

FINAL

**2020 Marine Mammal and Sea Turtle Mitigation Report for EL1156  
Cambriol G-92 Vertical Seismic Profile Program**

Submitted to:

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Submitted by:

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#### **IMPORTANT NOTICE**

This report was prepared exclusively for Equinor Canada Ltd. by Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in Wood's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Equinor Canada Ltd. only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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## LIST OF CONTENTS

1.0	INTRODUCTION .....	5
2.0	METHODS .....	7
2.1	Schedule .....	7
2.2	PAM Hydrophone Wet-Test .....	8
3.0	MONITORING AND MITIGATION PROGRAM RESULTS .....	9
4.0	SUMMARY .....	10
5.0	CLOSURE .....	11
6.0	REFERENCES.....	12
6.1	Mobilization.....	18
6.2	Health and safety .....	18
6.3	Communications.....	18

## LIST OF TABLES

Table 2.1	Timeline of activities related to the mitigation program onboard <i>MV Horizon Star</i> .....	7
Table 3.1	Marine mammal detections during 2020 EL1156 Cambriol G-92 VSP Program.....	9

## LIST OF APPENDICES

- APPENDIX A: OBSERVATION DECK SHEETS
- APPENDIX B: PERSONNEL
- APPENDIX C: OPERATIONS OVERVIEW

## ABBREVIATIONS

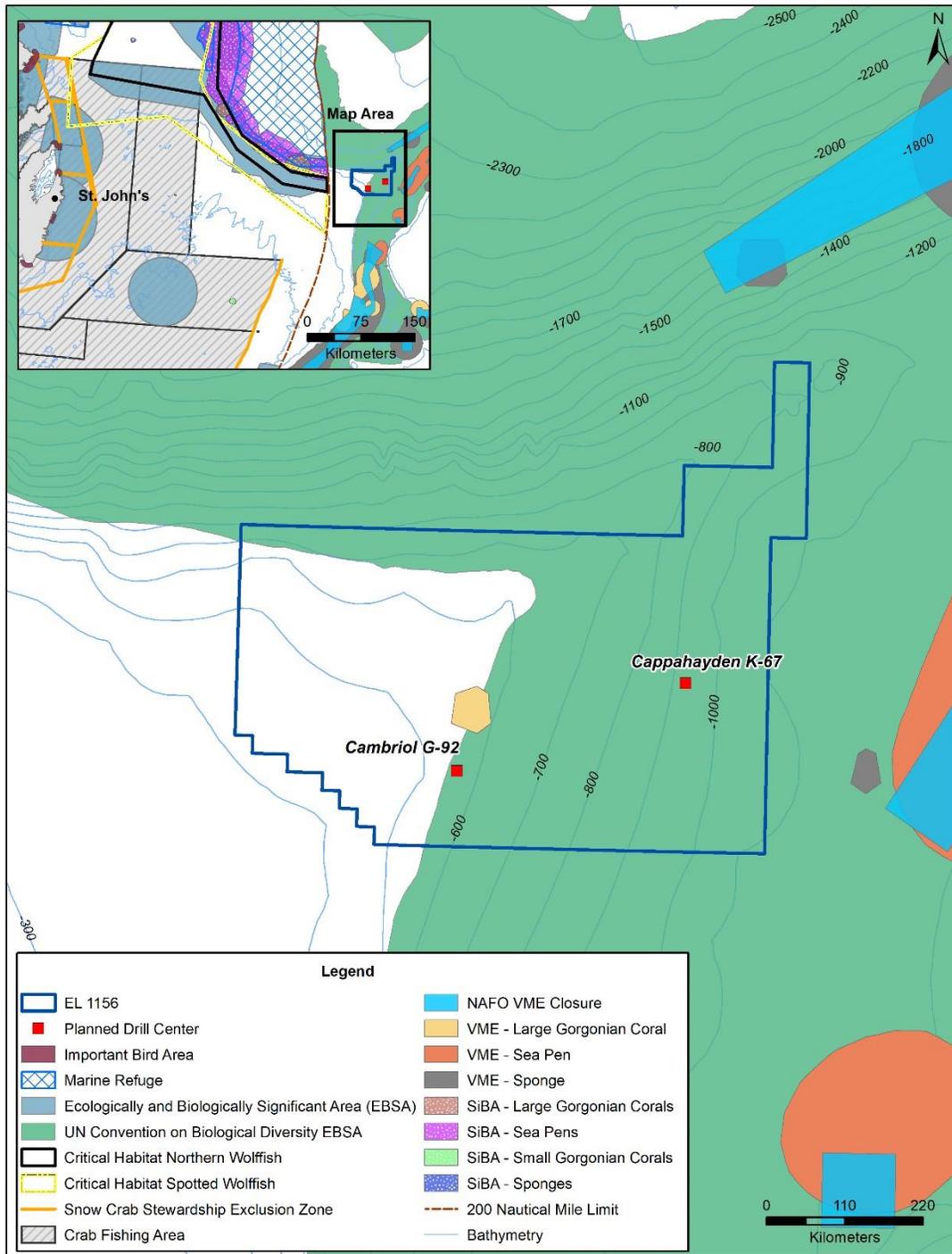
C-NLOPB	Canada - Newfoundland and Labrador Offshore Petroleum Board
DFO	Fisheries and Oceans Canada
EL	Exploration Licence
km	kilometres
m	meters
MMO	Marine Mammal Observer
PAM	Passive Acoustic Monitor
SOCP	Statement of Canadian Practice with respect to the mitigation of seismic sound in the marine environment
VSP	Vertical seismic profile

## 1.0 INTRODUCTION

Equinor Canada Limited (Equinor) contracted Wood Environment & Infrastructure Solutions, a division of Wood Canada (Wood), to conduct marine mammal and sea turtle monitoring and mitigation as part of the 2020 EL1156 Cambriol G-92 Vertical Seismic Profile (VSP) Program. VSP was conducted at the Cambriol G-92 well site (Figure 1.1) from August 21 to August 22, 2020 on the *Transocean Barents* platform. Monitoring for marine mammals and sea turtles was conducted to fulfill requirements outlined in the Flemish Pass Exploration Drilling Project-Environmental Assessment Decision Statement-Section 54 Condition 3.9 (ECCC 2019), the “Geophysical, Geological, Environmental and Geotechnical Guidelines” (C-NLOPB 2019) and “Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment” (SOCP)(DFO 2012). In consultation with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and Fisheries and Oceans Canada (DFO), a marine mammal and sea turtle mitigation plan for VSP (the Plan) was approved for this program (Wood 2020). All marine mammal and sea turtle mitigation was conducted aboard the supply vessel, *MV Horizon Star*.

The scope of work included monitoring for marine mammals and sea turtles inside the 500-metre safety zone around the sound source by visual observation and passive acoustic monitoring. Mitigation protocols were implemented by qualified marine mammal observers (MMO) and passive acoustic monitors (PAM).

The VSP program lasted 12 hours, during which time there were 8 marine mammal detections (combined visual and acoustic observations). There were no marine mammals or sea turtles observed in the 500-m safety zone, thus there were no delays or shutdowns were required during the program. The following summarizes events and sightings during the 2020 Marine Mammal and Sea Turtle Mitigation Program at Cambriol G-92.



**Figure 1.1 Map of the project location and well sites for EL 1156**

## 2.0 METHODS

The mitigation team was comprised of Wood biologists, Edgewise MMOs, and JASCO PAM technicians and are presented in Appendix B. The crew of the *MV Horizon Star* were responsible for vessel operations and assisting with the deployment/retrieval of the PAM equipment. The Captain had authority in matters of safety and the duty officer ensured the vessel traveled such that the PAMs and MMOs could monitor the 500-m safety-zone. Wood personnel were responsible for the overall implementation of the Plan under direction of biologist, Lara Miles. Ms. Miles also functioned as the Health and Safety Lead and provided Equinor with daily updates on the progress of the 2020 Marine Mammal and Sea Turtle Mitigation Program.

As outlined in the Plan, shut-down species included all marine mammal and sea turtle species. To allow for a 360-degree view of the safety zone and to ensure proper deployment of the PAM equipment (e.g., towed hydrophones); during VSP/monitoring activities the vessel travelled at less than 3 knots along a parallel 2 km track approximately 750-m from the platform. Both MMOs and PAM operators were stationed on the bridge of the *Horizon Star*. A direct line of communication between the VSP wireline operators on the platform and MMO/PAMs using the ship’s VHF was established before VSP operations. VSP wireline operators communicated all VSP sound source activities to the mitigation team (e.g., request for pre-watch, start of soft start, end of VSP etc.).

## 2.1 Schedule

The 2020 Vertical Seismic Profile Mitigation Program consisted of both visual and acoustic monitoring for marine mammals and sea turtles during VSP operations. JASCO personnel directed the ship’s crew on the installation, deployment, and retrieval of the towed hydrophones. VSP operations took place from August 21 to August 22, 2020 and lasted 12 hours (Table A.1). During VSP operations during daylight hours, weather conditions were clear with full visibility. In addition to VSP operations, the *MV Horizon Star* acted as a dedicated stand-by support vessel.

Following is a summarization of activities onboard the vessel as it pertains to the mitigation program.

**Table 2.1 Timeline of activities related to the mitigation program onboard *MV Horizon Star***

Date	Description
8 /08/2020	Mobilization and departure from St. John’s, NL
9 /08/2020	In transit to the <i>Transocean Barents</i>
09/08 to 20/08/2020	Horizon Star on stand-by
18 /08/ 2020	PAM equipment set up and wet tested.
20 /08/ 2020	Communications set up with the Schlumberger wireline engineers for VSP operations
21 /08/ 2020	Start of VSP and marine mammal and sea turtle monitoring
22 /08/ 2020	End of VSP and marine mammal and sea turtle monitoring
23 /08/ 2020	Mitigation team transferred to the Siem Diamond for transport to St. John’s, NL
24 /08/ 2020	Siem Diamond arrives in St. John’s Harbour; Demobilization

## 2.2 PAM Hydrophone Wet-Test

The setup of the hydrophone equipment and wet test was conducted on August 18<sup>th</sup>, 2020. PAM operators were located on the bridge of the vessel and the hydrophones were deployed approximately 490 m from the stern. For optimal acoustic monitoring, the vessel travelled at 2.5 knots approximately 750 m from the starboard side of the platform along a 2 km long parallel track (centered on the platform).

The PAM equipment wet test included:

- 1) Wood, JASCO, and vessel crew toolbox safety meeting;
- 2) Crew familiarization with the PAM equipment and handling techniques;
- 3) Practice vessel movements with towed array deployed;
- 4) Gather background soundscape during normal platform operations, and
- 5) Optimization of the equipment setup including deployment, towing, and retrieval.

The wet test lasted for 1 hour and marine mammals were detected in the area during the test.

### 3.0 MONITORING AND MITIGATION PROGRAM RESULTS

MMOs and PAMs monitored the 500-m safety zone for a total of 14.5 hours (Table A.2). There were 8 detections (acoustically or visually) of marine mammals during the VSP program (Table 6.2, Table A.3). No sea turtles were observed during VSP operations. There were no marine mammals or sea turtles detected visually or acoustically within the 500-m safety zone at any point during VSP operations thus, there were no biological delays or shutdowns.

Of the marine mammal detections, two were detected visually and six were detected acoustically. The two visual observations consisted of pods of dolphin (white-sided and unidentified species) swimming through the area. Both sightings were outside of the 500-m safety zone and did not require any mitigations or modifications to VSP operations. Unidentified dolphins were detected acoustically throughout the VSP program at distances > 1000 m from the source. There were also two detections of toothed whale during both the wet test and VSP operations, sperm, and pilot whales.

**Table 3.1 Marine mammal detections during 2020 EL1156 Cambriol G-92 VSP Program**

Species	Date	Detection Method	Number of Individuals	Range of animal to VSP (metres)	Mitigation Required
<b>Detections during the wet test</b>					
Sperm Whale	18/08/2020	Acoustic	Unknown	3000	None
Unidentified Dolphin	18/08/2020	Acoustic	Unknown	5000	None
<b>Detections during VSP operations</b>					
Unidentified Dolphin	21/08/2020	Acoustic	Unknown	3000	None
Pilot Whale	21/08/2020	Acoustic	Unknown	3000	None
Unidentified Dolphin	21/08/2020	Acoustic	Unknown	3000	None
White-sided Dolphin	21/08/2020	Both	20-30	2000	None
Unidentified Dolphin	21/08/2020	Both	10	600	None
Unidentified Dolphin	21/08/2020	Acoustic	Unknown	2000	None

## **4.0 SUMMARY**

As outlined in Chapter 3, the marine mammal and sea turtle monitoring and mitigation as part of the 2020 EL1156 Cambriol G-92 VSP Program was successfully conducted following SOCP guidelines during Equinor's VSP Program with no issues or concerns. Therefore, Section 54 Condition 3.9 was met and can be closed.

## 5.0 CLOSURE

This report on the 2020 Marine Mammal and Sea Turtle Mitigation Program for Cambriol G-92 has been prepared for the exclusive use by Equinor Canada Limited. The project was conducted using standard practices by qualified Wood staff and in accordance with verbal and written requests from the client.

Yours sincerely,

**Wood Environment & Infrastructure Solutions,  
a Division of Wood Canada Limited**

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## 6.0 REFERENCES

C-NLOPB (Canada-Newfoundland and Labrador Offshore Petroleum Board). 2019. Geophysical, Geological, Environmental and Geotechnical Guidelines.

DFO (Fisheries and Oceans Canada). 2012. Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment. Accessed April 2020.  
<http://www.dfo-mpo.gc.ca/oceans/publications/seismic-sismique/index-eng.html>

ECCC. 2019. Environmental Assessment Decision Statement – Flemish Pass Exploration Drilling Project. Available online: <https://iaac-aeic.gc.ca/050/documents/p80129/129198E.pdf>.

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## **APPENDIX A: OBSERVATION DECK SHEETS**

**Table A 1 VSP Operations Deck Sheet**

Ship/ platform name	Date	Reason for firing	Time soft start/ ramp-up began (UTC)	Time of full power (UTC)	Time of start of line (UTC)	Time of end of line (UTC)	Time of reduced output (UTC) (if relevant)	Time airguns/ source stopped (UTC)	Time pre-shooting search began (UTC)	Time search ended (UTC)	Time PAM began (UTC)	Time PAM ended (UTC)	Depth range	Was it day or night in the period prior to firing?	Was any mitigating action required?
Horizon Star	2020-08-21	I	15:00	15:25	15:25				13:04	13:35	13:04	0:00	d	d	n
Horizon Star	2020-08-22	I				3:30		3:30			0:00	3:30	d	d	n

**Table A 2 MMO and PAM Effort Deck Sheet**

Ship/ platform name	Date	Visual watch or PAM?	Observer's / operator's name(s)	Time of start of section of watch (UTC)	Time of end of section of watch (UTC)	Source activity	Start position - degrees latitude	Start position - minutes latitude	Start position - north/ south	Start position - degrees longitude	Start position - minutes longitude	Start position - east/ west	Depth of water at start position (metres)	End position - degrees latitude	End position - minutes latitude	End position - north/ south	End position - degrees longitude	End position - minutes longitude	End position - east/ west	Depth of water at end position (metres)	Speed of vessel (knots)	Wind direction	Wind force (Beaufort)	Sea state	Swell	Visibility (visual watch only)	Sun glare (visual watch only)	Precipitation
Horizon Star	2020-08-21	v	L.Miles	13:04	13:35	n	47	51.58	n	46	59.47	w	600.0	47	51.76	n	46	58.39	w	600.0	2.5	sw	4	c	o	g	sf	n
Horizon Star	2020-08-21	v	L.Miles	13:35	14:25	n	47	51.76	n	46	58.39	w	600.0	47	51.01	n	46	59.02	w	600.0	2.5	sw	4	c	o	g	sf	n
Horizon Star	2020-08-21	v	M.Montevecchi	14:25	15:00	n	47	51.01	n	46	59.02	w	600.0	47	52.19	n	46	58.61	w	600.0	2.5	sw	4	c	o	g	sf	n
Horizon Star	2020-08-21	v	L.Miles	15:00	15:25	s	47	52.19	n	46	58.61	w	600.0	47	52.09	n	46	58.61	w	600.0	2.5	sw	4	c	o	g	sf	n
Horizon Star	2020-08-21	v	L.Miles	15:25	16:30	f	47	52.09	n	46	58.61	w	600.0	47	51.08	n	46	0.17	w	600.0	2.5	sw	5	c	o	g	sf	n
Horizon Star	2020-08-21	v	M.Montevecchi	16:30	19:30	f	47	51.08	n	46	0.17	w	600.0	47	50.02	n	47	0.01	w	600.0	2.5	sw	4	c	o	g	sf	n
Horizon Star	2020-08-21	v	L.Miles	19:30	22:00	f	47	50.02	n	47	0.01	w	600.0	47	51.80	n	46	59.15	w	600.0	2.5	sw	4	c	o	g	sf	n
Horizon Star	2020-08-21	v	M.Montevecchi	22:00	23:00	f	47	51.80	n	46	59.15	w	600.0	47	50.90	n	47	0.30	w	600.0	2.2	sw	4	s	o	g	sf	n
Horizon Star	2020-08-21	p	J.Delaurie	13:04	14:00	n	47	51.58	n	46	59.47	w	600.0	47	51.00	n	47	0.00	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Hines	14:00	14:00	n	47	51.00	n	47	0.00	w	600.0	47	51.01	n	46	59.02	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Delaurie	14:30	16:00	n	47	51.01	n	46	59.02	w	600.0	47	50.90	n	47	0.40	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Hines	16:00	18:35	f	47	50.90	n	47	0.40	w	600.0	47	52.10	n	46	58.60	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Delaurie	18:35	20:00	f	47	52.10	n	46	58.60	w	600.0	47	51.85	n	46	59.16	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Hines	20:00	21:30	f	47	51.85	n	46	59.16	w	600.0	47	51.60	n	46	59.40	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Delaurie	21:30	23:00	f	47	51.60	n	46	59.40	w	600.0	47	50.90	n	47	0.30	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-21	p	J.Hines	23:00	1:25	f	47	50.90	n	47	0.30	w	600.0	-	-	-	-	-	w	600.0	2.5	sw	4	c	o	g		n
Horizon Star	2020-08-22	p	J.Delaurie	1:25	3:30	f	-	-	-	-	-	w	600.0	47	51.72	n	46	59.40	w	600.0	2.5	sw	4	c	o	g		n

**Table A 3 Marine Mammal or Sea Turtle Detections**

Ship platform name	Sighting number	Acoustic detection number	Date	Time at start of encounter (UTC)	Time at end of encounter (UTC)	Were animals detected visually and/or acoustically?	How were the animals first detected?	Observer's / operator's name	Position - degrees latitude	Position - minutes latitude	Position - north/ south	Position - degrees longitude	Position - minutes longitude	Position - east/ west	Water depth (metres)	Species or species group	Description	Beating to animal	Range of animal (metres)	Total number	Photograph taken	Behaviour (visual sightings only)	Direction of travel (relative to ship)	Direction of travel (compass point)	Airgun source activity when animals first detected	Airgun source activity when animals last detected	Time animals entered the mitigation exclusion zone (if relevant) (UTC)	Time animals left the mitigation exclusion zone (if relevant) (UTC)	Closest distance of approach from airgun source (metres)	Time of closest approach (UTC)	First observed distance during soft start (if relevant) (metres)	Closest observed distance during soft start (if relevant) (metres)	Last observed distance during soft start (if relevant) (metres)	What action was taken?	Length of power-down and/or shut-down (if relevant)	Estimated loss of production (if relevant) due to mitigating actions (hr)	Comments									
Horizon Star	1		2020-08-21	21:47	21:50	b	I	L.Miles	47	52.15	n	47	0.00	w	600.0	White-sided Dolphin	white near tail	200	200	20	n	swimming swimming	I	na	f	f	2000																			
Horizon Star	2		2020-08-21	21:28	21:29	b	v	L.Miles	47	52.21	n	47	59.96	w	600.0	Unidentified Dolphin		41	500	10	n	swimming swimming	I	na	f	f	600	2125											ship was crossed in front of the vessel away from the source							
Horizon Star	500		2020-08-21	13:13	13:15	a	a	J.Delaurie	47	51.50	n	46	59.60	w	600.0	Unidentified Dolphin		500																												
Horizon Star	501		2020-08-21	14:51	14:54	a	a	J.Delaurie	47	51.90	n	46	59.31	w	600.0	Spinn Whale	spinn whale clicks																													
Horizon Star	502		2020-08-21	15:08		a	a	J.Delaurie	47	51.92	n	46	59.48	w	600.0	Unidentified Dolphin																										to end time due to a few different groups, getting bearings from various locations. Chasing throughout day and evening				
Horizon Star	503		2020-08-21	21:40	21:45	a	a	J.Delaurie	47	52.28	n	46	59.65	w	600.0	Pilot Whale																											few different groups, getting bearings from various locations. Chasing throughout day and evening			
Horizon Star	504		2020-08-21	21:30		a	a	J.Delaurie	47	52.28	n	46	59.80	w	600.0	Unidentified Dolphin																											few different groups, getting bearings from various locations. Chasing throughout day and evening			
Horizon Star	505		2020-08-22	2:45		a	a	J.Delaurie	47	52.00	n	46	59.12	w	600.0	Unidentified Dolphin																														few different groups, getting bearings from various locations. Chasing throughout day and evening

## **APPENDIX B: PERSONNEL**

### **Wood**

- Lara Miles – Biologist-Team Lead (Marine Mammal Observer)

### **Edgewise Environmental**

- Marina Montevecchi – Marine Mammal Observer (August 14<sup>th</sup> to August 23<sup>rd</sup>)
- Ashley Pardy – Marine Mammal Observer (August 8<sup>th</sup> to August 12<sup>th</sup>)

### **JASCO Applied Sciences**

- Jason Hines – Passive Acoustic Monitor
- Julian Delarue – Passive Acoustic Monitor

### **Schlumberger Oilfield Services (onboard the *Transocean Barents*)**

- Joshua Ross-Wireline Professional Field Engineer

The following personnel were involved in shore support, mobilization, and demobilization of the 2020 Marine Mammal and Sea Turtle Mitigation Program:

### **Equinor Canada Limited**

- Melissa Jones
- Alistair Mellis
- Neil Osmond
- Terry Forkheim

### **Wood**

- Kevin Baldwin – Project Manager
- Justin So – Project Manager
- Andrea Lundrigan – HSE Manager
- Kyle Millar-HSE Support
- Andrew Peddle – Logistics Support

## **APPENDIX C: OPERATIONS OVERVIEW**

## 6.1 Mobilization

The *MV Horizon Star* mobilized on August 8, 2020 in St. John's, NL and departed to the *Transocean Barents* the same day. Mobilization included all mitigation team members reporting and all necessary equipment was delivered to the vessel.

Prior to mobilization, Wood, Edgewise, and JASCO personnel completed a COVID-19 screening which included a questionnaire and temperature screenings by Harvey port personnel prior to joining the vessel.

## 6.2 Health and safety

A hazard assessment and Health and Safety Plan were developed for the 2020 Marine Mammal and Sea Turtle Mitigation Program. These documents identified potential hazards associated with project activities, mitigation measures, and any residual risk. The Health and Safety Plan was reviewed by all personnel from Wood, Edgewise, and JASCO, which included all work instructions and safe operating procedures. Deck safety meetings for the deployment/retrieval of PAM equipment were also conducted by Wood, JASCO, and the crew of the *MV Horizon Star*, where any arising safety issues were discussed. Furthermore, vessel orientation was conducted by the vessel officers. While on-board, physical distancing practices and appropriate safety protocols were implemented where necessary.

## 6.3 Communications

The *MV Horizon Star* maintained scheduled communications with on shore and *Transocean Barents* personnel via e-mail. Daily updates included information on daily activities, planned activities, any issues that arose, any detections, and projected timeline for the VSP program. Updates were sent to the following personnel:

### Equinor Canada Limited

- Alistair Mellis
- Neil Osmond
- Melissa Jones
- Terry Forkheim
- Transocean Barents Logistics

### Wood

- Kevin Baldwin – Project Manager
- Justin So
- Miranda Mills