmental effects of WBM and associated cuttings.</li> </ul>	2002 CSR: A&E	7.1, 5.0, 16.0
1.48	<ul style="list-style-type: none"> <li>Follow-up monitoring will include potential toxicity, fate and environmental effects of produced water. Encana will conduct toxicity testing of organisms satisfactory to the CNSOPB Chief Conservation Officer as required under the OWTG with respect to produced water and in consultation with Environment Canada.</li> </ul>	2002 CSR: A&E	7.1, 5.0, 16.0
1.49	<ul style="list-style-type: none"> <li>Follow-up monitoring will include consideration of contaminant transport and resident organisms.</li> </ul>	2002 CSR: A&E	7.1, 5.0, 16.0
1.50	<ul style="list-style-type: none"> <li>Encana will co-operate, where possible, with COOGER to investigate fate/effects of produced water discharges from the PFC.</li> </ul>	Vol 4 (pg 11-10)/ 2007 CSR (pg 197)	16.0

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
1.51	<ul style="list-style-type: none"> <li>Encana supports the creation of a regional EEM mechanism, which includes regulators, industry and other stakeholders.</li> </ul>	2002 CSR	7.3, 16.0
1.52	<ul style="list-style-type: none"> <li>Independent observers have been contracted to provide observations of seabirds and marine mammals. Encana will consult with the Canadian Wildlife Service (CWS) in regard to an appropriate follow-up program for identification and verification of predicted impacts on marine birds including provisions of appropriate mitigation measures. Encana's commitments to conduct marine bird surveys, and to develop and implement mitigation and follow-up programs (e.g., interactions of birds with lights, flares and spills) will include consultation with the CWS in regard to the specific design elements set out in Environment Canada's October 9, 2002 review of the Addendum (Volume 1) (see Appendix 2, Issues 4, 5 and 6).</li> <li>[Encana will apply] CWS pelagic seabird survey protocols during marine-related bird monitoring.</li> </ul>	2002 CSR: A&E  2007 CSR (pg 197)	16.0
1.53	<ul style="list-style-type: none"> <li>Encana will use wildlife experts/observers for specific purposes, such as monitoring of sentinel species including fish and invertebrates that may aggregate around the PFC or to record species behaviour during pile-driving activity.</li> </ul>	Vol 4 (pg 5-11; 8-89) / IR No. SPANS-ECA-9	16.0
1.54	<ul style="list-style-type: none"> <li>The follow-up monitoring program developed in consultation with the Canadian Wildlife Service (CWS) will include identification and verification of potential effects of lighting and flaring activity and provision of appropriate mitigation measures.</li> </ul>	2002 CSR: A&E	16.0
1.55	<ul style="list-style-type: none"> <li>Encana will support oiled bird surveys on Sable Island by an independent biologist.</li> </ul>	2002 CSR/ 2002 CSR: A&E	16.0
1.56	<ul style="list-style-type: none"> <li>Encana will adhere to the provisions of the National Pollution Release Inventory (NPRI) for the Project. In conjunction with the CNSOPB Offshore Chemical Selection Guidelines and its Waste and Chemical Management Plans, Encana will strive to reduce or eliminate wastes and transfers of NPRI substances throughout the life of the Project.</li> </ul>	2002 CSR: A&E	7.3, 5.0, 8.1, 8.10
1.57	<ul style="list-style-type: none"> <li>For the offshore segment and the overall export pipeline, lifecycle systems and programs will be developed that will address the following: <ul style="list-style-type: none"> <li>Integrity management</li> <li>Environmental protection</li> <li>Construction and operational safety</li> <li>Emergency procedures and response</li> <li>Security management.</li> </ul> </li> </ul>	IR No. NEB-ECA-2.1(a)	5.0,
1.59	<ul style="list-style-type: none"> <li>EnCana will adhere to the provisions of the National Pollution Release Inventory (NPRI) for the Project. In conjunction with the CNSOPB Offshore Chemical Selection Guidelines and its Waste and Chemical Management Plans, EnCana will strive to reduce or eliminate wastes and transfers of NPRI substances throughout the life of the Project.</li> </ul>	2002 CSR: A&E	8.10

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
1.60	<ul style="list-style-type: none"> <li>• For the offshore segment and the overall export pipeline, lifecycle systems and programs will be developed that will address the following:               <ul style="list-style-type: none"> <li>• Integrity management</li> <li>• Environmental protection</li> <li>• Construction and operational safety</li> <li>• Emergency procedures and response</li> <li>• Security management.</li> </ul> </li> </ul>	IR No. NEB-ECA-2.1(a)	5.0
1.61	<ul style="list-style-type: none"> <li>• The Emergency Management Plan conforms to Canadian national standard CAN/CSA Z731-03 <i>Emergency Planning for Industry</i>, CNSOPB "Offshore Health and Safety Requirements", December 2000, Joint Rescue Coordination Centre (JRCC) Offshore Incident Notification and Search and Rescue Protocol, and Transport Canada regulations respecting emergency response.</li> </ul>	IR No. NEB-ECA-2.1(b)	5.0
1.63	<ul style="list-style-type: none"> <li>• Wetlands evaluations which will consider wetland functions will be conducted for each wetland potentially affected by the Project and will be completed in accordance with the Operational Bulletin Respecting the Alteration of Wetlands (March 2006) and the Wetland Designation Policy (March 2006). The evaluation will be used in developing compensation and post-construction monitoring programs to achieve no net loss of wetland functions. The evaluation and subsequent compensation/monitoring program will be submitted to the appropriate regulatory authorities.</li> </ul>	Vol 4 (pg 11-10)/ IR No. EC-ECA-1.26/ 2007 CSR (pg 167)	15.0
1.64	<ul style="list-style-type: none"> <li>• Once a more detailed pipeline route has been selected, submitting the following information to EC for review and approval:               <ul style="list-style-type: none"> <li>• a map showing the location of wetlands in relation to the proposed pipeline RoW,</li> <li>• an estimate of area of wetland (e.g., wetland in area of Betty's Cove Brook) that could be affected by the project,</li> <li>• supporting reasons for why the wetland is deemed unavoidable (i.e., the mapping and analysis employed which demonstrates why the wetland cannot be avoided);</li> <li>• a wetland functional analysis for the wetland habitat potentially affected by the Project (including adjacent and downstream of the pipeline route). The proposed methodology for this analysis shall reference the appropriate sources (e.g. Brinson ACE, Index to Biological Integrity, California Rapid Assessment Method);</li> <li>• if necessary, proposed wetland compensation and monitoring programs.</li> </ul> </li> </ul>	2007 CSR (pg 195)	15.0
<b>Public Consultation</b>			
1.90	<ul style="list-style-type: none"> <li>• Encana's public communications and consultation program will continue through all phases of the Project.</li> </ul>	2002 CSR Revised Vol 4	17.0
1.92	<ul style="list-style-type: none"> <li>• Continued participation in ESSIM.</li> </ul>	Vol 4 (pg 9-39)/ 2007 CSR (pg 193)	17.0
<b>2</b>	<b>DESIGN</b>		
<b>Subsea Pipeline/Flowlines Routing and Design</b>			

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
2.15	<ul style="list-style-type: none"> <li>• The proposed Deep Panuke pipeline location appears to traverse through MARLANT Op Areas I &amp; J. As such, prior to any development work, Encana will contact Kyle Penney, F SEMS Officer (902-721-8622) to determine MARLANT Op Area usage during that time.</li> <li>• In addition, Encana will confirm with DND that there is no known UXO (Unexploded Ordnance), chemical, biological, or radioactive material dump sites in the Project area. Encana will file a summary of this discussion and make it public by filing it with the Boards.</li> <li>• Should subsequent information surface to indicate an increased risk of encountering legacy sites containing conventional and/or chemical munitions (UXO) and/or radioactive materials, the Deep Panuke Emergency Response Plans will be modified to reflect the new information, and the new information will be discussed with relevant authorities.</li> </ul>	<p>DND Letter/ Transcripts 3501-3/ 2007 CSR (pg 193)</p> <p>2002 CSR/ Transcripts 2750, 3504-3508</p> <p>2007 CSR (pg 197)</p>	5.0, 9.0
2.16	<ul style="list-style-type: none"> <li>• The pipeline will be designed to withstand impacts from conventional mobile fishing gear in accordance with the Det Norske Veritas (DNV) Guideline DNV-RP-F111, Interference between Trawl Gear and Pipelines (formerly Guideline No. 13 as referenced in the applications).</li> </ul> <p>Encana is currently evaluating the potential risk of interaction with the hydraulic clam dredge to be used by the new Clearwater vessel, MV Atlantic Seahunter to harvest ocean quahogs on Sable Island Bank starting in 2007. Once this information is obtained, it will be used to determine if either export pipeline option can withstand an impact in accordance with the DNV Guideline DNV-RP-F111.</p> <p>Encana will communicate the results of that dredge study to the fishing industry and to the Boards; and will incorporate the findings into the export pipeline design and the Environmental Protection Plan, as applicable. Potential mitigation measures would be discussed with the fishing industry.</p>	<p>2002 CSR/IR No. NRCan-ECA-1.5</p> <p>Transcripts 3683-3685, 3691, 3706</p>	17.1
2.20	<ul style="list-style-type: none"> <li>• The following lines will be buried to a depth of approx. 1 m with natural or mechanical replacement of native sediments (mechanical backfill for KP 0-1 of the export pipeline for the M&amp;NP Option):                             <ul style="list-style-type: none"> <li>• M&amp;NP Option, export pipeline for KP 0-1, KP 1-22 and KP 110-PFC (i.e. ~50% of the pipeline)</li> <li>• SOEP Subsea Option, entire export pipeline</li> <li>• All interfield flowlines and umbilicals</li> </ul> </li> </ul> <p>The burial depth of 1 m is stated as being approximate and should only be considered as EnCana's preliminary design depth. The final burial depth selected will consider the results of the clam dredge study.</p>	<p>Vol 4 (pg 2-20)/ IR No. SPANS-ECA-4/ Transcripts 3706</p>	17.1
<b>PFC Design</b>			

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
2.24	<ul style="list-style-type: none"> <li>A detailed Concept Safety Analysis (previously called Safety Case analysis) will be undertaken by Encana to ensure that appropriate engineering design and materials procurement procedures are incorporated to ensure a safe facility. A comprehensive training program and state-of-the-art detection systems will alert the facility in the case of an accident. Environmental and safety protection systems will be in place (e.g., leak detection, emergency shutdown valves, blowout prevention safeguards, etc.).</li> </ul> <p>The Concept Safety Analysis will be submitted to the CNSOPB in August 2007.</p>	2002 CSR/ Vol 2 (8.1.1)/ IR No. COMM-ECA-2/ IR No. CNSOPB-ECA-DPA-HSO-006	5.0, 6.0, 12.0
2.26	<ul style="list-style-type: none"> <li>The Deep Panuke facility will not use marine antifouling coatings on the structures.</li> </ul>	2002 CSR	13.0, 16.0
2.27	<ul style="list-style-type: none"> <li>The treatment and disposal of wastes will be in accordance with the Offshore Waste Treatment Guidelines (OWTG) and Encana's environmental protection policies.</li> </ul>	2002 CSR	7.3, 5.0, 8.9
2.28	<ul style="list-style-type: none"> <li>Equipment, valves, and potential areas where hydrocarbon or chemicals could leak will be assessed to determine the need for secondary containment.</li> </ul>	2002 CSR	5.0, 8.4
2.29	<ul style="list-style-type: none"> <li>An open-drain system supplemented by spill trays will ensure that small spills/leaks are contained.</li> </ul>	2002 CSR	8.4
2.30	<ul style="list-style-type: none"> <li>Every reasonable effort will be made to prevent chemical contamination on decks, which could be entrained into deck drainage. Storage areas for totes containing chemicals and petroleum products will have secondary containment to prevent discharge onto deck surfaces. Absorbents will be used to remove residual hydrocarbons from decks. Spill containment equipment will be available to address emergency spills.</li> </ul>	2002 CSR	8.4, 11.1, 10.1
2.31	<ul style="list-style-type: none"> <li>Water intake will be designed and built at sufficient depth to reduce the entrainment of marine organisms (e.g., 10-15 m below surface).</li> </ul>	2002 CSR	8.6
2.32	<ul style="list-style-type: none"> <li>Bilge/ballast water will be treated as necessary to meet applicable guidelines prior to discharge.</li> </ul>	2002 CSR	8.2, 8.3
2.33	<ul style="list-style-type: none"> <li>All runoff collected from the open drains system will be treated to meet applicable regulations prior to discharge. All liquids collected in the closed drain system will be pumped back through the facility for separation and removal of hydrocarbons.</li> </ul>	2002 CSR	8.4
2.34	<ul style="list-style-type: none"> <li>During the operation phase, deck drainage will be collected and treated according to the OWTG. Drainage from equipment areas on platforms will be directed through a header system to a collection tank to an oil/water separator treatment unit on the production platform. Petroleum hydrocarbons and sludge in the oil/water separator will be transferred into containers for shipment to shore for disposal. The water from the oil/water separator will be treated using cartridge-style water polishers and tested prior to discharge to ensure compliance with the applicable discharge criteria.</li> </ul>	2002 CSR	8.4
2.35	<ul style="list-style-type: none"> <li>Produced water will be treated, tested and discharged overboard according to the OWTG. The OWTG specify an oil in water concentration limit of 30 mg/L (30 day average). Encana will strive to meet a target dispersed oil in water concentration of 25 mg/L (30 day average) for produced water.</li> </ul>	2002 CSR	8.6

#	Regulatory Commitment	Regulatory Doc. Ref.	Relevant Section of EPCMP
2.36	<ul style="list-style-type: none"> <li>In addition to a hydrocyclone, a dedicated full-time polishing unit (organophilic clay type) and stripping tower will be used to reduce hydrocarbons (and potentially other chemicals) and H<sub>2</sub>S, respectively, in produced water prior to discharge.</li> </ul>	Vol 4 (pg 2-38, 11-4)/ 2007 CSR (pg 192)	8.6
2.37	<ul style="list-style-type: none"> <li>Encana will reduce H<sub>2</sub>S to "as low as reasonably practicable" (ALARP) before discharging produced water (current design is 1-2 ppm).</li> </ul>	2002 CSR	8.6
2.38	<ul style="list-style-type: none"> <li>Seawater used for indirect cooling will be mixed with produced water before discharge. Total residual chlorine in seawater used in indirect cooling will not normally exceed 0.25 mg/L.</li> </ul>	2002 CSR	8.6
2.39	<ul style="list-style-type: none"> <li>Installing a platform based laboratory facility, or equivalent (to be demonstrated by Encana), to ensure timely and effective compliance monitoring for produced water.</li> </ul>	Vol 4 (pg 2-39) / 2007 CSR (pg 192)	8.6
2.40	<ul style="list-style-type: none"> <li>Sanitary and food wastes will be macerated to a particle size of 6 mm or less and disposed of overboard.</li> </ul>	2002 CSR	8.7
2.41	<ul style="list-style-type: none"> <li>Solid waste will be sorted and disposed of onshore in accordance with applicable regulations and standards. Waste materials will be recycled where possible.</li> </ul>	2002 CSR	8.7
2.42	<ul style="list-style-type: none"> <li>Hazardous wastes for onshore disposal will be accumulated in suitable containers and placed in appropriate shipping containers for return to shore for disposal and collected by licenced waste haulers. Applicable regulations and standards will be followed when handling and transporting hazardous waste, and staff will be appropriately trained to do so. An NSEL-approved hazardous waste contractor will be selected for the disposal of hazardous wastes, and will be regularly audited by Encana personnel for compliance with regulations.</li> </ul>	2002 CSR	8.9
2.43	<ul style="list-style-type: none"> <li>A study to evaluate fugitive emissions will be conducted during detailed design. Equipment and procedures to reduce these releases to ALARP will be incorporated in the design.</li> </ul>	2002 CSR	8.10, 12.0
2.44	<ul style="list-style-type: none"> <li>Stacks and flares will be designed to ensure that any air emissions of concern to worker health and safety will be discharged safely with exposures minimized to acceptable levels.</li> </ul>	2002 CSR	8.10
2.45	<ul style="list-style-type: none"> <li>The flare will be designed to reduce the potential for liquid carry-over.</li> </ul>	2002 CSR	8.10
2.46	<ul style="list-style-type: none"> <li>The flare stack will be designed to optimize plume dispersion (especially its height).</li> </ul>	2002 CSR	8.10
2.47	<ul style="list-style-type: none"> <li>Change-out of the amine solvent will be subject to the EPP.</li> </ul>	2002 CSR	5.0, 9.0
2.50	<ul style="list-style-type: none"> <li>Recovery of waste heat during offshore operations.</li> </ul>	Vol 4 (pg 2-40, 11-4)	5.0, 8.9
2.51	<ul style="list-style-type: none"> <li>No flame-retardant chemicals will be used in the firewater deluge system.</li> </ul>	2002 CSR: A&E	5.0, 8.6
2.52	<ul style="list-style-type: none"> <li>Details on fire suppression systems (water-based or gaseous) and a review of impacts associated with the selected firewater deluge system will be included in the EPP.</li> </ul>	2002 CSR: A&E	8.6

#	Regulatory Commitment	Regulatory Doc. Ref.	Relevant Section of EPCMP
2.53	<ul style="list-style-type: none"> <li>The emissions from stationary combustion turbines will meet the CEPA Ambient Air Quality Guidelines and the Provincial Regulations for Ground Level Emissions.</li> </ul>	2002 CSR: A&E	5.0, 8.10
2.54	<ul style="list-style-type: none"> <li>Encana will discuss the final configuration of turbines with Environment Canada.</li> </ul>	2002 CSR: A&E	5.0, 8.10
2.55	<ul style="list-style-type: none"> <li>Regarding operational statistics on wind conditions, the editorial errors noted in the comments [of the April 3, 2007 EC email to D. Morykot] will be addressed in an update or addendum to the Deep Panuke Design Handbook. If affected by imprecision or errors identified in the comments, revised operational wind statistics will be determined during Project development with the appropriate level of precision to fit specific operational needs as they arise.</li> </ul>	EC Clarifications	16.0
<b>Safety Zone</b>			
2.56	<ul style="list-style-type: none"> <li>The safety zone for the new Project will include, as a minimum, an area extending 500 m around the PFC, and will likely also include the interfield flowlines and wellheads. The exact configuration of the safety zone will be determined based on safety risk assessment and consultations with regulatory agencies. There will also be a temporary 500 m safety zone around the drilling rig when it is on location for development drilling. There will be no safety zones over the export pipeline; although there will be fishing restrictions over the subsea connection to the SOEP pipeline (SOEP Subsea Option).</li> </ul>	2002 CSR Revised Vol 4	5.0
2.57	<ul style="list-style-type: none"> <li>A copy of the offshore site plan will be sent to the Canadian Hydrographic Service to update charts. Notices to Mariners will be issued.</li> </ul>	2002 CSR	5.0
<b>4</b>	<b>OPERATIONS</b>		
	<b>General</b>		
4.1	<ul style="list-style-type: none"> <li>Engineering assumptions and options that are agreed upon and incorporated into final design and construction will be translated into operations and maintenance manuals for personnel use at the operations phase.</li> </ul>	2002 CSR	5.0, 13.0
4.2	<ul style="list-style-type: none"> <li>Once installed, equipment will be operated and maintained in accordance with documented processes and procedures. Encana will submit inspection and monitoring programs, a maintenance program and a weight control program to the CA for approval.</li> <li>Conducting periodic inspection of the PFC, pipeline, flowlines, and subsea structures to ensure structural integrity.</li> </ul>	2002 CSR/ 2007 CSR (pg 196)	75.3, 5.0, 13.0
4.3	<ul style="list-style-type: none"> <li>Necessary critical spares will be maintained should equipment change-out be required.</li> </ul>	2002 CSR	5.0, 13.0

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
4.4	<ul style="list-style-type: none"> <li>GHG emissions are a global issue; therefore, Encana manages its GHG emissions at the corporate level. A corporate approach to GHG reductions allows Encana to target the largest and most cost effective reduction opportunities across the organization. Nevertheless, Encana will consider all reasonable opportunities to further reduce GHG emissions from the Deep Panuke Project in the engineering design process within the constraints of the location (i.e., offshore) and facility safety.</li> </ul>	Vol 4 (pg 8-15)	5.0, 8.10
4.5	<p>Encana can confirm that it will meet all regulatory requirements resulting from expected federal and/or provincial reviews of [the greenhouse gases] issue. Encana continues to monitor the evolution of this issue.</p> <p>Encana awaits further direction in this area from government and expects that direction will become clearer in the coming months.</p>	2007 Addendum No. 1	7.3, 5.0
<b>Onshore Facilities and Pipeline</b>			
4.6	<ul style="list-style-type: none"> <li>While not prohibited, use of ATVs on the pipeline RoW will be discouraged through posting of warning signs along the RoW, and consultations with local ATV clubs.</li> </ul>	2002 CSR	15.0
4.7	<ul style="list-style-type: none"> <li>Vegetation control to maintain the cleared RoW during pipeline operation will only be conducted by mechanical means. Herbicide use will be restricted to approved herbicides around surface structures (fenced valve sites and meter stations) and will involve low application rates of compounds with low persistence and low ecological toxicity. Herbicides will not be used within close proximity (e.g., 30 m) of watercourses or wetlands.</li> </ul>	2002 CSR/ Vol 4 (pg 8-114)	15.0
4.8	<ul style="list-style-type: none"> <li>Vegetation control will be conducted outside the breeding period for most migratory bird species (April 1 to mid-August) to avoid contraventions of the MBCA and minimize the potential for destruction of eggs and young of migratory birds. Developing a compliance strategy for the MBCA shall also reflect an awareness of the following: <ul style="list-style-type: none"> <li>some migratory bird species protected under the MBCA nest outside the April 1 to mid-August timeframe;</li> <li>a number of birds nest at ground level, and some species (e.g. Bank Swallows) nest in burrows in stockpiles of soil or the banks of pits, and</li> <li>risk of impacting active nests or birds caring for pre-fledged chicks, discovered during Project activities outside the breeding season for most migratory birds, can be minimized by measures such as the establishment of vegetated buffer zones around nests, and minimization of activities in the immediate area until nesting is complete and chicks have naturally migrated from the area.</li> </ul> </li> </ul>	Vol 4 (pg 8-114)/ 2007 CSR (pg 195)	15.0
4.9	<ul style="list-style-type: none"> <li>Dust suppression techniques will be used if required. In selecting appropriate dust suppression techniques, Encana will comply with all applicable legislation.</li> </ul>	2002 CSR/ 2002 CSR: A&E)	15.0
4.10	<ul style="list-style-type: none"> <li>Wastes accumulated at the onshore pigging station will be collected by tanker truck and removed to an approved waste disposal facility. Prior to shipping, these wastes will be tested to determine the concentrations of organic and inorganic compounds. The testing will identify whether the wastes qualify as hazardous substances and identify the appropriate documentation for transport and means of disposal.</li> </ul>	2002 CSR	15.0
4.11	<ul style="list-style-type: none"> <li>Vegetation along watercourses will be monitored during operation.</li> </ul>	Vol 4 (pg 11-10)	15.0

#	Regulatory Commitment	Regulatory Doc. Ref.	Relevant Section of EPCMP
4.12	<ul style="list-style-type: none"> <li>Follow-up will be conducted after clean up activities to accurately evaluate habitat restoration and the success of stream bank protection and stability.</li> </ul>	Vol 4 (pg 11-10)/ 2007 CSR (pg 198)	15.0
4.13	<ul style="list-style-type: none"> <li>Wetland habitat restored on the RoW adjacent to existing wetlands will be monitored to determine the success of the restoration.</li> </ul>	Vol 4 (pg 11-10)	15.0
4.14	<ul style="list-style-type: none"> <li>Following the determination of the final crossing location and method, water quality will be monitored for total suspended solids (TSS) at each stream crossing.</li> </ul>	Vol 4 (pg 11-10)	15.0
4.15	<ul style="list-style-type: none"> <li>Stream crossings in acid drainage risk areas and/or areas contaminated by past mining activities will be monitored for surface water quality throughout the life of the Project.</li> </ul>	Vol 4 (pg 11-10)	15.0
<b>Subsea Export Pipeline/Flowlines</b>			
4.16	<ul style="list-style-type: none"> <li>The subsea pipeline will be monitored as part of the certification and inspection process. Part of this information will be made available to the EEM as appropriate.</li> </ul>	2002 CSR	16.0
4.17	<ul style="list-style-type: none"> <li>A typical [audit/inspection] plan [for the export pipeline] would include an annual visual inspection, a five-yearly internal inspection using intelligent pigs, and other "special" inspections which may be warranted. The "special" inspections will be performed as per CSA Z662 <i>Oil and Gas Pipeline Systems</i> for the onshore component and DNV OS-F101 <i>Submarine Pipeline Systems</i> for the offshore component.</li> </ul>	IR No. NEB-ECA-2.1/ IR No. SPANS-ECA-4	5.0, 13.0
4.18	<ul style="list-style-type: none"> <li>Encana will survey the export pipeline (M&amp;NP Option) with an Inertial Inline Inspection Tool within the first year of operation</li> </ul>	Transcripts 3349-3351	5.0, 13.0
4.19	<ul style="list-style-type: none"> <li>Developing design, inspection, maintenance and integrity assurance programs, and appropriate safety procedures, to minimize the potential of a flowline rupture.</li> </ul>	2007 CSR (pg 196)	5.0
<b>Vessel and Helicopter Traffic</b>			
4.20	<ul style="list-style-type: none"> <li>Standard vessel operations procedures, including avoidance measures, will be adhered to.</li> </ul>	2002 CSR	5.0, 10.0
4.21	<ul style="list-style-type: none"> <li>Vessel activities associated with the Deep Panuke Project will adhere to all applicable shipping regulations, including those with respect to the discharge of bilge/ballast water.</li> </ul>	2002 CSR	10.0
4.22	<ul style="list-style-type: none"> <li>Guidelines for Project aircraft and vessels operating in the vicinity of Sable Island and Country Island will be incorporated into the Project EPP as per respective Encana Codes of Practice.</li> </ul> <p>Encana will seek permission from the Canadian Coast Guard for "special trips" to Sable Island for purposes which could possibly include environmental or emergency response planning or maintenance of any communication equipment that may be required on the island for Deep Panuke. Such trips are anticipated to be infrequent (once or twice a year).</p>	2002 CSR/ IR No. EC-ECA-1.27	10.0, 11.0, 7.3
4.23	<ul style="list-style-type: none"> <li>Helicopters will avoid colonies and high concentrations of birds.</li> </ul>	2002 CSR	11.0

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
4.24	<ul style="list-style-type: none"> <li>To avoid potential adverse effects caused by vessel traffic, a buffer zone (approximately 2 km) surrounding Sable Island will be established for the Project. The Project will comply with the Sable Island Emergency Contingency Plan (Canadian Coast Guard 1985) and flying over the island will be avoided except in emergency or other non-routine situations (e.g., emergency refuelling) as per Encana's Code of Practice for Sable Island.</li> </ul>	2002 CSR	10.0
4.25	<ul style="list-style-type: none"> <li>If a landing on Sable Island is required (i.e., at the existing helicopter refuelling facility), helicopters will avoid flying over or landing in close proximity to large concentrations of horses and seals, and pilots will take advice from the Island manager on the position of breeding tern colonies. In addition, landing approaches will be made at right angles to the long axis of the Island and be as steep as safely possible to minimize the area of the island exposed to low-level flying.</li> </ul>	2002 CSR	11.0
4.26	<ul style="list-style-type: none"> <li>If non-routine Project related vessel or helicopter traffic must interact with Sable Island, any observed adverse animal reactions, or other adverse effects associated with the traffic, will be recorded and reported to appropriate regulatory agencies.</li> </ul>	2002 CSR	10.0, 11.0
<b>Field Centre</b>			
4.27	<ul style="list-style-type: none"> <li>Spills of petroleum products (or other chemicals) will be cleaned up immediately and reported in accordance with regulations. Oil absorbent pads and "oil dry" compounds will be available at all times in spill kits located at strategic sites on the platforms, to remove petroleum products from deck surfaces. The used absorbent materials and any other oily wastes will be placed in sealed containers and returned to shore for treatment and disposal at an approved waste management facility.</li> </ul>	2002 CSR	12.0
4.28	<ul style="list-style-type: none"> <li>It will be the responsibility of all Encana employees and contractors to report any accidents, incidents or spills to the Offshore Installation Manager for immediate action in accordance with the EPP.</li> </ul>	2002 CSR	12.0
4.29	<ul style="list-style-type: none"> <li>The standby vessel in the field will also be tasked as part of their regular duties to observe and report any spills from the facilities.</li> </ul>	2002 CSR	12.0
4.30	<ul style="list-style-type: none"> <li>The control room would be staffed 24 hours a day, seven days a week monitoring the facilities.</li> </ul>	2002 CSR	5.0, 13.0
4.31	<ul style="list-style-type: none"> <li>Sheens caused by discharges will be recorded by operations personnel on the platform as a component of ECM. An industry-accepted sheen index will be used to estimate the quantity of oil observed on the water surface.</li> </ul>	2002 CSR	8.11, 12.0
4.32	<ul style="list-style-type: none"> <li>In the case of an accidental hydrocarbon spill from the Project, it is highly unlikely that there would be any adverse effects on Sable Island. However, if such an interaction were to occur, then monitoring and follow-up will be undertaken to confirm clean-up and recovery.</li> </ul>	2002 CSR	12.0
4.33	<ul style="list-style-type: none"> <li>Fluids (e.g., well treatment fluids, well completion and workover fluids) will be treated to meet applicable guidelines prior to ocean discharge.</li> </ul>	2002 CSR	7.3, 9.0., 8.1
4.34	<ul style="list-style-type: none"> <li>Environmental compliance monitoring (ECM) will primarily involve monitoring for conformance with discharge limits. ECM procedures will be clearly defined in the EPP.</li> </ul>	2002 CSR	5.0, 8.1

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
4.35	<ul style="list-style-type: none"> <li>Maintenance of the injection equipment will normally be carried out during scheduled shut-down. Various options such as flaring and platform shut-down will be considered in discussion with the regulators for dealing with acid gas.</li> </ul>	2002 CSR	7.3, 5.0, 13.0
4.36	<ul style="list-style-type: none"> <li>Atmospheric discharges will be tested periodically to verify the efficiency of the systems.</li> </ul>	2002 CSR	8.10, 13.0
4.37	<ul style="list-style-type: none"> <li>A camera system will provide continuous visual monitoring of the flare.</li> </ul>	2002 CSR	8.10
4.38	<ul style="list-style-type: none"> <li>Encana is committed to an immediate response to an unplanned change to flaring mode. It is proposed that within seven days of the mode shift, a written response would be submitted to the CNSOPB outlining the options, actions and schedule for resumption of normal operating mode. These procedures will be outlined in the Project flaring procedures to be included in the EPP.</li> </ul>	2002 CSR	8.10, 13.0
4.39	<ul style="list-style-type: none"> <li>Encana will work with the appropriate regulatory authorities to develop the required reporting mechanism and parameters regarding Project air emissions.</li> <li>[Encana will report] emissions annually as per the OWTG, as well as Sections 46 (GHG emissions inventory) and 48 (National Pollutant Release Inventory) of CEPA 1999.</li> </ul>	2002 CSR/ 2007 CSR (pg 197)	7.3, 8.10
4.40	<ul style="list-style-type: none"> <li>Encana will continually strive to reduce flaring to optimize process efficiency and to improve environmental performance.</li> </ul>	2002 CSR	7.3, 5.0, 8.10
4.41	<ul style="list-style-type: none"> <li>Encana will develop flaring mitigation procedures in the EPP to reduce, where practical, the temporary and localized emissions and potential effects associated with flaring events during construction and start-up. Procedures will specify: <ul style="list-style-type: none"> <li>procedures during perforating/well testing to minimize smoky plumes;</li> <li>safe zones for vessels to occupy during the test flares;</li> <li>go/no go zones for vessels;</li> <li>safety gear and procedures on board platforms and vessels;</li> <li>wind direction forecast requirements such as the need to be sure of sustained wind directions during the test;</li> <li>visibility and other weather requirements;</li> <li>real-time requirements to monitor the efficiency of the flare and downwind effects;</li> <li>reporting requirements to document the safe conduct of the work and potential improvements; and</li> <li>notification procedures for shipping, staff, and environmental staff.</li> </ul> </li> </ul>	2002 CSR	5.0, 8.10
4.42	<ul style="list-style-type: none"> <li>Test flaring will be conducted according to the flare mitigation procedures included in the EPPs. Well test flaring will be scheduled with respect to weather conditions and the presence of marine craft and service vessels to the extent practical. Notifications to Mariners will be issued.</li> </ul>	2002 CSR	8.10, 13.0

#	<b>Regulatory Commitment</b>	<b>Regulatory Doc. Ref.</b>	<b>Relevant Section of EPCMP</b>
4.43	<ul style="list-style-type: none"> <li>• A Physical Environmental Monitoring Program will be developed and implemented with reference to applicable regulations and guidelines. The Plan will include four main programs:               <ul style="list-style-type: none"> <li>• Weather and seastate data collection program;</li> <li>• Current measurement program;</li> <li>• Surface ocean wave measurement program; and</li> <li>• Weather forecasting.</li> </ul> </li> </ul>	2002 CSR	13.4
4.44	<ul style="list-style-type: none"> <li>• Encana will monitor biofouling of the platform jackets during scheduled underwater ROV inspection surveys. Marine growth will be removed by hydrojetting if the equivalent marine growth thickness approaches the design threshold. Sodium hypochlorite will be used to control biofouling of seawater intakes and discharge caissons. The residual free chlorine concentration at the outlet under normal operating conditions will be below 0.25 ppm.</li> </ul>	2002 CSR	13.5, 16.0
4.45	<ul style="list-style-type: none"> <li>• Modifying the biofouling management program as required to suit the differences between the PFC and the 2002 proposed structures.</li> </ul>	Vol 4 (pg 10.1)/ 2007 CSR (pg 193)	13.5, 16.0
4.46	<ul style="list-style-type: none"> <li>• Encana will contact all vessels approaching the 500 m safety zone.</li> </ul>	2002 CSR	5.0, 17.0
4.47	<ul style="list-style-type: none"> <li>• Gas or diesel will not be used as the prime fuel while condensate is available for fuel [for the M&amp;NP Option].</li> </ul>	IR No. EC-ECA-1.2	5.0, 8.10

**APPENDIX 3 Offshore Waste Treatment Guidelines [HOLD 1] Summary Chart  
Applicable to Deep Panuke Production Operations**

Waste Stream	Discharge	Design and Operational Considerations	Discharge Limits	Reporting to CNSOPB CCO	Measurement and Calculations
<b>Air Emissions</b>	<b>Greenhouse Gases (GHG) &amp; Other Emissions to Air</b>	<ul style="list-style-type: none"> <li>New operations of production installations to detail plans to control GHGs as part of Development Applications with an estimate of Annual emissions</li> </ul>	<ul style="list-style-type: none"> <li>None Specified</li> </ul>	<ul style="list-style-type: none"> <li>Periodic update on review of strategy to control and reduce GHG emissions</li> </ul>	<ul style="list-style-type: none"> <li>None specified</li> </ul>
<b>Produced Water</b>	<b>Oil in Water</b>	<ul style="list-style-type: none"> <li>New operations of production installations DPA to report on technical &amp; economic feasibility of alternatives to conventional marine discharge of produced water</li> </ul>	<ul style="list-style-type: none"> <li>Weighted average of <math>\leq 30</math> mg/L over 30 days</li> <li>Average of <math>\leq 44</math> mg/L over 24 hr</li> </ul>	<ul style="list-style-type: none"> <li>Report exceedances as per <i>Guidelines for the Reporting and Investigation of Incidents</i></li> <li>Report individual sample values, 24-hour performance metric, and total volume of produced water discharged, for each day of discharge monthly</li> <li>Where fluids have been added to prevent hydrate and/or ice formation and are discharged as part of produced water, report volume discharged and average concentration as part of monthly reporting.</li> <li>Report on produced water characterization program at least annually</li> </ul>	<ul style="list-style-type: none"> <li>Oil in produced water measured every 12 hr at a minimum</li> <li>Standard Methods for the Examination of Water and Wastewater, 20th Edition, 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons</li> <li>Chemical characterization may draw upon sampling programs for reservoir monitoring purposes. May also include toxicity testing, detailed component and/or fate modeling studies, participation in relevant research activities directly relating to produced water discharge at the production installation.</li> </ul>
<b>Bilge Water</b>	<b>Oil in Water</b>	<ul style="list-style-type: none"> <li>Must be treated</li> </ul>	<ul style="list-style-type: none"> <li><math>\leq 15</math> mg/L</li> </ul>	<ul style="list-style-type: none"> <li>Report exceedances as per <i>Guidelines for the Reporting and Investigation of Incidents</i></li> </ul>	<ul style="list-style-type: none"> <li>Submit proposed sampling methodology</li> <li>Standard Methods for the Examination of Water and Wastewater, 20th Edition (as amended or updated), 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons; or</li> <li>Using oil-water separator compliant with Transport Canada for vessel bilge discharge, according to <i>Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals</i></li> </ul>

Waste Stream	Discharge	Design and Operational Considerations	Discharge Limits	Reporting to CNSOPB CCO	Measurement and Calculations
					(SOR/2007-86) (consistent with MARPOL)
Ballast Water	Oil in Water	<ul style="list-style-type: none"> <li>Where ballast water is segregated and no contamination with oil is suspected, may be discharged without treatment or monitoring.</li> <li>If suspected to be contaminated with oil, should be treated before discharge</li> </ul>	<ul style="list-style-type: none"> <li>≤ 15 mg/L</li> </ul>	<ul style="list-style-type: none"> <li>Report exceedances as per <i>Guidelines for the Reporting and Investigation of Incidents</i></li> </ul>	<ul style="list-style-type: none"> <li>Submit proposed sampling methodology</li> <li>Standard Methods for the Examination of Water and Wastewater, 20th Edition (as amended or updated), 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons</li> </ul>
Deck Drainage	Oil in Water	<ul style="list-style-type: none"> <li>Where there is no potential for contamination with oil, may be discharged to sea without treatment</li> <li>Where there is potential for contamination with oil, should be collected and treated before discharge</li> <li>Deck drainage collection systems to be separated from drip pans under machinery</li> <li>Return drip pan contents to process or recover/recycle or send to shore disposal</li> </ul>	<ul style="list-style-type: none"> <li>≤ 15 mg/L</li> </ul>	<ul style="list-style-type: none"> <li>Report exceedances as per <i>Guidelines for the Reporting and Investigation of Incidents</i></li> </ul>	<ul style="list-style-type: none"> <li>Measured at least every 12hr for continuous discharge; submit proposed sampling methodology for batch discharge</li> <li>Standard Methods for the Examination of Water and Wastewater, 20th Edition (as amended or updated), 5520 Oil and Grease, 5520 C Partition-Infrared Method and 5520 F Hydrocarbons</li> </ul>
Cooling Water	Residual Chlorine or Other Biocides	<ul style="list-style-type: none"> <li>Screen all biocides according to the <i>Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands</i></li> <li>Identify any biocide (including discharged concentration) that may be discharged to sea in cooling water in EPP</li> </ul>	<ul style="list-style-type: none"> <li>None Specified</li> </ul>	<ul style="list-style-type: none"> <li>None Specified</li> </ul>	<ul style="list-style-type: none"> <li>None Specified</li> </ul>
Desalination Brine	Brine	<ul style="list-style-type: none"> <li>Brine from desalinated water may be discharged without treatment</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>None required</li> </ul>	<ul style="list-style-type: none"> <li>None required</li> </ul>
Sewage and Kitchen Waste	Organic Solids	<ul style="list-style-type: none"> <li>Must be treated; some circumstances may require additional treatment</li> <li>In cases where an installation chemically disinfects sewage prior to discharge, describe any biocide that may be discharged in sewage and the concentrations to be discharged to the sea</li> </ul>	<ul style="list-style-type: none"> <li>Macerated to &lt; 6 mm</li> </ul>	<ul style="list-style-type: none"> <li>None required</li> </ul>	<ul style="list-style-type: none"> <li>None required</li> </ul>
Testing of Fire Control	Fire Water	<ul style="list-style-type: none"> <li>Water from testing fire control systems may</li> </ul>	<ul style="list-style-type: none"> <li>None specified</li> </ul>	<ul style="list-style-type: none"> <li>Notify CNSOPB prior to conducting</li> </ul>	<ul style="list-style-type: none"> <li>None required</li> </ul>

Waste Stream	Discharge	Design and Operational Considerations	Discharge Limits	Reporting to CNSOPB CCO	Measurement and Calculations
<b>Systems</b>		be discharged without treatment <ul style="list-style-type: none"> <li>Where chemical fire suppressant agents are added to water, describe chemicals and amounts to be discharged in EPP</li> <li>Oil should not be discharged to sea in conjunction with testing of fire suppression systems</li> </ul>		scheduled testing of fire suppression systems where fire suppression chemicals are expected to be discharged to sea <ul style="list-style-type: none"> <li>.Any discharge of oil must be reported and responded to as a spill in accordance with the operator's contingency plans</li> </ul>	
<b>Operational Discharges from Subsea Systems</b>	<b>Pressure testing, antifreeze, purging fluids, etc (e.g. (Mono)Ethylene Glycol and Methanol)</b>	<ul style="list-style-type: none"> <li>Discharge without treatment</li> <li>Screen chemicals according to the <i>Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands</i></li> <li>Describe fluids discharged for operation of subsea systems (including volumes or discharge rates) in EPP</li> </ul>	<ul style="list-style-type: none"> <li>None specified</li> </ul>	<ul style="list-style-type: none"> <li>Report on the systems discharging these fluids, and associated discharged fluid volumes or tonnage monthly</li> </ul>	<ul style="list-style-type: none"> <li>Specified case by case</li> </ul>
<b>Discharges associated with Installation and Maintenance of Subsea Systems</b>	<b>Ethylene glycol, methanol, water, brine, residual petroleum, and other residues</b>	<ul style="list-style-type: none"> <li>Screen chemicals according to the <i>Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands</i></li> <li>Reduce to a minimum amount of discharged residual hydrocarbons</li> <li>Describe planned batch discharges in EPP</li> <li>Case by case authorization required for discharges not described in EPP</li> </ul>	<ul style="list-style-type: none"> <li>None specified</li> </ul>	<ul style="list-style-type: none"> <li>Report volumes of discharged chemicals through normal process for reporting chemical usage</li> <li>Report estimated volume of discharged residual petroleum</li> <li>Report sheens as per operator's spill contingency plan</li> </ul>	<ul style="list-style-type: none"> <li>None required</li> </ul>
<b>Naturally Occurring Radioactive Material (NORM)</b>	<b>NORM</b>	<ul style="list-style-type: none"> <li>None specified</li> </ul>	<ul style="list-style-type: none"> <li>None specified</li> </ul>	<ul style="list-style-type: none"> <li>Report occurrence or probability of occurrence as early as possible to initiate discussion on disposal options</li> </ul>	<ul style="list-style-type: none"> <li>General guidance on NORM provided in Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM), Health Canada 2000, Cat. H46-1/30-2000E</li> </ul>

**Notes:**

- Offshore operators are expected to minimize the volumes of waste materials generated by their operations and to minimize the quantity of substances of potential environmental concern contained within these waste materials. Where these Guidelines include performance targets in respect of the concentration or volume of waste material in discharges, these are intended to express the minimum performance expectations of the Boards. Boards expect that operators will strive to minimize the concentrations and volumes of waste materials discharged to the environment and will adopt best practices in waste management and treatment consistent with the principals of continual improvement.
- This summary table only includes waste discharge information relevant to Deep Panuke's production operations.
- While every attempt has been made to ensure the accuracy of this Summary Table, users should refer to the OWTG [HOLD 1] for definitive guidance.

**APPENDIX 4 Williams and Chardine Protocol**

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The Leach's Storm-Petrel:  
General information and handling instructions

Urban Williams (Petro-Canada)  
&  
John Chardine (Canadian Wildlife Service)

The Grand Banks is an area that is frequented by large numbers of seabirds, representing a variety of species. Large populations are found in this area in both summer and winter, and come from the Arctic, northern Europe, and the south Atlantic, as well as from colonies along the Newfoundland Coast. One of the species found in the area of the Terra Nova Field is the Leach's Storm-Petrel (*Oceanodroma leucorhoa*).

#### 1.1.1.1 The Bird:

Leach's Storm-Petrels are small seabirds, not much bigger than a Robin. They have relatively long wings and are excellent fliers. Leach's Storm-Petrels are dark brown in colour and show a conspicuous white patch at the base of the tail. In the hand, you can easily notice a small tube at the top of their bill, and you will also notice that the birds have a peculiar, not unpleasant smell (although some Newfoundlanders call these birds "Stink Birds"). Storm-Petrels are easy prey for gulls and other predators, and so to protect themselves from predation, Leach's Storm-Petrels are only active at night when on land at the breeding colonies.



#### 1.1.1.2 Nesting Habitat:

Leach's Storm-Petrels are distributed widely in the northern hemisphere, however, their major centres of distribution are Alaska and Newfoundland. The bird breeds on offshore islands, often in colonies numbering tens or hundreds of thousands of pairs, even millions at one colony in Newfoundland. The nest is a chamber, sometimes lined with some grass, located at the end of a narrow tunnel dug in the topsoil. Depending on the colony, burrows may be under conifer or raspberry thickets or open grassland.

#### 1.1.1.3 Reproduction:

In Newfoundland, Leach's Storm-Petrels lay their single egg in May and June. The egg is incubated by both parents alternately, sometimes for stretches exceeding 48 hours. The egg is incubated for 41-42 days, which is a long time for such a small egg. The peak hatching period is in the last half of July. The young petrel remains in the tunnel for about 63-70 days. Once breeding is over in late-August or early September, the birds disperse from the colonies and migrate to their wintering grounds in the Atlantic. September is the most important period for migration of Storm-Petrels to the offshore areas such as near the Terra Nova field.

#### **1.1.1.4 Populations:**

Canada alone supports more than 5 million pairs of Leach's Storm-Petrels. Most of them are found in Newfoundland. The Leach's Storm-Petrel colony located on Baccalieu Island is the largest known colony of this species.

Nesting sites for Leach's Storm-Petrels are found along the southeast coast of Newfoundland. These are - i) Witless Bay Islands (780,00 nesting pairs), ii) Iron Island (10,000 nesting pairs), iii) Corbin Island (100,000 nesting pairs), iv) Middle Lawn Island (26,000 nesting pairs), v) Baccalieu Island (3,336,000 nesting pairs), vi) Green Island (72,000 nesting pairs), and vii) St. Pierre Grand Columbier (100,000 nesting pairs).

#### **1.1.1.5 Feeding Habits:**

Leach's Storm-Petrels feed at the sea surface, seizing prey in flight. Prey usually consists of myctophid fish and amphipods. The chick is fed planktonic crustaceans, drops of stomach oil from the adult bird, and small fish taken far out at sea. Storm-Petrels feed far out from the colony and it would be reasonable to assume that birds nesting in eastern Newfoundland can be found feeding around the Terra Nova site.

#### **1.1.1.6 The Problem:**

As identified in the C-NOPB Decision 97-02, seabirds such as Leach's Storm-Petrels are attracted to lights on offshore platforms and vessels. Experience has shown that Storm-Petrels may be confused by lights from ships and oil rigs, particularly on foggy nights, and will crash into lighted areas such as decks and portholes. Fortunately, this type of accident does not often result in mortality, however, once on deck the bird will sometimes seek a dark corner in which to hide, and can become fouled with oil or other contaminants on deck.

#### **1.1.1.7 Period of Concern:**

Leach's Storm-Petrels are in the Terra Nova area from about May until October and birds could be attracted to lights at any time throughout this period. The period of greatest risk of attraction to lights on vessels appears to be at the end of the breeding season when adults and newly fledged chicks are dispersing from the colonies and migrating to their offshore wintering grounds. September is the most important period for migration of storm-petrels to the offshore areas. Past experience suggests that any foggy night in September could be problematic and may result in hundreds or even thousands of birds colliding with the vessel.

#### **1.1.1.8 The Mitigation:**

On nights when storm-petrels are colliding with the vessel, the following steps should be taken to ensure that as many birds as possible are safely returned to their natural habitat:

- All decks of the vessel should be patrolled as often as is needed to ensure that birds are picked up and boxed (see below) as soon as possible after they have collided with the vessel. After collision, birds will often "freeze" below lights on deck or seek dark areas underneath machinery and the like.
- Birds should be collected by hand and gently placed in small cardboard boxes. Care should be taken not to overcrowd the birds and a maximum of 10-15 birds should be placed in each box, depending upon its size. The birds are very easy to pick up as they are poor walkers and will not fly up off the deck so long as the area is well-lit. They will make a squealing sound as they are picked up- this is of no concern and is a natural reaction to be handled (the birds probably think they have been captured to be eaten!).

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- When the birds are placed in the box the cover should be put in place and the birds left to recover in a dark, cool, quiet place for about 5-10 minutes. The birds initially will be quite active in the box but will soon settle down.
  - Following the recovery period, the box containing the birds should be brought to the bow of the boat or to some other area of the vessel that has minimal (if any) lighting. The cover should be opened and each bird individually removed by hand. The release is usually accomplished by letting the bird drop over the side of the vessel. There is no need to throw the bird up in the air at release time. If the birds are released at a well-lit part of the vessel they usually fly back towards the vessel and collide again.
  - If any of the birds are wet when they are captured (i.e. they drop into water on the deck) then they should be placed in a cardboard box and let dry. Once the bird is dry it can be released as per the previous instruction. Also, temporarily injured birds should be left for longer to recover in the cardboard box before release.
  - Any birds contaminated with oil should be kept in a separate box and not mixed with clean birds. Contact Canadian Wildlife Service at (709) 772-5585 for instructions on how to deal with contaminated birds.
  - In the event that some birds are captured near dawn and are not fully recovered before daylight, they should be kept until the next night for release. Storm-Petrels should not be released in daylight as at this time they are very vulnerable to predation by gulls. Birds should be kept in the cardboard box in a cool, quiet place for the day, and do not need to be fed.
  - Someone should be given the responsibility of maintaining a tally of birds that have been captured and released, and those that were found dead on deck. These notes should be kept with other information about the conditions on the night of the incident (moonlight, fog, weather), date, time, etc). THIS IS A VERY IMPORTANT PART OF THE EXERCISE AS IT IS THE ONLY WAY WE CAN LEARN MORE ABOUT THESE EVENTS.

#### **1.1.1.9 Handling Instructions:**

- Leach's Storm-Petrels are small, gentle birds and should be handled with care at all times.
- It is recommended that the person handling the birds should wear thin rubber gloves or clean, cotton work gloves. The purpose of the gloves is to protect both the Storm-Petrel and the worker.
- As mentioned Storm-Petrel's have a strong odour that will stick to the handler's hands. Washing with soap and water will remove most of the smell.
- Handling Leach's Storm-Petrels does not pose a health hazard to the worker, however some birds may have parasites on their feathers, such as feather lice. These parasites do not present any risk to humans, however, as a precaution we recommend wearing cotton work gloves or thin rubber gloves while handling birds and washing of hands afterwards.

**1.1.1.10 Wilson's Storm Petrels:**

A relative of the Leach's Storm-Petrel is the Wilson's Storm-Petrel. They breed in the south Atlantic and Antarctica and migrate north in our spring to spend the summer in Newfoundland waters. This species is very numerous on the Grand Banks in the summer, and shares the same nocturnal habits as the Leach's Storm-Petrel. Thus it is possible that Wilson's Storm-Petrels may also be attracted to the lights of a vessel at night. The two species are very similar and should be handled in the same way as described above for our Leach's Storm-Petrel.

**1.1.1.11 Permits:**

A permit to handle storm-petrels issued by the Canadian Wildlife Service will be held on board the vessel to cover personnel involved in bird collision incidents.

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## APPENDIX 5 References

- American Public Health Association, American Water Works Association, Water Environment Federation, 1998. Standard Methods for the Examination of Water and Wastewater, 20<sup>th</sup> Edition (or as amended or updated)
- Canadian Association of Petroleum Producers. 1999. CH<sub>4</sub> and VOC Emissions from the Canadian Oil and Gas Industry (CAPP Publication Number 1999-0009)
- Canadian Association of Petroleum Producers. 2000. Global Climate Change Voluntary Challenge Guide, 5<sup>th</sup> Edition (CAPP Publication Number 2000-0004)
- Environment Canada. 1993. Biological Test Method: Fertilization Assay Using Echinoids (Sea Urchins and Sand Dollars) (Environmental Protection Directorate Report No. EPS 1/RM/27).
- Health Canada. 2000. Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM), Cat. H46-1/30-2000E.
- United States Environmental Protection Agency. 1997. Determination of Trace Elements in Marine Waters by On-line Chelation Preconcentration and Inductively Coupled Plasma – Mass Spectrometry (EPA Method 200.10)
- United States Environmental Protection Agency. Mercury Cold Vapor Extraction (EPA Method 245.1)