

LETTER OF AUTHORIZATION APPLICATION

BOEM control number: L23-017

Requested period of effectiveness:

Start date: September 20th ,2023

End date: January 15th, 2024

A- Type of Survey

Please indicate which type of survey will be used in the proposed activity

Deep penetration seismic (greater than 1,500cuin total airgun array volume)

- 2D seismic-towed steamer
- 2D seismic-seafloor cable or nodes
- 3D seismic-towed streamer
- 3D seismic-seafloor cable or nodes
- NAZ
- WAZ
- 4D (time lapse)
- Vertical cable
- Borehole seismic (VSP)

Shallow penetration seismic (less than 1,500cuin total airgun array volume)

- Surface vessel
- Surface vessel and AUV/ROV
- Borehole seismic (VSP)

HRG surveys (no airgun used)

- Surface vessel
- AUV/ROV
- Both

Other

Describe (if other):

B Survey area and operational plan

Question:	Response:
Location: (lease block, facility or prospect name, lat/lon, etc.)	Ewing Bank, Atwater Valley, Green Canyon.
Overall duration of the activity:	114 days

(days from mobilization to demobilization):	
Areal extend of the survey area: (in OCS lease blocks or Km ² (Attach GIS file of the survey lines and/or survey area perimeter)	~380 OCS blocks – 8,923.5 Km ² Shape file attached separately.
Water depth range:	150 - 2,000 m
G&G ITR / PIES modeling zone(s) in which the activity will occur (1-7):	0.7 days in zone 2. 64.3 days in zone 5.
Number of days during the overall activity period on which the sound sources listed in section C will operate:	65 days

C Sound sources

List the same sound sources provided in response to question #3 in “Section D Proprietary Information Attachment” to the G&G Permit Application and indicate their Duration of Use.

The source types to be used during this survey will be Gemini 8000 in³. Gemini airgun arrays will be used for the entire survey and will fire in a flip flap flop pattern on a 50m x 100 m shot grid. A separation distance of no less than 2500 m will be maintained between each source vessel.

Energy Source	Manu-facturer	Model	Total Array Volume & Number of Elements (cubic inches or Liters.)	Source Level (SL) in dB re 1μPa@1m in water (RMS)	Source Level (SL) in dB re 1μPa@1m in water (Peak to Peak)	Operating Frequency (Hz, kHz, range)	Pulse Duration (seconds, milli-seconds)	Pulse Rate (or Cycle) (Pulses per second or minute)	Towing Depth of the Source (ft or m)	Towing Depth of the Receiver(s) (ft or m)	Duration of Use (Number of Days or Percent of Active Sound Source Days)
PIES (Pressure Inverted Echo Sounder)	Sonardyne	8302-3116	N/A	190-202 dB	80-120 dB	14-19 kHz	N/A	1 pulse every 30 seconds	Placed on seabed	Placed on seabed	115 days
Extended Frequency Source	TGS	Gemini	8000 in ³	~220 dB	~243 dB	0-100 Hz		10 pulse / minute	8 m	OBN receivers on seabed	67 days

D Take estimate

Since Level B takes are based on the number of individuals exposed above the 160 dB SPLrms threshold over a 24-hour period, regardless of the duration of an exposure, the area covered (in square kilometers) by a source vessel (or source vessels) within 24-hrs is directly related to the number of Level B takes that may occur. Thus, comparing the area covered over a 24-hour period by the source vessel(s) in the different Survey Types simulated in the exposure modelling (Zeddies et al. 2015) to the area expected to be covered during a planned survey provides a means to select the Survey Type most appropriate for the planned survey.

In the exposure modelling conducted by Zeddies et al. (2015; pg. D-157), the Coil survey type assumed four source vessels sailing at 4.9 knots (2.5 m/s) along a series of overlapping circles 12.5 km in diameter. This circular pattern concentrated survey activities in a smaller area relative to the patterns used to simulate 2D, 3D NAZ, and 3D WAZ Survey Types. The survey area in which the Coil survey pattern was simulated was 58 km x 58 km, or 3,364 km². Over the course of the 7-day simulation, 30% of the area was covered (1,009 km²) or 144 km² per day.

The other Survey Types were simulated in a different sized survey area (145 km x 48 km) using 2 to 4 survey vessels sailing at 4.5 or 4.9 kts along various patterns resulting in the following estimated areas covered:

- 2D – 5,568 km² in 7 days or 795 km² per day;
- 3D NAZ – 1,392 km² in 7 days or 199 km² per day;
- 3D WAZ – 5,916 km² in 7 days or 845 km² per day.

The planned 3D OBN survey will involve two source vessels sailing along closely spaced survey sail lines that are approximately 100–200 m apart and up to 56 km in length. The source vessels will optimize line turns using a “racetrack” or “teardrop” pattern to sail on adjacent or nearby lines 100–200 m apart while maintaining a separation of >2.5 km between the source vessels. If survey activities occurred throughout the entire survey area of 3,175 km² over the course of 58 days, the average area covered per day would be 54.7 km². Therefore, the Coil Survey Type was selected in the take calculator because the area covered during that simulated survey most closely matches the area to be covered by the source vessels operating during the planned 3D OBN survey.

Take estimate table:

Parameters	
Survey Type	CO/L
Zone Number	5

Schedule	
Season	# days
Summer	43
Winter	21

Parameters	
Survey Type	CO/L
Zone Number	2

Schedule	
Season	# days
Summer	1
Winter	0

Exposures by Metric			
	Summer	Winter	Total
Level A			
Low-Frequency Hearing Group			
Bryde's whale	0.39	0.21	0.60
High-Frequency Hearing Group			
Kogia (dwarf, pygmy sperm whale)	22.78	11.05	33.82
Level B			
Low-Frequency Hearing Group			
Bryde's whale	18.64	9.06	27.70
Mid-Frequency Functional Hearing Group			
Beaked whales (Cuvier/Blainville/Gervais)	4,882.16	2,437.93	7,320.09
Bottlenose dolphin	3,849.77	1,986.19	5,835.97
Short-finned pilot whale	455.57	224.17	679.74
Sperm whale	1,138.91	547.37	1,686.28
Atlantic spotted dolphin	1,584.83	793.36	2,378.19
Clymene dolphin	2,309.34	1,179.55	3,488.89
False killer whale	580.35	290.16	870.52
Fraser's dolphin	269.20	132.46	401.66
Killer whale	15.48	7.81	23.29
Melon-headed whale	1,574.97	774.98	2,349.95
Pantropical spotted dolphin	10,479.54	5,352.70	15,832.24
Pygmy killer whale	364.79	182.39	547.17
Risso's dolphin	677.53	346.56	1,024.09
Rough-toothed dolphin	838.39	419.18	1,257.57
Spinner dolphin	2,808.03	1,434.27	4,242.30
Striped dolphin	901.97	460.70	1,362.67
High-Frequency Hearing Group			
Kogia (dwarf, pygmy sperm whale)	388.18	197.72	585.90

Level A Color Legend:			
	Level A SEL		
	Level A Peak		
*If no color highlight, both Level A peak and SEL are <0.01			
Total take, including Level B Scaling (where appropriate)			
	Summer	Winter	Total
	3.91411	1.9212573	5.84
	493.10	246.23	739.33
	1104.88	570.04	1674.92
	134.39	66.13	200.52
	481.76	231.54	713.29
	454.85	227.70	682.54
	662.78	338.53	1001.31
	171.20	85.60	256.80
	77.26	38.02	115.28
	4.57	2.30	6.87
	464.62	228.62	693.24
	3007.63	1536.22	4543.85
	107.61	53.80	161.42
	199.87	102.24	302.11
	240.62	120.30	360.92
	805.90	411.64	1217.54
	258.86	132.22	391.09
	147.38	74.51	221.89

Exposures by Metric			
	Summer	Winter	Total
Level A			
Low-Frequency Hearing Group			
Bryde's whale	<0.01	<0.01	<0.01
High-Frequency Hearing Group			
Kogia (dwarf, pygmy sperm whale)	<0.01	<0.01	<0.01
Level B			
Low-Frequency Hearing Group			
Bryde's whale	<0.01	<0.01	<0.01
Mid-Frequency Functional Hearing Group			
Beaked whales (Cuvier/Blainville/Gervais)	<0.01	<0.01	<0.01
Bottlenose dolphin	639.25	<0.01	639.25
Short-finned pilot whale	<0.01	<0.01	<0.01
Sperm whale	<0.01	<0.01	<0.01
Atlantic spotted dolphin	100.42	<0.01	100.42
Clymene dolphin	<0.01	<0.01	<0.01
False killer whale	0.48	<0.01	0.48
Fraser's dolphin	0.16	<0.01	0.16
Killer whale	<0.01	<0.01	<0.01
Melon-headed whale	<0.01	<0.01	<0.01
Pantropical spotted dolphin	0.03	<0.01	0.03
Pygmy killer whale	<0.01	<0.01	<0.01
Risso's dolphin	0.01	<0.01	0.01
Rough-toothed dolphin	6.63	<0.01	6.63
Spinner dolphin	<0.01	<0.01	<0.01
Striped dolphin	<0.01	<0.01	<0.01
High-Frequency Hearing Group			
Kogia (dwarf, pygmy sperm whale)	<0.01	<0.01	<0.01

Level A Color Legend:			
	Level A SEL		
	Level A Peak		
*If no color highlight, both Level A peak and SEL are <0.01			
Total take, including Level B Scaling (where appropriate)			
	Summer	Winter	Total
	<0.01	<0.01	<0.01
	<0.01	<0.01	<0.01
	639.25	<0.01	639.25
	<0.01	<0.01	<0.01
	<0.01	<0.01	<0.01
	100.42	<0.01	100.42
	<0.01	<0.01	<0.01
	0.48	<0.01	0.48
	0.16	<0.01	0.16
	<0.01	<0.01	<0.01
	<0.01	<0.01	<0.01
	0.03	<0.01	0.03
	<0.01	<0.01	<0.01
	0.01	<0.01	0.01
	6.63	<0.01	6.63
	<0.01	<0.01	<0.01
	<0.01	<0.01	<0.01
	<0.01	<0.01	<0.01

E Mitigation and monitoring effort

Question:	Response:
Please indicate which set of monitoring and mitigation measures from the ITR apply to the planned activity:	All monitoring and mitigation measures in the ITRs applicable to Airgun Surveys with a total volume >1,500 in3 (Deep Penetration) will be followed.
Confirm that you will apply this set of monitoring and mitigation measures during the activity:	Yes

F Map of the survey and transit route:

