LETTER OF AUTHORIZATION APPLICATION

BOEM CONTROL NUMBER: L22-017

REQUESTED PERIOD OF EFFECTIVENESS:
START DATE: July 1, 2023
END DATE: April 30, 2024

A. TYPE OF SURVEY:

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

_X_ Deep Penetration Seismic (greater than 1,500 in^3 total airgun array volume)

- 2D Seismic-towed Streamer
- 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 1,500 in^3 total airgun array volume)

- Surface Vessel
- Surface Vessel and AUV/ROV
- Borehole Seismic (VSP)

___ HRG Surveys (no airguns used)

- Surface vessel
- AUV/ROV
- Both

___ Other

Describe (if Other):

B. SURVEY AREA AND OPERATIONAL PLAN:

Question:	**Response**
Location: (Lease Block(s), Facility or Prospect Name, Lat/Lon, etc.)	Mississippi Canyon and Atwater Valley BOEM Protraction Areas.
Overall Duration of the Activity (days):	~80 days (Mobilization to Demobilization)
Areal extent of the survey area: (in OCS lease blocks or km^2) (Attach GIS file(s) of survey lines and/or survey area perimeter)	The maximum size of the survey area includes all or portions of 185 lease blocks, ~3,175 km^2. Shape files attached separately
Water Depth Range:	1100 - 1500 m
G&G ITR/PEIS Modeling Zone(s) in which the activity will occur (1-7):	Modeling Zone 5
Number of days during the overall activity period on which the sound source(s) listed in Section C will operate: (If the activity will occur in more than one Modeling Zone, provide the number of operating days within each modeling zone.)	58 days Seasonal distribution of days used in Take Estimates shown in Section D (except for sperm whales for which all survey activity was assumed to occur during the summer season): Summer = 0 days Winter = 58 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 have not yet been determined but will likely include both low-frequency (TPS or EFS sources) and conventional airgun arrays. The conventional source will be used for the dense imaging survey while the low frequency source will be used to acquire a sparse velocity survey. The 1st source vessel will tow dual conventional source arrays while the 2nd source vessel will tow a single low frequency source. The conventional airgun arrays will be used for the majority of the survey and will fire in a flip flop pattern on a 50m x 50 m shot grid. The low frequency source will be used to acquire the velocity data on a 50m x 200m shot grid. A separation distance of no less than 2500 m will be maintained between each 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)
Airgun Array	Teledyne	Bolt LLX	5110 in^3 32 elements	~239 dB	~264 dB	0-200 Hz	0.1 s	7-12.5 s	8-10 m	OBN receivers on seabed	58
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	80
Extended Frequency Source	Ion	EFS	8000 in^3 2 elements	~220 dB	~243 dB	0-100 Hz		10-44 s	8 m	OBN receivers on seabed	58 days
Tuned Pulse Sources	Sercel	TPS	28,000 in^3 1 element	~220 dB	~236 dB	0-100 Hz	1 second	10-44 seconds	10 m	NA	58 days

D. TAKE ESTIMATE:

Since Level B takes are based on the number of individuals exposed above the 160 dB SPL_{rms} threshold over a 24-hour period, regardless of the duration of an exposure, the area covered (in square kilometres) 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 km^2. Over the course of the 7-day simulation, 30% of the area was covered (1,009 km^2) or 144 km^2 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 km^2 in 7 days or 795 km^2 per day;
3D NAZ – 1,392 km^2 in 7 days or 199 km^2 per day;
3D WAZ – 5,916 km^2 in 7 days or 845 km^2 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 km^2 over the course of 58 days, the average area covered per day would be 54.7 km^2. 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	*COIL*
Zone Number	*5*

Schedule	
Season	# days
Summer	0
Winter	58

Exposures by Metric			
	Summer	Winter	Total
Level A			
Low-Frequency Hearing Group			
Bryde's whale	< 0.01	0.58	0.58
High-Frequency Hearing Group			
Kogia (dwarf, pygmy sperm whale)	< 0.01	30.51	30.51
Level B			
Low-Frequency Hearing Group			
Bryde's whale	< 0.01	25.03	25.03
Mid-Frequency Functional Hearing Group			
Beaked whales (Cuvier/Blainville/Gervais)	< 0.01	6,733.33	6,733.33
Bottlenose dolphin	< 0.01	5,485.68	5,485.68
Short-finned pilot whale	< 0.01	619.14	619.14
Sperm whale	< 0.01	1,511.78	1,511.78
Atlantic spotted dolphin	< 0.01	2,191.20	2,191.20
Clymene dolphin	< 0.01	3,257.82	3,257.82
False killer whale	< 0.01	801.41	801.41
Fraser's dolphin	< 0.01	365.85	365.85
Killer whale	< 0.01	21.58	21.58
Melon-headed whale	< 0.01	2,140.42	2,140.42
Pantropical spotted dolphin	< 0.01	14,783.64	14,783.64
Pygmy killer whale	< 0.01	503.73	503.73
Risso's dolphin	< 0.01	957.18	957.18
Rough-toothed dolphin	< 0.01	1,157.73	1,157.73
Spinner dolphin	< 0.01	3,961.32	3,961.32
Striped dolphin	< 0.01	1,272.42	1,272.42
High-Frequency Hearing Group			
Kogia (dwarf, pygmy sperm whale)	< 0.01	546.09	546.09

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	5.30632978	5.31
< 0.01	680.07	680.07
< 0.01	1574.39	1574.39
< 0.01	182.64	182.64
< 0.01	639.48	639.48
< 0.01	628.87	628.87
< 0.01	934.99	934.99
< 0.01	236.41	236.41
< 0.01	105.00	105.00
< 0.01	6.37	6.37
< 0.01	631.42	631.42
< 0.01	4242.91	4242.91
< 0.01	148.60	148.60
< 0.01	282.37	282.37
< 0.01	332.27	332.27
< 0.01	1136.90	1136.90
< 0.01	365.18	365.18
< 0.01	205.80	205.80

*Note that the requested take for sperm whales is 645 in the event that all survey activities (58 days) occur during the summer season.

E. MITIGATION AND MONITORING EFFORTS:

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 in^3 (Deep Penetration) will be followed.
Confirm that you will apply this set of monitoring and mitigation measures during the activity:	Yes

F. MAP OF SURVEY AREA AND TRANSIT ROUTE: