



## **Port au Port Drilling Project Description**

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Report No. PR-011  
Rev. 1**

**Submitted by**

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## Report Approval Cover Sheet

<b>Report Title:</b>	<b>Port au Port Drilling Project Description</b>
<b>Project Name:</b>	Port au Port General
<b>Client:</b>	n/a
<b>Client Ref:</b>	n/a
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### Approval Record

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## Report Record of Revision

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## Record of Revision

Rev. No.	Date	Revision Details
0	6 <sup>th</sup> March 2007	Original
1	15 <sup>th</sup> Mar 2007	Update to reflect comments from C-NLOPB – include number of wells to be drilled, and details on the timing of proposed drilling.

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## 1. Introduction

### 1.1 Company Background

PDI Production Inc (PDIP) is an oil and gas operating company holding working interests in properties that it operates. The company is the operator of the “Port au Port Project”, in West Newfoundland, on behalf of the interest holders, itself and Canadian Imperial Venture Corporation (CIVC).

PDIP currently holds 60% of the following:

- Offshore exploration license EL-1070, which includes the Shoal Point prospect.
- Onshore production lease 2002-01, which includes the Garden Hill South discovery, where PDIP have already re-entered an existing well, and Garden Hill North and Garden Hill Central, where existing seismic surveys indicate the potential for commercial hydrocarbon bearing reservoirs.

### 1.2 Rationale and Drilling Options

PDIP intends to drill exploration and development wells in these areas in order to develop the hydrocarbon resources on behalf of the interest holders. The wells currently planned to be drilled in a coordinated exploration and development campaign are as follows:-

- |    |                           |                  |
|----|---------------------------|------------------|
| a) | Shoal Point               | exploration well |
| b) | Garden Hill North (GHN)   | exploration well |
| c) | Garden Hill Central (GHC) | exploration well |
| d) | Garden Hill South (GHS)   | development well |

Details of the timing of drilling are discussed in Section 5. However, in order to meet the license extension granted to EL-1070, drilling should commence prior to January 15, 2007, and it is PDIP's intention to drill a well at Shoal Point prior to this deadline. It is anticipated that the drilling of the other wells will commence shortly thereafter. It should also be noted that PDIP may choose to drill additional wells (production or exploration), or choose to modify any of the above exploration wells to development wells, over the next 3 to 5 years. The number of additional wells chosen will be dependent on a number of factors. For example, the results of initial drilling (and any seismic work) will influence further drilling decisions. However, the maximum number of wells proposed at Shoal Point is currently planned at five. For the onshore area, it is estimated that up to four additional wells may be drilled at GHS, with an additional four wells over the GHN/GHC area.

For the planned exploration wells, if a discovery is made, the well will be temporarily suspended with a view to completion as a development well. Should no significant discovery be made, the well will be plugged and abandoned to conform to the appropriate regulations (*Petroleum Drilling Regulations* or *Offshore Petroleum Drilling Regulations*).

The exact targets for drilling the resources on the Port au Port Peninsula are currently unknown; however PDIP are analyzing existing seismic data to firm up the location for drilling targets. Where existing data is insufficient to specify drilling targets, PDIP will undertake additional seismic work in the area. The process for obtaining appropriate approvals to undertake seismic work in the area has already commenced.

This project description describes the drilling options being considered for the development of the resources.

#### 1.2.1 Shoal Point

There are two distinct options for exploration drilling at Shoal Point:

- Drilling a sidetrack well from the existing (abandoned) K39 well.

- Drilling a deviated well from onshore.

The preferred, and most likely, drilling method is the use of the existing K39 well, from which a sidetrack well would be drilled to the offshore target. The wellhead locations for both of these options are onshore and therefore in either case the well will be drilled using conventional onshore drilling techniques.

#### 1.2.2 Garden Hill South, Garden Hill North and Garden Hill Central

The resources at Garden Hill South, Garden Hill North and Garden Hill Central are all onshore and therefore will also be drilled using conventional onshore drilling techniques.

### 1.3 Relevant Legislation

Permits and authorizations for drilling at Shoal Point are required from the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB). As federal permits are required in order to undertake drilling operations, the project is subject to an environmental assessment under the *Canadian Environmental Assessment Act*.

In addition, projects (or undertakings) occurring in the Province of Newfoundland and Labrador may be subject to registration and potentially subsequent assessment under the Province's *Environmental Protection Act*. The requirement for registration under this Act is at the discretion of the Minister of Environment and Conservation.

PDIP are also aware that Species at Risk (SAR) may be present in the area and will ensure that appropriate measures to deal with these species are considered as part of the environmental assessment process.

In addition, PDIP are aware that additional permits and permissions may be required for specific activities and the company will ensure that these are obtained as needed.

### 1.4 Document Overview

As this project requires consideration from both federal and provincial authorities, PDIP are concurrently submitting this project description to the C-NLOPB and the Department of Environment and Conservation. This project description describes PDIP's intentions for drilling the resources at the locations described, and explains the context in which the document is submitted, thereby providing an overview of the regulatory context.

This document also provides a high level overview of the geology in the area and provides a more detailed description of the type of drilling units that are likely to be used. In addition, the document describes typical hole and casing sizes. The document then describes, briefly, PDIP's intentions for well abandonment, and for the handling of waste produced during drilling operations. Finally, the document presents a brief description of the environmental impact and the timing of the proposed drilling.

## 2. Geological Description

The Port au Port peninsula lies at the northernmost landfall of the Appalachian Mountain system. Several important petroleum provinces, such as West Texas and the Anadarko and Michigan basins, have developed along this mountain system, all producing from Lower to Middle Ordovician dolomitized reservoirs.

The Garden Hill field is contained within a fault-bounded inversion fairway that trends to the northeast across the Port au Port peninsula and Port au Port Bay. Recent review of existing seismic data indicates that the Garden Hill field comprises three structural culminations – Garden Hill South, Garden Hill Central

and Garden Hill North. These structures share a common petroleum system, including reservoir, source, migration route, trapping mechanism and geological history.

From Garden Hill, the inversion fairway runs north east and extends out into Port au Port Bay. The Shoal Point lead lies on the same overall structural trend as Garden Hill, but in the overlying thrust sheet.

### 3. Project Description and Overview

#### 3.1 Drilling Units – Garden Hill and Shoal Point

For all prospective Garden Hill (Lease 2002-01) and Shoal Point (EL-1070) drilling locations, drilling will be conducted using a mobile (land) drilling unit (MDU). As there is not yet an established land based drilling industry in Newfoundland, a drilling unit must be mobilized from another area within the country (e.g. Alberta). In order to reduce mobilization/demobilization costs, it is preferred to drill a number of planned wells sequentially with a single MDU that is capable of drilling to significant depths and withstanding poor weather conditions.

The reservoir targets to be drilled are at a depth of approximately 2.5km – 3.5km (which is relatively deep) and require drilling through hard rock formations. For any winter operations, high winds and blizzards are expected, and it is therefore anticipated that any unit selected will require crew and equipment weatherproofing. The drilling unit basic requirements will be approximately as follows:

- a) Weather proofed, triple derrick, complete with heated blow out prevention and heated crew facilities
- b) Top drive drilling facilities
- c) Turbo drilling facilities
- d) Water based and synthetic based mud handling and cleaning system
- e) 68,950kPa (10,000psi) pressure control equipment

Safe operations are the number one priority for PDIP and PDIP will therefore ensure that the drilling rig is fit for purpose and that appropriate drilling standards are adhered to during the drilling process. As a responsible operator, PDIP will of course also ensure that sufficient and appropriate downhole and surface barriers are in place at all times to minimise the potential for any loss of containment during drilling operations.

#### 3.2 Drill Hole & Casings

Examples of typical hole/casing sizes are displayed in Table 3.1. It is anticipated that the hole/casing sizes and setting depths for future drilling locations will be similar to those described in the table.

**Table 3.1: Typical Hole and Casing Characteristics**

Hole Section	Hole Size (mm)	Casing Size (mm)	Section Depth (m below GL)	Drilling Fluid Type	Drilling Fluid Return
<b>Conductor</b>	660	508	25	WBM	Drilling Unit
<b>Surface</b>	445	339.7	450	SBM	Drilling Unit
<b>Intermediate</b>	311	244.5	2500	SBM	Drilling Unit
<b>Liner</b>	215.9	178	3500	KCl + N <sup>2</sup>	Drilling Unit

This scenario assumes no abnormal geopressures or shallow hazards will be encountered and is based upon the conditions experienced at the existing production well located at Garden Hill South (PaP#1). The well will be started with the conductor hole, typically drilled to 30m below ground level. The conductor hole will be followed by the remainder of the drilling and casing programme, terminating with the open hole

section, drilled under-balanced and cased. Under-balanced drilling of this section will prevent reservoir damage through the avoidance of lost circulation materials.

### 3.3 Well Abandonment

Following completion of drilling and well testing, each well will be either plugged and abandoned or plugged and suspended, as defined by and in conformance to the appropriate Newfoundland drilling regulations (onshore or offshore). Well log information will be used to determine the depths at which to set plugs to ensure isolation of any formations that may contain hydrocarbons. Permanently abandoned wells will be cut-off below ground level, and the ground will be remediated to its original state.

### 3.4 Emissions and Waste Disposal

As for most industrial operations, a certain amount of waste (including solid and liquid waste, as well as air emissions) is expected to be generated. For the operations described, however, waste is expected to be limited.

Waste from drilling operations is expected to include drilling fluids and cuttings, solid waste (including domestic and industrial waste) and grey/black water. In addition, produced hydrocarbons including oil and gas and produced water may be encountered during test operations, which will need to be handled appropriately.

Methods for dealing with the specific waste materials anticipated are addressed in the following subsections.

#### 3.4.1 Drilling Fluids (Muds) and Cuttings

Because the planning process for the drilling program is at a preliminary stage, the specific drilling fluid programmes have not been selected. However, the exploration and development wells covered under this project will likely be drilled using water based and synthetic drilling muds and, since underbalanced drilling will possibly be used to pierce the production matrix, weighted drilling fluids (such as potassium chloride (KCl)) may also be used. In all cases, there will be no operational discharges of drilling waste to the environment. Drilling waste will be stored and trucked from site using an appropriate waste management contractor.

#### 3.4.2 Produced Hydrocarbons

When the wells have been drilled to total target depth, a geological evaluation will be undertaken, which will determine whether well testing is necessary. Well testing would require specialized contractors and equipment, personnel and procedures in addition to the drilling contractors, in order to facilitate perforation of the well and allow well fluids to flow.

During testing, any associated gas will be flared but the oil will be recovered. Appropriate approvals will be sought to allow flaring and installation and use of storage facilities at site. In addition, in all cases of flaring, the most efficient combustion flare types will be used to minimize emissions.

#### 3.4.3 Grey/Black Water

All grey/black water will be collected by certified disposal contractors and disposed of in the appropriate manner.

#### 3.4.4 Cooling Water

The drives and brakes on the rigs will be water cooled. It is anticipated that this will be via a closed system and that the water may be treated with chlorine as a biocide. The treated cooling water will be disposed of at the end of the campaign using a certified waste disposal contractor.



### 3.4.5 Solid Waste

PDIP aim to minimize environmental impacts as much as possible and, therefore, a waste recycling program will be implemented.

All trash and garbage that cannot be recycled will be stored in a suitable container and disposed of at an appropriate landfill site.

Combustible waste (such as oily rags, paint cans etc) will be stored appropriately and disposed of, as required, by a certified contractor.

Hazardous wastes will be suitably stored, and where necessary sealed, prior to disposal by a certified waste contractor.

### 3.4.6 Air Emissions

Air emissions during the drilling phases of the project are not anticipated to be significant. A certain amount of fugitive emissions is, however, expected (i.e. air emissions other than those released from vents or stacks etc., for example, air emissions from equipment leaks or fuel storage tanks). In addition, combustion gases are expected from diesel combustion systems (e.g. engines and generators used during operations), as well as from the flare stack.

## 4. Environmental Impact

### 4.1 Environmental Characteristics

An initial review of the Government of Newfoundland and Labrador Forest Resources Website indicates that the onshore project area lies within the Port au Port Subregion of the Western Newfoundland Ecoregion. Generally, this ecoregion is characterized by a humid climate with a relatively longer frost-free period than other ecoregions of Newfoundland and Labrador. The landscape is dominated by rock barrens. The rock type is dominated by limestone. The limestone heaths of the area support numerous species of rare and endangered plants. Forests are generally unproductive or totally lacking.

An initial review of the Western Newfoundland and Labrador Offshore Strategic Environmental Assessment indicates that there may be potential sensitivities in the offshore project area including shallow subtidal and intertidal areas, as well as sensitive spawning areas for various species. In addition, commercial fisheries, specifically lobster fisheries in the area around Shoal Point, are present in the area. PDIP recognize the importance of these resources to the Province, and specifically to the local community in the Port au Port area, and are committed to minimizing the environmental impact of the proposed project. PDIP will consider the details of the environment and resources and undertake consultations with the community during the assessment process in order to effectively plan drilling operations.

### 4.2 Species at Risk

PDIP are also aware that Species at Risk (SAR) may be present in the area. An initial search using Environment Canada's online SAR tool indicates that the proposed areas are within the range of the following SAR:

- Blue Whale (Atlantic Population),
- North Atlantic Right Whale, and
- Red Crossbill percna subspecies.

PDIP will ensure that appropriate measures to protect these species are considered as part of the environmental assessment process.

## 5. Timing

Although the final timing of the proposed drilling operations will be influenced by decisions from the Department of Natural Resources (for the onshore portion of the program) and from the C-NLOPB (for the offshore component of the program) and the results of seismic surveys, as well as rig market conditions, it should be noted that the license extension granted for Exploration License 1070 indicates that drilling within the offshore area EL-1070 must commence before January 15, 2008. PDIP, therefore intend to secure a rig to drill in the EL-1070 block prior to this deadline; likely over fall 2007 / early winter 2008.

PDIP may also drill additional wells in the EL-1070 license block (from onshore to offshore targets) over the next 3 to 5 years. These wells may be drilled at any time during this time period. Similarly, PDIP may undertake drilling in the onshore Garden Hill area any time over the next 3 to 5 years. However, it should be noted that PDIP are committed to working with the local community and regulatory agencies to plan work for times that are mutually acceptable, in order to minimize environmental disturbance and maintain a good working relationship with the community. Therefore, PDIP intend to consult with the local fishing community to determine any sensitive fishing periods and other concerns and to consult with the local population to ensure that their concerns are addressed prior to undertaking any planned drilling work. In addition, scheduling and timing of regulatory authorizations will factor into the planning of drilling activities.