



Project Description

North Flemish Pass

Gravity Survey

2015 - 2019



Prepared by:
Date:

RPS
November 10th, 2014

Table of Contents

1	INTRODUCTION	2
1.1	RELEVENT LEGISLATION & REGULATORY APPROVAL	2
1.2	THE OPERATOR.....	2
1.3	CANADA NEWFOUNDLAND & LABRADOR BENEFITS.....	2
1.4	CONTACTS.....	3
2	PROJECT DESCRIPTION.....	4
2.1	SPATIAL AND TEMPORAL BOUNDARIES.....	4
2.2	SURVEY PARAMETERS.....	5
2.3	PROJECT OVERVIEW	5
2.3.1	Objectives and Rationale	6
2.3.2	Alternatives to the Project and Within the Project.....	6
2.2.3.1	Project Scheduling	6
2.3.3	Site Plan	6
2.3.4	Consultations.....	7
2.3.5	Reporting Requirements during Field Work	7
3	EQUIPMENT	8
3.1	AIRCRAFT.....	8
3.1.1	On Line Navigation System:.....	9
3.2	GRAVITY SYSTEM	9
3.3	MAGNETIC SYSTEM	9
3.4	BRIDGEPORTH SELF CONTAINED INSTRUMENT CONTAINER	10
4	SAFETY CONSIDERATIONS.....	11
4.1.1	Installation	11
4.1.2	Accidental Events	11
5	ENVIRONMENT	12
Figure 1: The Study Area and Project Area 2015-2019.		4
Table 1-Study Area Coordinates		5
Table 2-Project Area Coordinates		5

1 INTRODUCTION

Bridgeporth Holdings Ltd. (Bridgeporth) and JEBCO Seismic (Canada) Co. (JEBCO) in partnership are proposing to conduct a Non-Exclusive Geophysical program offshore Newfoundland under the jurisdiction of the Canada - Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB).

JEBCO is an independent international geophysical contractor that provides multi-disciplinary geophysical products, services and expertise worldwide.

The primary tools used by Bridgeporth are high resolution gravity and magnetics. The applications of gravity and magnetics, which are both passive measurements, have been shown to be extremely complementary to seismic data.

This document is a Project Description intended to allow the C-NLOPB to fulfill its responsibilities under the Canada Newfoundland and Labrador Atlantic Accord Implementation Newfoundland & Labrador Act and the Canada Newfoundland Atlantic Accord Implementation Act. The project description is presented to allow C-NLOPB the opportunity to provide scoping advice to provide C-NLOPB with an Environmental Impact Assessment for the project.

1.1 RELEVANT LEGISLATION & REGULATORY APPROVAL

An authorization to conduct a Geophysical program will be required by the C-NLOPB. The C-NLOPB is mandated in this matter by the Canada Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act and the Canada Newfoundland Atlantic Accord Implementation Act. Geophysical Surveys are no longer on the schedule of projects under the Canada Environmental Assessment Act 2012. The Operator will follow the Guidelines issued by the C-NLOPB, *the Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012).

1.2 THE OPERATOR

The Operator will be Bridgeporth a geophysical service company for the oil & gas exploration industry specializing in providing non-seismic solutions. Bridgeporth helps deliver an upgraded geologic insight to exploration companies seeking a deeper understanding of their geology, but lacking the specialist resources necessary to efficiently leverage all that non-seismic data can offer. Bridgeporth helps reduce the risk of exploration; increasing the likelihood of success while significantly reducing the intrusive component of the exploration program by deploying passive primary measurement technology.

1.3 CANADA NEWFOUNDLAND & LABRADOR BENEFITS

The Accord Acts require that before any work or activity is authorized in the offshore area, a Canada-Newfoundland Benefits plan must be approved by the board. Bridgeporth, and JEBCO, are committed to providing maximum benefits associated with East Coast operations to

Canadian, and in particular, Newfoundland and Labrador residents and companies where they are commercially acceptable in accordance with "The Operators" operating requirements and fair market value.

The Operator will manage the East Coast operation from Newfoundland & Labrador. The Operator will provide full and fair opportunity to Canadian individuals and organizations, in particular those from Newfoundland and Labrador, to participate in its activities wherever possible. The Operator will support the principle that first consideration will be given to personnel and support services that can be provided in Newfoundland & Labrador.

Contractors working with Bridgeporth must conform to a high standard of Health, Safety & Environmental competency.

1.4 CONTACTS

RPS Energy Canada Ltd.
1310 Hollis Street
Halifax, Nova Scotia B3J 3P3
Tel: (902) 425-1622

Lead Canadian Consultancy Services

Alternate Contact:

RPS Energy Houston
411 North same Houston Parkway East
Houston, TX 77060

Technical Director – Seismic Operations and Site Investigations

Bridgeporth Ltd.
26 Linford Forum,
Rockingham Drive, Linford Wood
Milton Keynes MK14 6LY UK.
Tel: +44(0)1908 667014

VP Sales
Tel: +44(0)1908 667014

JEBCO Seismic (Canada) Company
Suite #112, 2450 Fondren Road
Houston, Texas 77063
USA

Tel: +1 713-975-0202;

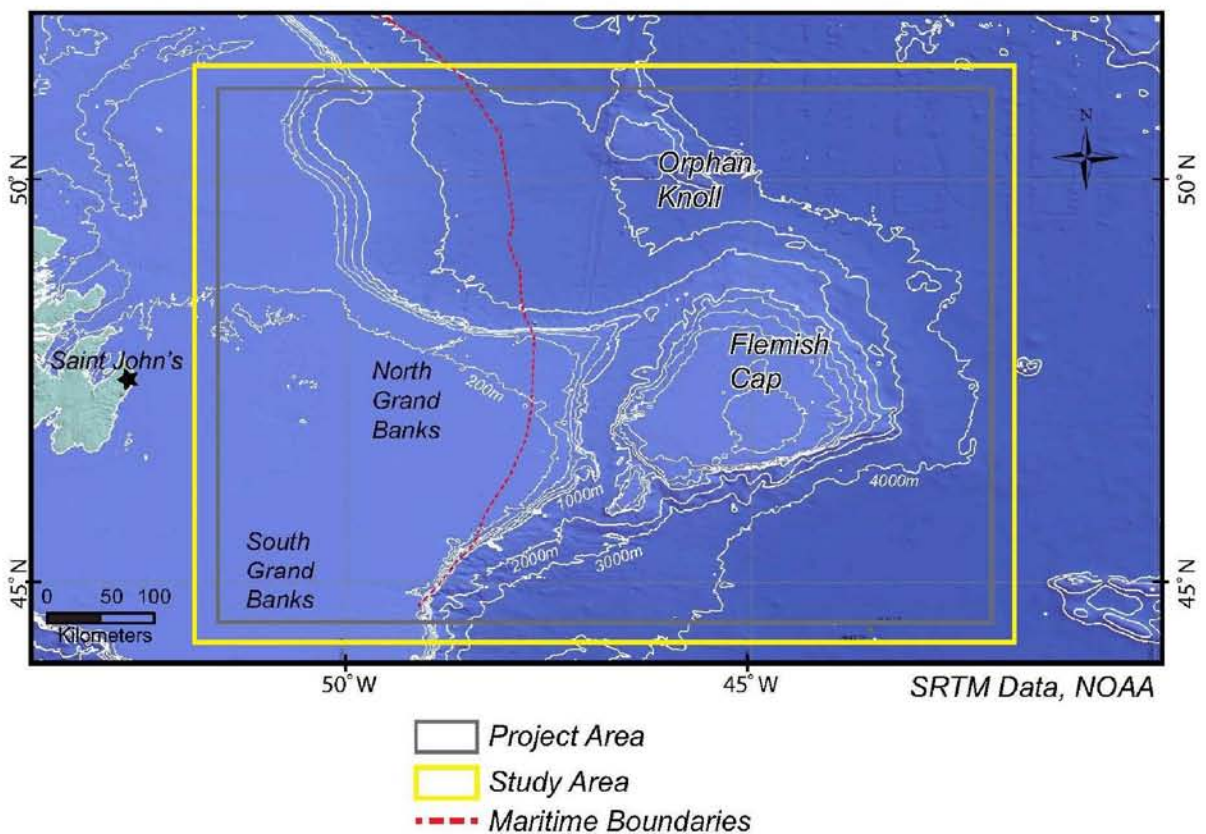
Director
Tel: +1 713-975-0202

2 PROJECT DESCRIPTION

The official name of the proposed project is “**North Flemish Pass Gravity Survey**”. The Operator is proposing to conduct one or more gravity surveys from the 1st of March to the end of November 2015 through to 2019. The survey may start as early as March 1st, 2015 within the proposed project area (Figure 1). Magnetic data will also be collected.

The size of the program will be approximately 472,000 km². In Figure 1, the “Study Area” represents the entire area proposed for assessment from 2015 to 2019. The “Project Area” represents the area where activities are to take place in 2015 – 2019. The Study Area includes the Project Area, plus a 50+km buffer around the Project Area.

Figure 1: The Study Area and Project Area 2015-2019



To conduct this survey, Bridgeporth will utilize a Fixed Wing twin engine Aircraft flown at a constant altitude.

2.1 SPATIAL AND TEMPORAL BOUNDARIES

The Study Area (2015-2019) includes the “Project Area”) where activities will take place each year 2015-2019. The project area is well within the study area, as shown in figure 1. The temporal boundaries of the survey are between March 1st and November 30th from 2015 -

2019. The duration of the program is estimated to be not greater than 220 days in a given calendar year.

2.2 SURVEY PARAMETERS

Theoretical feasibility modelling using geological constraint derived from two JEBCO seismic lines was used to estimate the signal wavelength and amplitude that is expected to be measured across the Flemish Pass survey area. The minimum line spacing will be 1500m in the shallow water, increasing in spacing as the acquisition lines enter into deeper water. This is to avoid oversampling of the data (i.e. we do not wish to sample the water column).

Table 1-Study Area Coordinates

Idx	Longitude	Latitude	Length	Total Length	Heading
1	51° 52' 35.4672" W	51° 25' 50.2717" N	705.78 km		86.0°
2	41° 43' 12.0790" W	51° 25' 50.2717" N	800.18 km	705.78 km	180.0°
3	41° 43' 12.0790" W	44° 14' 2.1904" N	810.89 km	1506 km	273.5°
4	51° 52' 35.4672" W	44° 14' 2.1904" N	800.18 km	2316.8 km	0.0°
5	51° 52' 35.4672" W	51° 25' 50.2717" N	0 m	3117 km	

Table 2-Project Area Coordinates

Idx	Longitude	Latitude	Length	Total Length	Heading
1	41° 59' 25.6604" W	44° 29' 21.6839" N	763.23 km		273.4°
2	51° 35' 27.7980" W	44° 29' 21.6839" N	740.04 km	763.23 km	0.0°
3	51° 35' 27.7980" W	51° 08' 42.6025" N	671.36 km	1503.3 km	86.3°
4	41° 59' 25.6604" W	51° 08' 42.6025" N	740.04 km	2174.6 km	180.0°
5	41° 59' 25.6604" W	44° 29' 21.6839" N		2914.7 km	

2.3 PROJECT OVERVIEW

The proposed project is Gravity and Magnetics Survey, consisting of approximately 472,000 km² of data collection between 2015-2019 with the first tranche in the vicinity of 120,000 km² to be collected in March to November 2015. (Survey lines yet to be determined).

The platform requirement for aircraft deployment is discussed below.

Fixed Wing Aircraft

When a new aircraft is used for the first time a number of modifications have to be made to facilitate the survey work. This makes the process of moving the instrumentation to a new aircraft for each job very expensive. It is normal that once an aircraft is set up and configured for gravity survey work it is used for many years. The Gravity meter is deployed in a Fixed Wing Aircraft and flown in a grid pattern over the area of interest at a low altitude (typically 150-500m). A typical flight plan for a survey such as the one being discussed over Flemish Pass would employ a 1,000m or 1,500m flight line spacing with orthogonal tie lines flown at a much wider spacing (5-10 km). The base of operations (typically a regional airport with hanger access) for survey work could be 100s of km from the area to be surveyed. The aircraft makes repeated trips to the project area over a period, gradually building up the grid of measurements. Operations will be limited by weather, as the survey equipment requires low turbulence to

record high quality data. Good visibility is also required for safe operations at low altitude, so operations are also restricted by daylight hours and weather conditions.

Magnetic Data will also be acquired from the Aircraft in a remote module on the wingtips or nose/tail boom. Magnetic data will be very useful for understanding basement geology or the presence of igneous deposits. Both Magnetic and Gravity measurements are completely passive measurements. This means that no signal is emitted and the systems measure naturally occurring properties of the earth.

2.3.1 Objectives and Rationale

The primary objective of the project is to determine the presence and likely locations of geological structures which may contain hydrocarbon deposits. The application of Gravity has been shown to be very complimentary to seismic data, especially as a way to quickly in-fill information between 2D seismic lines in a very cost effective way. Existing 2D / 3D data has been found to be insufficient to serve all the needs of energy companies in their exploration, development, and production activities.

The proposed Survey data collection will be acquired to compliment 2D seismic data sets previously acquired in the region, including that collected by JEBSCO. The gravity and magnetic data will be integrated with the 2D seismic to produce a pseudo 3D model of the earth subsurface.

2.3.2 Alternatives to the Project and Within the Project

The alternative to the project would be to forego exploration in Newfoundland and pursue opportunities elsewhere in the world, in order to assist market demand for data.

2.2.3.1 Project Scheduling

The survey will not exceed 220 days per calendar year. However, logistics and weather will play an important role in scheduling; therefore, in order to allow flexibility in timing the operator is proposing March 1 to November 30 window for data collection. Therefore the Operator is seeking Geophysical Operations Authorization (GOA) effective March 1, 2015 for the first year which will be reflected in the GOA Application.

2.3.3 Site Plan

The project area proposed for 2015 - 2019 is shown in Figure 1. The proposed survey line orientation for Gravity data collection 2015 will be provided upon application for the GOA.

Fixed Wing Aircraft

Altitude	150+ m above sea level
Survey Lines – Direction & Spacing	~010°/190° 1,500m
Tie Lines - Direction & Spacing	~100°/280° - 4,500m

It is the Operators intention to start the program in March 1, 2015.

2.3.4 Consultations

During the course of the assessment, the Operator will consult with Stakeholders with an interest in the project. Those consulted, and the results of those consultations will be compiled in the EA.

2.3.5 Reporting Requirements during Field Work

The Operator ensures that reporting on the commencement and completion of the survey and weekly progress reports will be submitted as required by the C-NLOPB Guidelines for the duration of the survey.

3 EQUIPMENT

3.1 AIRCRAFT

Example Aircraft: Basler BT-67
Operator: Bridgeporth
Endurance: 1860 nm (2140 Miles)
Speed: 205 kts (cruise), 115 kts (acquisition)
Engines: 2x Pratt & Whitney Canada PT6A 67AR Turboprops



Basler Twin Engine Aircraft

3.1.1 On Line Navigation System:

DGPS sensor system: Novatel OEMV-3. This includes Real Time DGPS with built in Omnistar demodulator.

Omnistar Accuracy: Omnistar VBS will show a 2-sigma (95%) of significantly less than 1 meter horizontal position error and the 3-sigma (99%) horizontal error will be close to 1 meter. Option: Omnistar HP service when available has 2 sigma horizontal errors of about 6 cm, and a 3 sigma vertical error of less than 15 centimetres. If Omnistar HP is not available the option is to use Omnistar XP which is a GPS positioning system that is based on orbit and clock corrections supplied by NASA's Jet Propulsion Laboratory. XP is a Precise Point Positioning (PPP) technology. Positional accuracy typically 10cm and 20 cm (95%) in the horizontal and vertical planes respectively.

Positional Accuracy: Achieved overall positional accuracy of order 1 meter

3.2 GRAVITY SYSTEM

System: GT-2A-Adv / or a ZLS Fluid Dampened Meter

Measurement Range: 9.75 to 9.85/m/sec

Dynamic Range: up to ± 1.000 Gal (Airborne)

Drift (corrected) : <0.1 mGal/day (Airborne)

Resolution: 0.2 mGal (Airborne)

3.3 MAGNETIC SYSTEM

Airborne specification:

System: three sensors at the wing-tips and tail boom

Compensation: Aircraft generated fields compensated using digital compensator operating on a measured set of defined maneuvers

Overall Noise Figures:

Magnetometers: normalised fourth difference of the TMI is less than 0.2 nT for 95% of the length of the flown line

Aircraft manoeuvres: Correction algorithms (against roll (± 100), pitch (± 50), yaw (± 50), will achieve a Figure of Merit as follows: All Sensors ≤ 2 nT

Base Station: normalised fourth difference of the TMI is less than 0.5nT.

The diurnal variation is less than 10nT over a period of 10minutes.

3.4 BRIDGEPORTH SELF CONTAINED INSTRUMENT CONTAINER

Container Weight:	5 tons
Container Size:	20ft x 8ft 6 x 8ft
Power Requirements:	400v AC 3 phase plus neutral 60 Hz
Positioning:	Back deck close to centre of gravity



4 SAFETY CONSIDERATIONS

“The Operator” will conduct operations in accordance with a Safety Management System (“SMS”). The SMS is used in every aspect of the “Operator’s” conduct of business and allows confidence that the best possible procedures are in place for the health, welfare and safety of all those directly and indirectly involved with any project conducted by the Operator.

“The Operator” undertakes the preparation of a comprehensive job safety plan (“JSP”) for each and every project, involving processes for Hazard Identification and Risk Assessment. The JSP is reviewed and approved by all survey crew members and by management prior to survey commencement.

4.1.1 Installation

Installation of the survey equipment in the aircraft will be done by qualified Contractor’s personnel.

4.1.2 Accidental Events

In the unlikely event of an emergency, the Operator and its contractors will implement the measures outlined in the Operators Emergency Response Plan. Any accident or hazardous occurrence as specified by Section 27 of the NL Geophysical Operations Regulations or Section 15.4 of the Draft NL Petroleum OSH Regulations will be reported to the Board. Quarterly statistics reports will also be provided to the Board.

5 ENVIRONMENTAL CONSIDERATIONS

Considering the offshore survey is by aircraft, potential interactions with marine wildlife is likely limited to seabirds and marine mammals near and at surface. No sensitive areas or critical habitat for any species listed under Schedule 1 of *Species at Risk Act (SARA)* occur within the Study Area. The Ivory Gull is the only listed seabirds to potentially occur. Marine mammals that are observed offshore Newfoundland that are listed under Schedule 1 of *SARA* include blue, fin, northern bottlenose, Sowerby's beaked and north Atlantic right whales. Listed species will be evaluated in the EA report.