



**R. G. Schneider**  
Assistant Secretary  
Asset Development Land  
Manager

**Chevron U.S.A. Inc.**  
100 Northpark Blvd.  
Covington, LA 70433  
Tel 985-773-6996  
ryanschneider@chevron.com

June 8, 2023

Jolie Harrison, Division Chief  
Permits and Conservation Division, Office of Protected Resources  
1315 East-West Highway, F/PR1 room 13805  
Silver Spring, MD 20910

**Re: Application for a Letter of Authorization for the take of marine mammals incidental to the Mochima Zero Offset VSP Geophysical Survey in the Gulf of Mexico  
Mississippi Canyon Area: Block 937**

Dear Ms. Harrison:

Please find the attached request for an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to conducting a geophysical survey by Chevron U.S.A. Inc. ("Chevron").

Chevron plans to conduct a geophysical survey in the Gulf of Mexico Outer Continental Shelf, in **Mississippi Canyon Area: Block 937**, as shown on the map accompanying this application. Schlumberger is the likely source provider offering two options of source array. The source array type employed will be based on availability at the time of survey. Both source array types are described in the long form of this Letter of Application. The proposed geophysical operation is a Zero Offset VSP, Offset VSP & Salt Proximity survey using airguns deployed from a drillship mounted crane as the energy source and the receivers are deployed via conventional wireline. The survey is anticipated to occur sometime between September 2023 and September 2024. We have requested a larger window of time for flexibility necessary for efficiencies in drilling operations and rig availability. The proposed survey would occur at final TD of the wellbore. Because Chevron's activities have the potential to cause harassment of marine mammals, we are requesting a Letter of Authorization under the Incidental Take Regulations published in 86 Fed. Reg. 5,322 (Jan. 19, 2021), to be codified at 50 C.F.R. Part 217, Subpart S, for Taking Marine Mammals Incidental to Geophysical Surveys Related to Ancillary Oil and Gas Activities in the Gulf of Mexico.

This application includes all currently available information. Take estimation results were acquired using NMFS released Gulf of Mexico Exposure Estimation Tool made available in 2021 (NMFS, 2021b).

Application for a Letter of Authorization for the take of marine mammals incidental to the Mochima Zero Offset  
VSP Geophysical Survey in the Gulf of Mexico  
June 12, 2023

We look forward to working with you and your staff to answer any questions you may have about this application. Please feel free to contact Bryan Harvey at (832) 284-2180 or [bryan.harvey@chevron.com](mailto:bryan.harvey@chevron.com) with additional questions.

Yours very truly,



R.G. Schneider  
Assistant Secretary

**Application for Letter of Authorization for the Non-Lethal Taking of Marine Mammals:**

**Applicant: Chevron Corporation**

**Survey Type: Zero Offset Vertical Seismic Profile (VSP) Survey**

**OCS Block: Mississippi Canyon 937 (OCS-G-36789)**

**Prospect: Mochima**



## Table of Contents

<b>1. Description of Proposed Activities</b> .....	3
<b>1.1. Project Description</b> .....	3
<b>1.1.1. Activities Considered in Application</b> .....	4
<b>1.1.2. Acoustic Sources</b> .....	5
<b>1.1.2.1. The Dual Magnum Airgun Array Option</b> .....	5
<b>1.1.2.1.1. Dual Magnum Array Directivity</b> .....	6
<b>1.1.2.1.2. Dual Magnum Angle Frequency Form</b> .....	7
<b>1.1.2.1.3. Dual Magnum Signature Characterization</b> .....	8
<b>1.1.2.2. The Hypercluster Airgun Array Option</b> .....	9
<b>1.1.2.2.1. Hypercluster Array Directivity</b> .....	10
<b>1.1.2.2.2. Hypercluster Angle Frequency Form</b> .....	10
<b>1.1.2.2.3. Hypercluster Signature Characterization</b> .....	11
<b>2. Survey Dates, Duration, and Specific Geographic Region</b> .....	12
<b>2.1. Survey Activity Date Possibilities &amp; Duration</b> .....	12
<b>2.2. Survey Geographic Region</b> .....	12
<b>3. Species &amp; Number of Marine Mammals</b> .....	12
<b>4. Affected Species Status and Distribution</b> .....	13
<b>5. Type of Incidental Taking Authorization Requested</b> .....	13
<b>6. Take Estimates for Marine Mammals</b> .....	13
<b>6.1. Estimated Numbers of Marine Mammals That Might Be Taken by Harassment</b> .....	13
<b>6.1.1. Level A Harassment Estimated</b> .....	13
<b>6.1.2. Level B Harassment Estimated</b> .....	14
<b>7. Effects on Marine Mammal Species</b> .....	16
<b>8. Minimization of Adverse Effects to Subsistence Uses</b> .....	16
<b>9. Anticipated Impacts on Habitat</b> .....	16
<b>10. Anticipated Effects of Habitat Impacts on Marine Mammals</b> .....	16
<b>11. Mitigation Measures</b> .....	16
<b>12. Monitoring and Reporting</b> .....	16

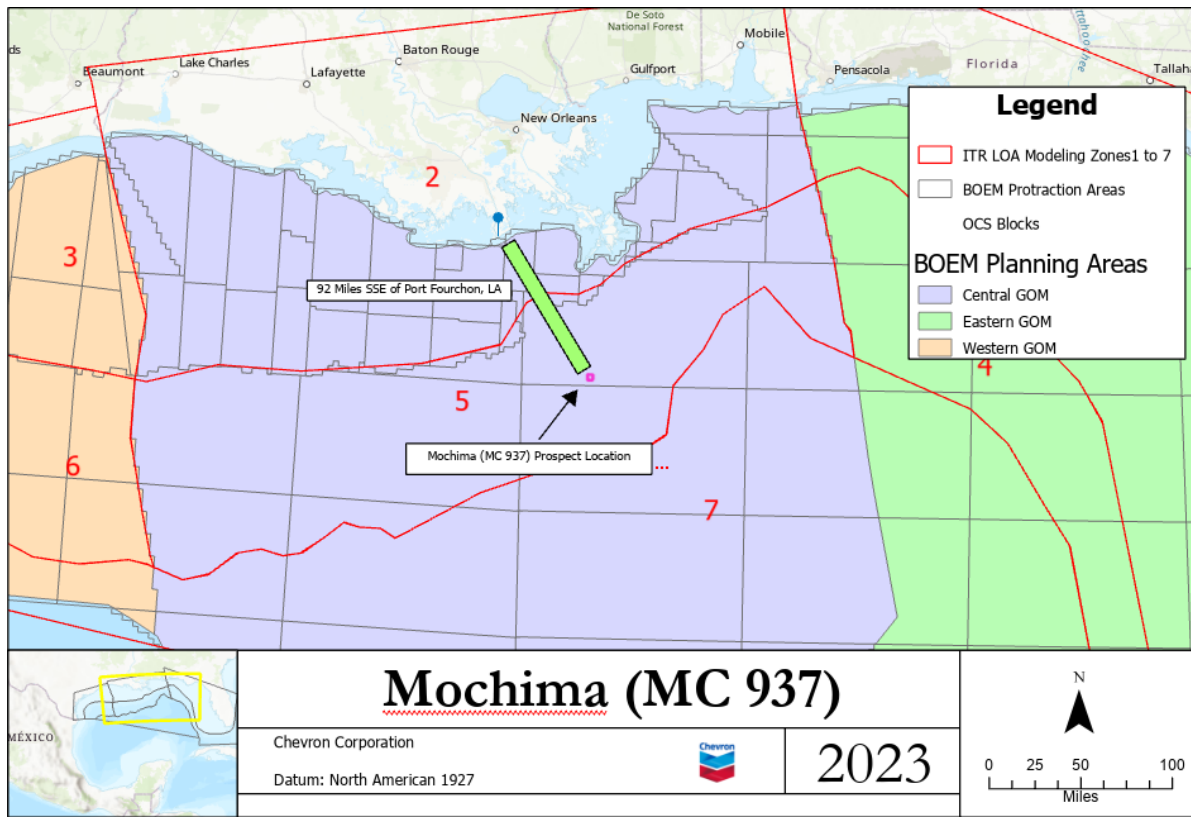
# 1. Description of Proposed Activities

In accordance with the incidental take regulation (ITR), Chevron Corporation submits this request for a Letter of Authorization (LOA) for the non-lethal, unintentional taking of small numbers of marine mammals resulting from Zero Offset, Rig Source vertical seismic profile (VSP) geophysical surveys conducted in the Gulf of Mexico (GOM). The information provided in this document is submitted in accordance with the final ITR published 19 January 2021 (86 Federal Register [FR] 5322) and the requirements of 50 Code of Federal Regulations (CFR) § 216.104 to allow for take by incidental harassment of small numbers of marine mammals resulting from geophysical surveys for oil and gas exploration activities.

## 1.1. Project Description

Please indicate which type of survey will be conducted during the planned activity
<p><input checked="" type="checkbox"/> <b>Deep Penetration Seismic (greater than 1,500 in<sup>3</sup> total airgun array volume)</b></p> <ul style="list-style-type: none"> <li>• 2D Seismic-towed Streamer</li> <li>• 2D Seismic-Sea-floor Cable or Nodes</li> <li>• 3D Seismic-towed Streamer</li> <li>• 3D Seismic-Sea-floor Cable or Nodes</li> <li>• NAZ</li> <li>• WAZ</li> <li>• 4D (Time Lapse)</li> <li>• Vertical Cable</li> <li>• <b>Borehole Seismic (VSP)</b></li> </ul> <p><input type="checkbox"/> <b>Shallow Penetration Seismic (less than 1,500 in<sup>3</sup> total airgun array volume)</b></p> <ul style="list-style-type: none"> <li>• Surface Vessel</li> <li>• Surface Vessel and AUV/ROV</li> <li>• Borehole Seismic (VSP)</li> </ul> <p><input type="checkbox"/> <b>HRG Surveys (no airguns used)</b></p> <ul style="list-style-type: none"> <li>• Surface vessel</li> <li>• AUV/ROV</li> <li>• Both</li> </ul> <p><input type="checkbox"/> <b>Other</b>  <u>Describe (if Other):</u></p>

Figure 1 (Map locations of prospect area)



### 1.1.1. Activities Considered in Application

The VSP survey will be a one-time survey. The Zero Offset VSP survey will utilize conventional three-component accelerometers deployed via wireline. The seismic source is then deployed from the drillship crane. Duration of the survey is 2 days.

Table 2 provides a summary of information used in take estimations employed in this Application. Input parameters for the NMFS Draft Exposure Tool are provided in Section 6.1

Table 2. Approximate locations, durations, and seasons within which the proposed survey activities will occur during the 5-year period of this Application.

Table 1: Location, duration and season the proposed survey activity will occur.

Category	VSP Survey Information
BOEM Planning Area	Central
ITR Assessment Zone	5
Exploration & Production Prospect Areas	Mochima (MC Block 937)
Season <sup>1</sup>	Assessed for Summer
Number of Surveys	1
Survey Duration	2

<sup>1</sup> The modeling used in the take assessment of the ITR reflects summer season as survey acquisition is anticipated to be in October.

### 1.1.2. Acoustic Sources

The sound source for this survey will be chosen at the time of well TD. Two options are available: The Dual Magnum Air Gun Array and The Hypercluster Air Gun Array. Both sound sources are provided by SLB, and the array chosen will be based on availability at the time of the survey. For this application, each source array will be described below.

The sound sources for the proposed VSP survey consists of a horizontal, planar array of individual compressed air chambers (i.e., air guns) of varied sizes that will be deployed using the drillship mounted crane. These sources are tuned compressed air systems with suitable frequency range for achieving the geological objectives. The main characteristics of the pressure signal generated by a single-source element are the strong initial peak and the subsequent bubble pulses. The amplitude of the initial peak depends primarily on the operating pressure and chamber volume of the element, whereas the period and amplitude of the bubble pulses depend on the chamber volume and source array depth. The volume of the air guns and size of the array vary and are tuned for optimum output. For the purposes of this Application, the maximum air gun source array that may be used during VSP survey was used for the exposure assessment.

Table 2 provides a summary of the acoustic properties of the sources to be used during the proposed VSP survey included in this Application.

Energy Source	Manufacturer	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 Survey Days)
Option 1 Airgun array (Dual Magnum)	Sercel	G-Source II	2400 cu in 12 elements	230	253	5-50 Hz	0.1 sec.	5-10 shots at every depth station (1 station every 10 minutes – 100 total stations)	15 ft	N/A	100%
Option 2 Airgun Array (Hypercluster)	Sercel	G-Source II	1500 cu in 6 elements	230	251	5-50 Hz	0.1 sec	5-10 shots at every depth station (1 station every 10 minutes – 100 total stations)	15 ft	N/A	100%

#### 1.1.2.1. The Dual Magnum Airgun Array Option

The Dual Magnum Airgun source array contains 12 elements and a maximum total volume of 2,400in<sup>3</sup> . The source array is made up of four ‘sub-arrays, with 2 m-crossline spacing between each sub-array, each with three air gun elements. The source array has dimensions of 6 m × 0.545 m and is composed of elements ranging in size from 150 to 250 in<sup>3</sup> (Figure 2).

This source array will be deployed at a depth of 12 to 15 m. The survey will employ the rig crane to deploy the source array. Acoustic pulses will be delivered varying time intervals in the area of interest depending on data quality and operator efficiency.

Figure 2: Dual Magnum Airgun Array Source Configuration

### Dual Magnum Air Gun Array

- 12 x G-Guns
- Peak to Peak output: 47 +/- 0.678 ( 4.7 +/- 0.0678 MPa, ~ 253 db re 1 muPa. at 1m.) (15' depth)\*
- RMS Pressure in bar-m 3.3 ( 0.33 MPa, 230 db re 1 muPa. at 1m.) \*
- SEL (Sound Exposure Level) 154.1 dB re 1muPa<sup>2</sup>-s (Mxx) (10Hz - 25 kHz) 148.1 at 500 M\*
- Total Volume 2400 in<sup>3</sup> / Firing Pressure 2,000 PSI

90cm inter gun spacing      60cm inter gun spacing      60cm inter gun spacing      90cm inter gun spacing

1  
5/11/2015

Schlumberger

\* Modeled output using Gundalf software (Marine mammal noise impact report (0-25,000 Hz))

Table 3: Dual Magnum Individual Element Geometry and Contribution

Gun	Pressure (psi)	Volume (cu in)	Type	x (m.)	y (m.)	z (m.)	delay (s.)	sub-array	p-p contrib. (pct.)
1	2000.0	250.0	G-GUN	0.000	0.000	4.528	0.000	4	9.0
2	2000.0	250.0	G-GUN	0.000	-0.545	5.472	0.000	4	9.3
3	2000.0	250.0	G-GUN	0.000	0.545	5.472	0.000	4	9.3
4	2000.0	150.0	G-GUN	2.000	0.000	4.615	0.000	3	7.3
5	2000.0	150.0	G-GUN	2.000	-0.445	5.385	0.000	3	7.6
6	2000.0	150.0	G-GUN	2.000	0.445	5.385	0.000	3	7.6
7	2000.0	150.0	G-GUN	4.000	0.000	4.615	0.000	2	7.3
8	2000.0	150.0	G-GUN	4.000	-0.445	5.385	0.000	2	7.6
9	2000.0	150.0	G-GUN	4.000	0.445	5.385	0.000	2	7.6
10	2000.0	250.0	G-GUN	6.000	0.000	4.528	0.000	1	9.0
11	2000.0	250.0	G-GUN	6.000	-0.545	5.472	0.000	1	9.3
12	2000.0	250.0	G-GUN	6.000	0.545	5.472	0.000	1	9.3

### 1.1.2.1.1. Dual Magnum Array Directivity

The following tables show the inline and crossline directivity of the array in both (angle-frequency) and (angle-amplitude) form and optionally, the azimuthal directivity (theta-phi) form.

*Note that the effects of cable ghosting if present are not shown in Gundalf directivity displays although source ghosting is included. This matches common practice in such displays.*

For inline directivity displays, the x-axis is the inline angle from the vertical with the word **fore** indicating the end nearest the boat. For crossline directivity displays, the x-axis is the crossline angle from the vertical with the word **port** indicating the port side.



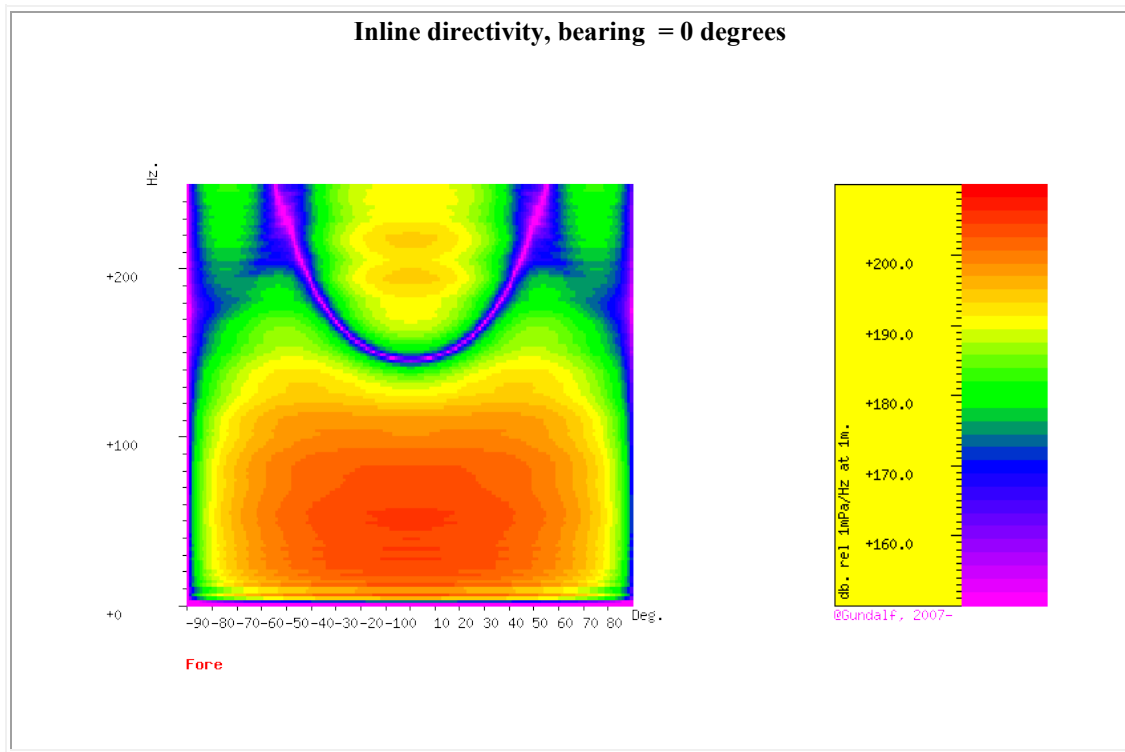
Note that *inline* is used nominally to mean any angle within +/- 45 degrees of the boat direction (which corresponds to a bearing of zero degrees). Similarly, *crossline* is used nominally to mean any angle within +/- 45 degrees of the perpendicular to the boat direction which is measured as a bearing of 90 degrees, (i.e. starboard). The nominal inline and crossline angles can be set by the user in the report options. The values used are indicated in the diagram titles below as bearings.

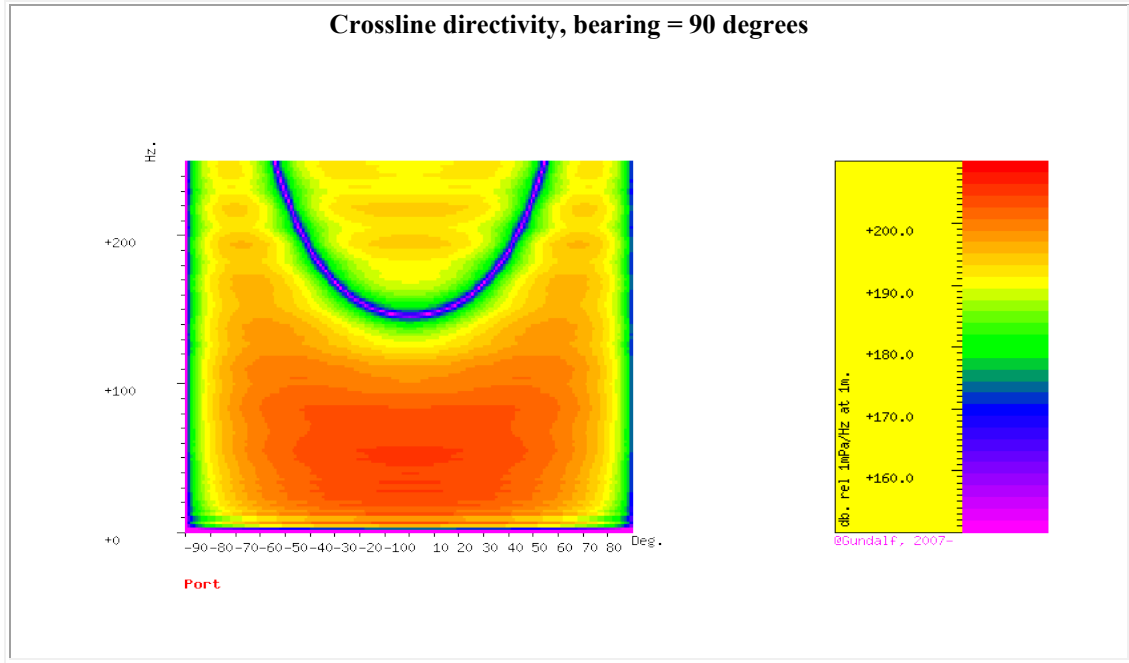
Where shown, the azimuthal plots show contours at four chosen frequencies as a function of phi (angle from the x-axis, opposite to the boat direction) and theta (the angle from the vertical). A bearing of zero degrees corresponds to a value of phi of 180 degrees.

### 1.1.2.1.2. Dual Magnum Angle Frequency Form

The following tables show the inline and crossline directivity of the array in (dip angle-frequency) form. Both plots are scaled as db. relative to 1 microPa. per Hz. at 1m.

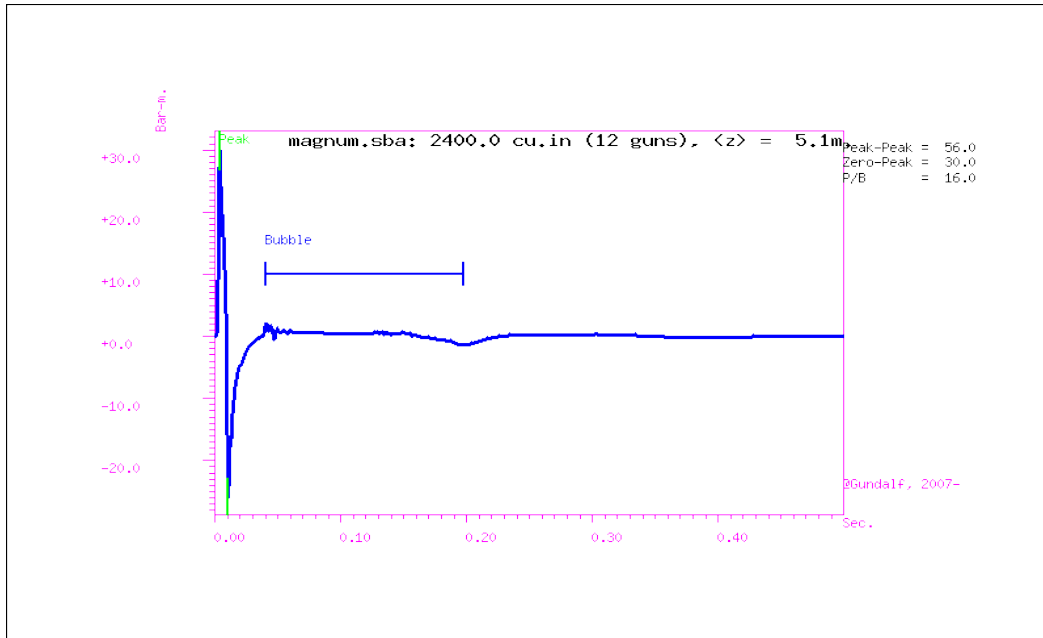
Figure 3: Inline & Crossline Directivity Of the Dual Magnum Airgun Array





### 1.1.2.1.3. Dual Magnum Signature Characterization

Figure 4: Source Signature Output of The Dual Magnum Airgun Array



### 1.1.2.2. The Hypercluster Airgun Array Option

The Hypercluster Airgun source array contains 6 elements and a maximum total volume of 1,500in<sup>3</sup>. The source array is made up of two 'sub-arrays, with 1.5 m-crossline spacing between each sub-array, each with three air gun elements. The source array has dimensions of 6 m × 0.545 m and is composed of 250 in<sup>3</sup> elements. (Figure 5).

This source array will be deployed at a depth of 12 to 15 m. The survey will employ the rig crane to deploy the source array. Acoustic pulses will be delivered varying time intervals in the area of interest depending on data quality and operator efficiency.

Figure 5. Source array configuration for The Hypercluster Airgun Array

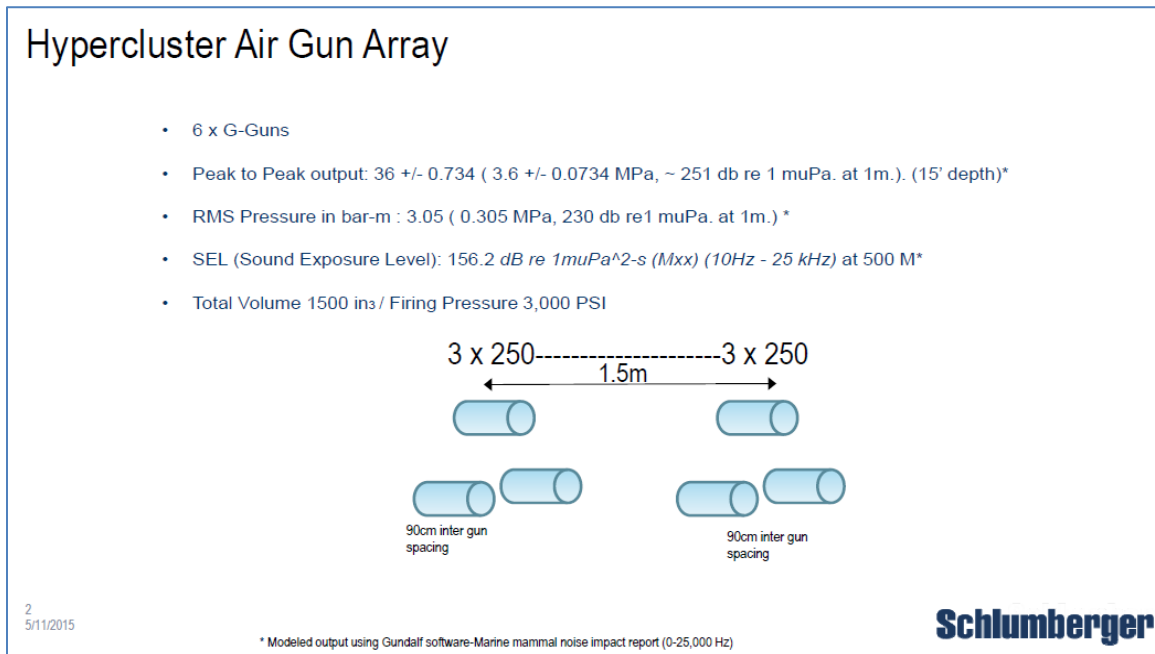


Table 4: Hypercluster Airgun Element Geometry and Contribution

Gun	Pressure (psi)	Volume (cu in)	Type	x (m.)	y (m.)	z (m.)	delay (s.)	sub-array	p-p contrib. (pct.)
1	3000.0	250.0	G-GUN	0.000	-0.450	4.832	0.10000	1	16.9
2	3000.0	250.0	G-GUN	0.000	0.000	4.052	0.10000	1	16.1
3	3000.0	250.0	G-GUN	0.000	0.450	4.832	0.10000	1	17.0
4	3000.0	250.0	G-GUN	1.500	-0.450	4.832	0.10000	1	16.9
5	3000.0	250.0	G-GUN	1.500	0.000	4.052	0.10000	1	16.2
6	3000.0	250.0	G-GUN	1.500	0.450	4.832	0.10000	1	17.0

### 1.1.2.2.1. Hypercluster Array Directivity

The following tables show the inline and crossline directivity of the array in both (angle-frequency) and (angle-amplitude) form and optionally, the azimuthal directivity (theta-phi) form.

*Note that the effects of cable ghosting if present are not shown in Gundalf directivity displays although source ghosting is included. This matches common practice in such displays.*

For inline directivity displays, the x-axis is the inline angle from the vertical with the word **fore** indicating the end nearest the boat. For crossline directivity displays, the x-axis is the crossline angle from the vertical with the word **port** indicating the port side.

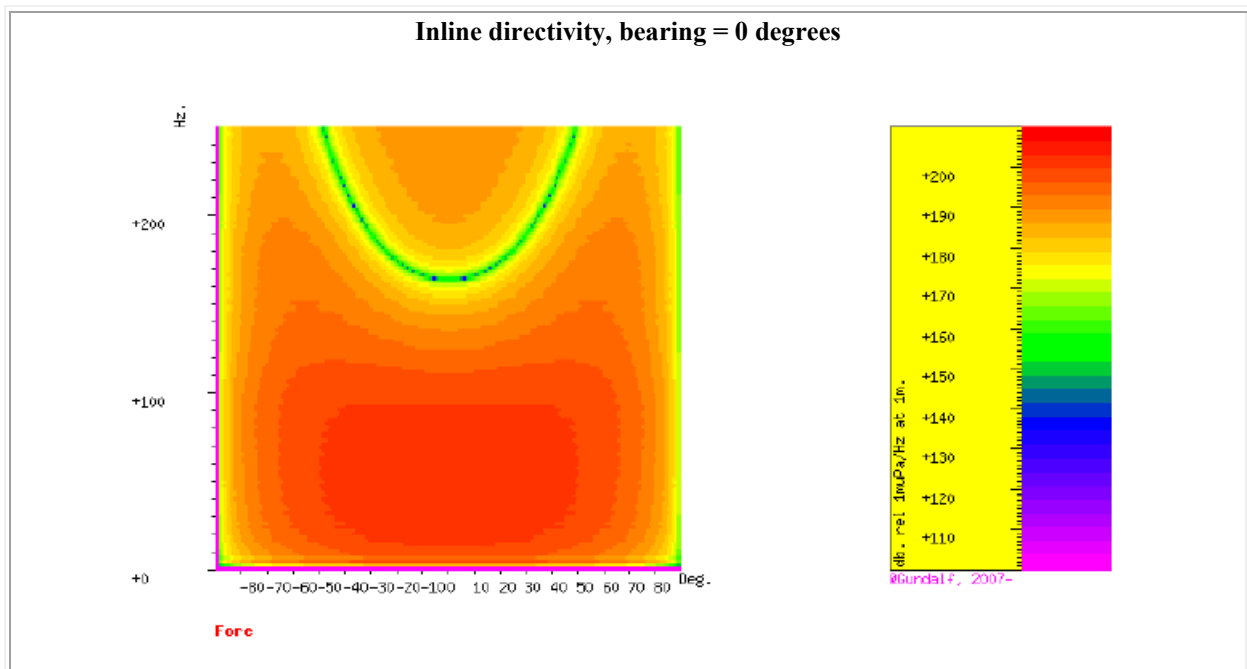
Note that *inline* is used nominally to mean any angle within +/- 45 degrees of the boat direction (which corresponds to a bearing of zero degrees). Similarly, *crossline* is used nominally to mean any angle within +/- 45 degrees of the perpendicular to the boat direction which is measured as a bearing of 90 degrees, (i.e. starboard). The nominal inline and crossline angles can be set by the user in the report options. The values used are indicated in the diagram titles below as bearings.

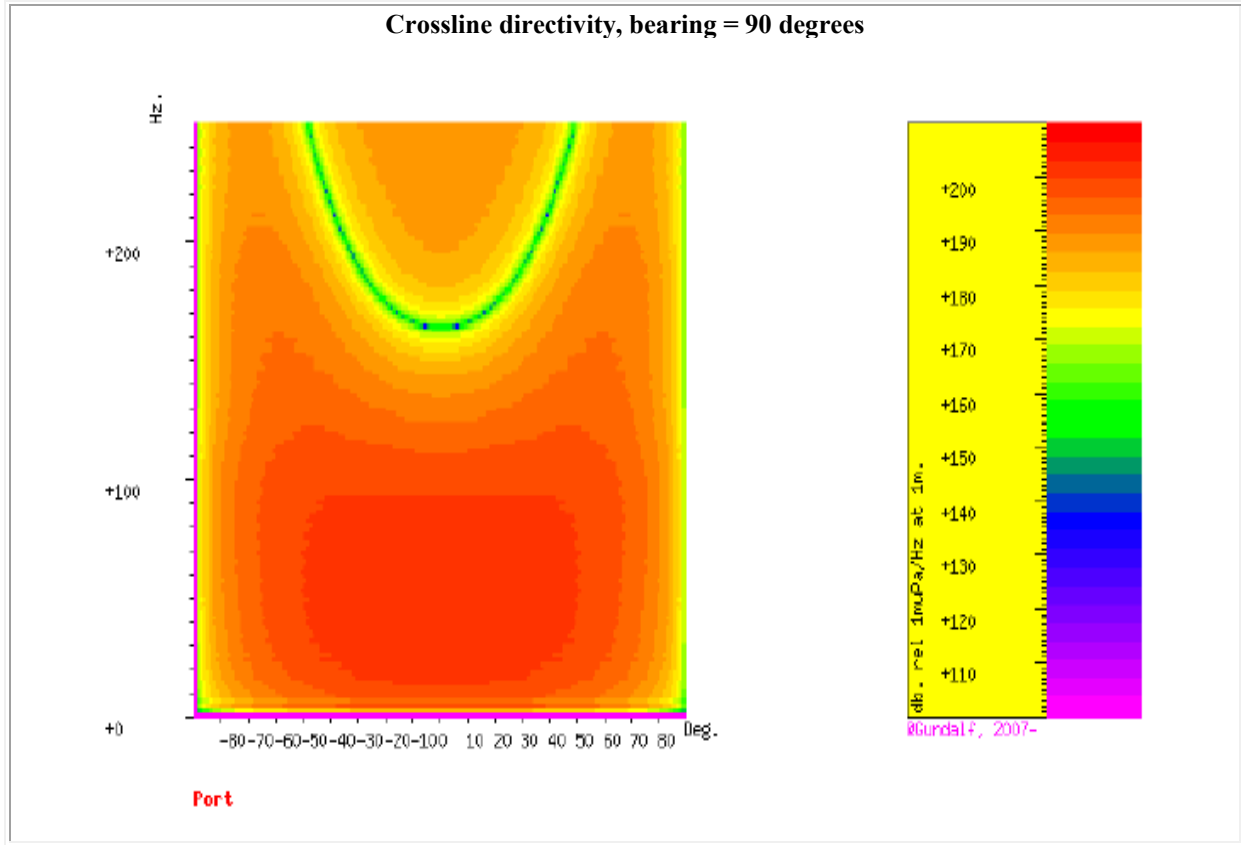
Where shown, the azimuthal plots show contours at four chosen frequencies as a function of phi (angle from the x-axis, opposite to the boat direction) and theta (the angle from the vertical). A bearing of zero degrees corresponds to a value of phi of 180 degrees.

### 1.1.2.2.2. Hypercluster Angle Frequency Form

The following tables show the inline and crossline directivity of the array in (dip angle-frequency) form. Both plots are scaled as db. relative to 1 microPa. per Hz. at 1m.

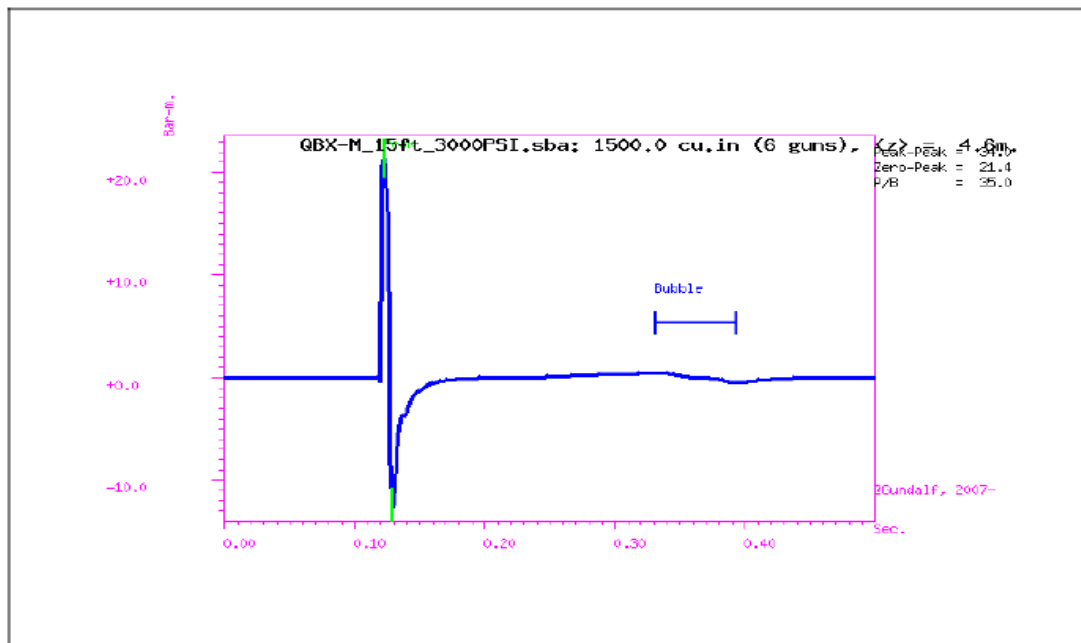
Figure 6: Inline & Crossline Directivity Of the Hypercluster Airgun Array





### 1.1.2.2.3. Hypercluster Signature Characterization

Figure 7: Source Signature Output of The Hypercluster Airgun Array



## 2. Survey Dates, Duration, and Specific Geographic Region

### 2.1. Survey Activity Date Possibilities & Duration

Survey activities considered under this Application will occur no earlier than July 2023 but no later than July 2024

### 2.2. Survey Geographic Region

Activities will be limited to Mississippi Canyon Block 937.

## 3. Species & Number of Marine Mammals

Marine mammal species occurring in the U.S. GOM were identified and provided in the published ITR (86 FR 5322). Information about each species distribution, abundance, and status can be found in that document. A summary of the GOM species with modeled abundance estimates from the ITR (86 FR 5322) are provided in Table 5.

Table 5. Summary of marine mammals of the northern Gulf of Mexico

Common Name	Scientific Name	Stock	ESA/MMPA Stock Status	Modeled Abundance Estimates <sup>2</sup>
Rice's (Bryde's) whale	<i>Balaenoptera brydei</i> (potentially new species) <sup>1</sup>	Northern Gulf of Mexico	E/S	44
Sperm whale	<i>Physeter macrocephalus</i>	Northern Gulf of Mexico	E/S	2,128
Atlantic spotted dolphin	<i>Stenella frontalis</i>	Northern Gulf of Mexico	NS	47,488
Beaked whale <sup>3</sup>	<i>Ziphius cavirostris</i> and <i>Mesoplodon</i> spp.	Northern Gulf of Mexico	NS	2,910
Common bottlenose dolphin	<i>Tursiops truncatus</i>	Northern Gulf of Mexico	NS	138,602
Clymene dolphin	<i>Stenella clymene</i>	Northern Gulf of Mexico	NS	11,000
False killer whale	<i>Pseudorca crassidens</i>	Northern Gulf of Mexico	NS	3,204
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Northern Gulf of Mexico	NS	1,665
Killer whale	<i>Orcinus orca</i>	Northern Gulf of Mexico	NS	185
Melon-headed whale	<i>Peponocephala electra</i>	Northern Gulf of Mexico	NS	6,733
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Northern Gulf of Mexico	NS	84,014
Pygmy killer whale	<i>Feresa attenuata</i>	Northern Gulf of Mexico	NS	2,126
Risso's dolphin	<i>Grampus griseus</i>	Northern Gulf of Mexico	NS	3,137
Rough-toothed dolphin	<i>Steno bredanensis</i>	Northern Gulf of Mexico	NS	4,853
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Northern Gulf of Mexico	NS	1,981
Spinner dolphin	<i>Stenella longirostris</i>	Northern Gulf of Mexico	NS	13,485
Striped dolphin	<i>Stenella coeruleoalba</i>	Northern Gulf of Mexico	NS	4,914
<i>Kogia</i> spp. <sup>3</sup>	<i>Kogia breviceps</i> and <i>Kogia sima</i>	Northern Gulf of Mexico	NS	2,234

ESA = Endangered Species Act; E = endangered; MMPA = Marine Mammal Protection Act; NS = non-strategic stock; S = strategic stock. 1 Data published on 22 January 2021 indicate the whale previously identified as the Bryde's whale may be a new species of whale, the Rice's whale, and although official species designation has not yet been made by the National Marine Fisheries Service (NMFS), the new name is included here for reference (NMFS, 2021a). 2 Abundance estimates from modeled estimates in the incidental take regulation (86 FR 5322). 3 Due to difficulty in identifying to species level during visual surveys, *Kogia* spp. and beaked whale species are grouped into guilds and abundance estimates are provided for these guilds rather than each species.

## 4. Affected Species Status and Distribution

Affected species status and distribution were examined by the National Marine Fisheries Service (NMFS) within the scope of the proposed regulation, and more information can be found in the published ITR (86 FR 5322)

## 5. Type of Incidental Taking Authorization Requested

Chevron requests an LOA pursuant to Section 101 (a)(5)(D) of the Marine Mammal Protection Act (MMPA) for incidental take of small numbers of marine mammals during geophysical surveys conducted as part of oil and gas exploration and production activities within the U.S. GOM. Proposed activities, as outlined in Section 1.0, have the potential to impact marine mammals from sounds generated by the vessel and survey equipment. Level A harassment is not expected to result from the proposed activities due to the expected source levels and implementation of mitigation measures. Level B harassment may occur because of proposed activities; therefore, Chevron is requesting authorization for small numbers of Level B takes of marine mammals. The species potentially taken are described fully in the published ITR and listed in Table 4 for reference..

## 6. Take Estimates for Marine Mammals

The draft GOM exposure estimation tool provided by NMFS (2021b) was used in this analysis. This draft tool applies modeling conducted by Zeddies et al. (2015, 2017) using 4,130 and 8,000 in<sup>3</sup> source arrays in various survey configurations. The source array volumes proposed in this application are significantly less (~70% for Dual Magnum & ~82% for Hypercluster) than the 8000 in<sup>3</sup> source array used to estimate exposures in the ITR; the proposed activities are expected to result in fewer takes than those predicted in the parameters set forth in the draft exposure estimation tool. Therefore, the number of exposures for of each species estimated in this application should be considered as highly conservative estimates. Final number of takes will be determined during the consultation process with NMFS.

### 6.1. Estimated Numbers of Marine Mammals That Might Be Taken by Harassment

The parameters used as input into the NMFS (2021b) draft exposure estimation tool to estimate takes which may result from the VSP survey activities are provided in Table 5.

Table 5. Parameters used in the National Marine Fisheries Service (NMFS) draft exposure estimation tool (NMFS 2021b)

Parameter	VSP Exposure Tool Input
Survey Type	2D
Array Volume (in <sup>3</sup> )	8,000
Survey Days	2

2D = two-dimensional; VSP = vertical seismic profile. All survey days input into the draft tool were assumed to occur in the summer season.

#### 6.1.1. Level A Harassment Estimated

No level A exposures are expected to result from any of the described survey activities due to a combination of mitigation measures (Section 11.0) that prevent Level A exposures. Exposures for *Kogia* spp. result from the use of the PK metric which is an instantaneous exposure; the implementation of mitigation measures outlined in Section 11.0

reduces the risk of exposure to above the PK threshold such that takes are not expected to occur. Also, source intensity during the application will be much less than what was modeled (2D versus VSP Source)

### 6.1.2. Level B Harassment Estimated

Level B exposures, like the Level A exposures provided in Section 6.1.1, were estimated using the NMFS draft exposure estimation tool (NMFS, 2021b) using the parameters provided in Table 5. Exposures in Table 6 assumes the ZVSP survey will have a duration of 2 days.

Table 6. Maximum annual Level B exposures for the proposed Distributed Acoustic Sensing vertical seismic profiling surveys estimated using the National Marine Fisheries (NMFS) draft exposure estimation tool (NMFS, 2021b).

#### Summer Take Estimates

Parameters	
Survey Type	2D
Zone Number	5

Schedule	
Season	# days
Summer	2
Winter	0

Exposures by Metric			
	Summer	Winter	Total
<b>Level A</b>			
<b>Low-Frequency Hearing Group</b>			
Bryde's whale	< 0.01	< 0.01	< 0.01
<b>High-Frequency Hearing Group</b>			
Kogia (dwarf, pygmy sperm whale)	0.54	< 0.01	0.54
<b>Level B</b>			
<b>Low-Frequency Hearing Group</b>			
Bryde's whale	< 0.01	< 0.01	< 0.01
<b>Mid-Frequency Functional Hearing Group</b>			
Beaked whales (Cuvier/Blainville/Gervais)	368.73	< 0.01	368.73
Bottlenose dolphin	249.31	< 0.01	249.31
Short-finned pilot whale	27.29	< 0.01	27.29
Sperm whale	71.15	< 0.01	71.15
Atlantic spotted dolphin	95.38	< 0.01	95.38
Clymene dolphin	148.96	< 0.01	148.96
False killer whale	30.34	< 0.01	30.34
Fraser's dolphin	16.13	< 0.01	16.13
Killer whale	0.97	< 0.01	0.97
Melon-headed whale	94.36	< 0.01	94.36
Pantropical spotted dolphin	675.99	< 0.01	675.99
Pygmy killer whale	19.07	< 0.01	19.07
Risso's dolphin	44.33	< 0.01	44.33
Rough-toothed dolphin	43.83	< 0.01	43.83
Spinner dolphin	181.13	< 0.01	181.13
Striped dolphin	58.18	< 0.01	58.18
<b>High-Frequency Hearing Group</b>			
Kogia (dwarf, pygmy sperm whale)	24.65	< 0.01	24.65

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
368.73	< 0.01	368.73
249.31	< 0.01	249.31
27.29	< 0.01	27.29
71.15	< 0.01	71.15
95.38	< 0.01	95.38
148.96	< 0.01	148.96
30.34	< 0.01	30.34
16.13	< 0.01	16.13
0.97	< 0.01	0.97
94.36	< 0.01	94.36
675.99	< 0.01	675.99
19.07	< 0.01	19.07
44.33	< 0.01	44.33
43.83	< 0.01	43.83
181.13	< 0.01	181.13
58.18	< 0.01	58.18
25.19	< 0.01	25.19

- Level A takes were calculated for some marine mammal species; however, it is unlikely an animal will remain in the area around the source array to receive sound sufficient to result in a Level A take and they are therefore not expected to occur.
- As additional measures, mitigation per regulations will be in place prior to, during and after the VSP survey.
- Abundance estimates from modeled estimates in the incidental take regulation (86 Federal Register [FR] 5322).



**Winter Only Take Estimates**

Parameters	
Survey Type	2D
Zone Number	5

Schedule	
Season	# days
Summer	0
Winter	2

Exposures by Metric			
	Summer	Winter	Total
<b>Level A</b>			
<b>Low-Frequency Hearing Group</b>			
Bryde's whale	< 0.01	< 0.01	< 0.01
<b>High-Frequency Hearing Group</b>			
Kogia (dwarf, pygmy sperm whale)	< 0.01	0.54	0.54
<b>Level B</b>			
<b>Low-Frequency Hearing Group</b>			
Bryde's whale	< 0.01	< 0.01	< 0.01
<b>Mid-Frequency Functional Hearing Group</b>			
Beaked whales (Cuvier/Blainville/Gervais)	< 0.01	377.72	377.72
Bottlenose dolphin	< 0.01	259.17	259.17
Short-finned pilot whale	< 0.01	28.07	28.07
Sperm whale	< 0.01	70.13	70.13
Atlantic spotted dolphin	< 0.01	98.10	98.10
Clymene dolphin	< 0.01	151.56	151.56
False killer whale	< 0.01	31.18	31.18
Fraser's dolphin	< 0.01	16.59	16.59
Killer whale	< 0.01	1.01	1.01
Melon-headed whale	< 0.01	97.05	97.05
Pantropical spotted dolphin	< 0.01	687.77	687.77
Pygmy killer whale	< 0.01	19.60	19.60
Risso's dolphin	< 0.01	45.53	45.53
Rough-toothed dolphin	< 0.01	45.05	45.05
Spinner dolphin	< 0.01	184.29	184.29
Striped dolphin	< 0.01	59.20	59.20
<b>High-Frequency Hearing Group</b>			
Kogia (dwarf, pygmy sperm whale)	< 0.01	26.05	26.05

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	377.72	377.72
< 0.01	259.17	259.17
< 0.01	28.07	28.07
< 0.01	70.13	70.13
< 0.01	98.10	98.10
< 0.01	151.56	151.56
< 0.01	31.18	31.18
< 0.01	16.59	16.59
< 0.01	1.01	1.01
< 0.01	97.05	97.05
< 0.01	687.77	687.77
< 0.01	19.60	19.60
< 0.01	45.53	45.53
< 0.01	45.05	45.05
< 0.01	184.29	184.29
< 0.01	59.20	59.20
< 0.01	26.58	26.58

- Level A takes were calculated for some marine mammal species; however, it is unlikely an animal will remain in the area around the source array to receive sound sufficient to result in a Level A take and they are therefore not expected to occur.
- As additional measures, mitigation per regulations will be in place prior to, during and after the VSP survey.
- Abundance estimates from modeled estimates in the incidental take regulation (86 Federal Register [FR] 5322).

## 7. Effects on Marine Mammal Species

Anticipated impacts on marine mammal habitat were examined by NMFS within the scope of the proposed regulation, and more information can be found in the published ITR (86 FR 5322).

Given that the scope of activities proposed in this application are less than that of the ITR, the activities in this application are expected to remain within this finding will have only negligible impacts. The assessment conducted in the ITR assumed an 8,000 in<sup>3</sup> air gun array as the acoustic sound source for all seismic survey activities. Therefore, it is reasonable to assume that the project activities would not adversely impact marine mammal stocks.

## 8. Minimization of Adverse Effects to Subsistence Uses

This section addresses NFMS' requirement to identify methods to minimize adverse effects of the proposed activity on subsistence uses.

There are no current subsistence hunting areas in the vicinity of any of the proposed lease blocks and there are no activities related to the proposed surveys that may affect the availability of a species of marine mammal for subsistence uses. Consequently, there are no available methods to minimize potentially adverse effects to subsistence uses.

## 9. Anticipated Impacts on Habitat

Anticipated impacts on marine mammal habitat were examined by NMFS within the scope of the proposed regulation, and more information can be found in the published ITR (86 FR 5322)

## 10. Anticipated Effects of Habitat Impacts on Marine Mammals

Anticipated effects of habitat impact on marine mammals were examined by NMFS within the scope of the proposed regulation, and more information can be found in the published ITR (86 FR 5322).

## 11. Mitigation Measures

Chevron has demonstrated a strong commitment to minimizing impacts to marine mammal species through a comprehensive and progressive mitigation and monitoring program and will follow all monitoring and mitigation measures set forth in the ITR (86 FR 5322) that are applicable to air gun surveys with total source volumes above 1,500 in<sup>3</sup>.

The mitigation measures will align with those currently required under existing regulations (e.g., BOEM Notice to Lessees and Operators 2016-G02, revised 19 June 2020) as well as additional mitigation outline in the published ITR and the NMFS 2020 Biological Opinion and its appendices (NMFS, 2020), as they apply to the proposed survey activities.

## 12. Monitoring and Reporting

Chevron will comply with all monitoring and reporting guidelines provided in the published ITR (86 FR 5322) as they pertain to Protected Species Observer and passive acoustic monitoring data and reporting injured or dead marine mammal species.