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

Ocean Bottom Node (OBN) and Distributed Acoustic Sensing (DAS) Survey in bp Atlantis Prospect Area
BOEM G&G Permit: Pending
Outer Continental Shelf, Gulf of Mexico

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February 2024

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List of Acronyms and Abbreviations

μPa	micropascal
2D	two-dimensional
3D	three-dimensional
BOEM	Bureau of Ocean Energy Management
bp	bp Exploration & Production Inc.
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
DAS	distributed acoustic sensing
dB	decibel
EWG	expert working group
FR	Federal Register
GOMx	Gulf of Mexico
ITR	incidental take regulation
JASCO	JASCO Applied Sciences
LOA	Letter of Authorization
MMPA	Marine Mammal Protection Act
NAZ	narrow azimuth
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NUT	New or Unusual Technology
OBN	ocean bottom node
OCS	Outer Continental Shelf
Lpk	zero-to-peak sound pressure level
PTS	permanent threshold shift
re	referenced to
ROV	remotely operated vehicle
SL	source level
SPL	root-mean-square sound pressure level
WAZ	wide azimuth

1.0   Description of Proposed Activities

In accordance with the final incidental take regulation (ITR) published 19 January 2021 (86 *Federal Register* [FR] 5322) and revised 5 January 2023 (88 FR 916), bp Exploration & Production Inc. (bp), hereinafter referred to as the "Applicant", submits this request for a Letter of Authorization (LOA) for the non-lethal, unintentional taking of small numbers of marine mammals resulting from a three-dimensional (3D) ocean bottom node (OBN) and distributed acoustic sensing (DAS) geophysical survey conducted in the Gulf of Mexico (GOMx). The information provided in this document is submitted in accordance with the final ITR published 19 January 2021 (86 FR 5322), any relevant updates from the 2023 proposed ITR (88 FR 916), 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

The Applicant proposes to conduct a 3D OBN and DAS survey within the Atlantis bp prospect in the Bureau of Ocean Energy Management's (BOEM's) Central Planning Area of the GOM that overlaps with ITR assessment zones 5 and 7 (**Figure 1**). The survey is expected to begin no earlier than 27 April 2024.

The prospect area under consideration is located in the Green Canyon and Atwater Valley lease areas. In 2024, the Applicant anticipates a single OBN/DAS survey within this prospect area. **Table 1** provides the protraction blocks for the primary boundaries of this prospect. Surrounding blocks may be included in some surveys; however, all blocks involved in the survey will remain in either zone 5 or zone 7.

Table 1.   Primary Gulf of Mexico protraction blocks for the Atlantis prospect area in which survey will occur.

Atlantis
GC: 522, 523, 524, 525, 564, 565, 566, 567, 568, 569, 607, 608, 609, 610, 611, 612, 613, 650, 651, 652, 653, 654, 655, 656, 657, 658, 694, 695, 696, 697, 698, 699, 700, 701, 702, 738, 739, 740, 741, 742, 743, 744, 745, 746, 782, 783, 784, 785, 786, 787, 788, 789, 790, 826, 827, 828, 829, 830, 831, 832, 833, 834, 871, 872, 873, 874, 875, 876, 877, 878, 915, 916, 917, 918, 919, 920, 921, 922, 961, 962, 963, 964, 965
AT: 529, 573, 574, 617, 618, 661, 662, 663, 705, 706, 707, 749, 750, 751, 793, 794, 795, 837, 838, 881, 882

AT = Atwater Valley; GC = Green Canyon.
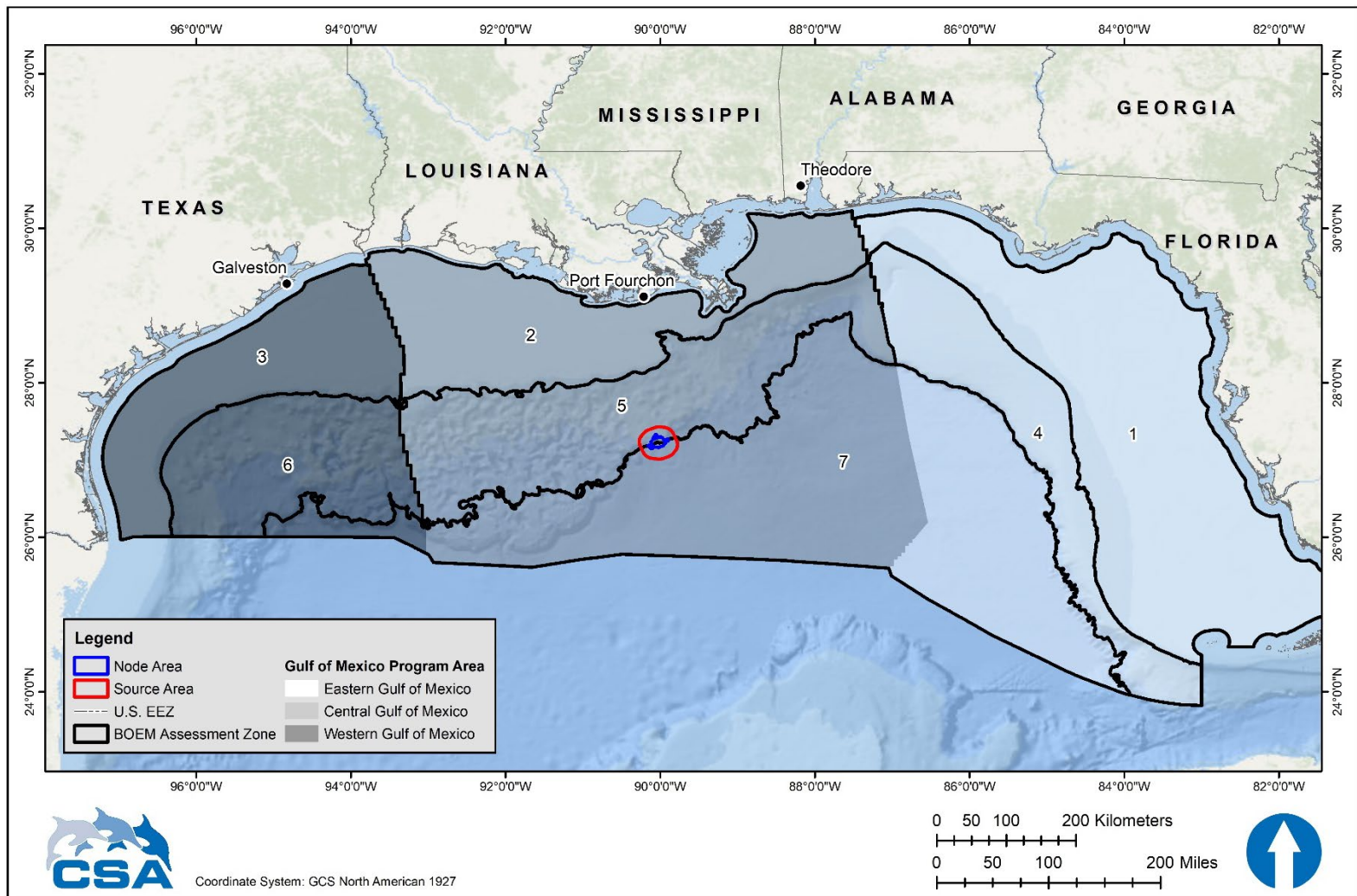
Figure 1. Location of the proposed three-dimensional (3D) ocean bottom node (OBN) and distributed acoustic sensing (DAS) geophysical survey in bp Exploration & Production Inc. Atlantis prospect area located within the Bureau of Ocean Energy Management's (BOEM's) Gulf of Mexico Central Planning Area in relation to the assessment zones identified in the incidental take regulation (ITR) (86 Federal Register (*FR*) 5322). EEZ = exclusive economic zone.

1.1.1 Activities Considered in Application

OBN surveys are best characterized as 3D narrow azimuth (NAZ) surveys that employ bottom-mounted receivers, or "nodes", used in conjunction with a vessel-towed seismic source array. Seismic receivers (nodes) are deployed from remotely operated vehicles (ROV) within the node area (**Figure 1**) using 213 m x 184.5 m configuration. In total, the Applicant will deploy up to 5,112 nodes, each with a footprint of approximately 0.26 m^2 which, when fully deployed, will cover approximately 196 km^2 of seafloor for a survey that covers an approximate area of 677 km^2. The nodes take the place of traditional seismic streamers and allow a tighter survey configuration due to increased maneuverability of the vessels without towed streamers. OBN surveys were not modeled as part of the ITR; therefore, for modeling comparisons, the coil survey scenario as modeled by Zeddies et al. (2015) was used as the most comparable survey type. The main comparison lies in the "density" of the surveys over single transect lines and the areal coverage of the survey. The longest proposed source line length for this survey is 65 km, more comparable to the 58 km linear component of the coil array (noting that the coil survey consists of concentric circles along that 58 km distance and each of the circular source paths in the coil survey has a total length of about 39.3 km) versus the modeled 3D narrow/wide azimuth (NAZ/WAZ) which incorporated 145 km survey lines. Additionally, the maximum source footprint of the proposed survey is approximately 1,751 km^2 which is closer to the 3,364 km^2 footprint of the modeled coil survey than the other survey types modeled such as 3D NAZ survey with larger footprints up to 6,960 km^2. The spatial footprint of the survey was the main consideration for selecting a proxy for this take assessment.

DAS surveys utilize an optical fiber cable connected between the well and production facility to receive the 3D geophysical information. However, due to the use of the fiber cable as a receiver, the seismic source operations are most comparable to a two-dimensional (2D) seismic survey. The cable is permanently installed in the well and does not emit any sound. The seismic source is then deployed from one or two source vessels, each towing two source arrays alternately emitting an acoustic pulse.

Both the OBN and DAS survey will use the same seismic source and will thus be conducted at the same time. One dual-source vessel will be used to produce acoustic pulses at regular spatial intervals across the node grid. The source vessel will survey along transect lines that extend through, and 10 km beyond, the node grid on every site. The survey is anticipated to start 27 April 2024 and will occur over approximately 60 operational days.

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

Table 2. Approximate location, duration, and season within which the proposed ocean bottom node (OBN) and distributed acoustic sensing (DAS) survey activities used for the analysis in this Application.

Category	Ocean Bottom Node Survey
Bureau of Ocean Energy Management Planning Area	Central
Incidental take regulations (ITR) assessment zone	5 and 7
bp Exploration & Production Inc. prospect area	Atlantis
Season in which surveys would occur[1]	Summer
Total survey duration (days)	60

LOA = Letter of Authorization.
[1]The modeling used in the take assessment of the ITR reflects only two seasons, winter (December–March) and summer (April-November). Therefore, the proposed 60-day survey period between April through June would only occur during the summer season identified in the ITR take assessment so that was the season used in this Application.

1.1.2 Acoustic Sources

The source for the proposed OBN and DAS survey consists of a horizontal, planar array of individual compressed air chambers (i.e., air guns) of different sizes towed behind the source vessel. This source is a tuned compressed air system 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 towing depth. Both the volume of the air guns and size of the array are selected based on the needs of the survey.

The Applicant intends to use a two air gun source arrays deployed from the source vessel, each with up to 32 elements and a maximum total volume of 5,110 in³. Each source array is made up of three 'sub-arrays,' with 7.5-m crossline spacing between each sub-array, each with approximately 10 or 12 air gun elements. Each source array has dimensions of approximately 15 m × 7 m and is composed of elements ranging in size from 90 to 250 in³ (**Figure 2**).

Figure 2.   Source array configuration for the proposed ocean bottom node (OBN) and distributed
acoustic sensing (DAS) survey.

This source array will be towed at a depth of 12 m. The survey will employ one vessel towing two source arrays operating in an alternative manner (i.e., each array alternated with a pulse interval at 12.5 s), such that the volume of the array will never exceed a total volume of 5,110 in^3 irrespective of how many source arrays are towed. Acoustic pulses will be delivered at regular spatial intervals from a source array towed by a surface vessel across the area of interest and extending 10 km per side beyond the receiver pattern. The source level (SL) expressed as a zero-to-peak sound pressure level (Lpk) of the source array is expected to be approximately 255 decibels (dB) referenced to (re) 1 micropascal (µPa) m. In the ITR assessment (86 FR 5322) and the GOMx exposure estimation tool provided by NMFS (2021) no 5,110 in^3 air gun array was modeled or available for use as a proxy in this Application, only a 4,130 in^3 and an 8,000 in^3 air gun array. However, modeling results for the 4,130 in^3 air gun array in the exposure estimation tool are only available for a subset of the species assessed in this Application (**Section 3.0**) including *Kogia* spp., Rice's whale, beaked whales, bottlenose dolphins, short-finned pilot whales, and sperm whales (NMFS 2021). Additionally, the SL of the 8,000 in^3 air gun array (estimated endfire SL expressed as Lpk of 255 dB re 1 µPa m) is closer to the SL of the proposed air gun array (**Table 3**); therefore, as a conservative approach for the take assessment in this Application, the 8,000 in^3 array was selected as the proxy in the GOMx exposure estimation tool.

Operating frequencies for the source array are expected to range from 10 to 2,000 Hz, with a peak frequency of 45 Hz. Predicted SLs are based on far-field measurements that are back calculated to approximate the conditions 1 m from a monopole source. This methodology, while widely accepted for estimating SLs, does not fully capture the near-field characteristics of the source. In the case of an air gun array, which is a distributed source in the near-field rather than a monopole source as is assumed, near-field characteristics can have substantial bearing on the propagation of that source. This results in reported SLs that are conservative, often overestimated, and lacking in specific spectral information. The total area covered by the proposed OBN and DAS survey will be approximately 1,255 km^2 (**Table 3**).

Table 3 provides a summary of the acoustic properties of the sources to be used during the proposed OBN/DAS survey included in this Application.

Table 3.   Survey specifications for the source arrays to be used during the proposed surveys in the U.S. Gulf of Mexico included in this Application.

Source Information	OBN/DAS Survey
Mean Vessel Survey Speed (knots)	4.3
Approximate Total Survey Area (km^2)	1,751 km^2
Array Tow depth (m)	12
Array Maximum Total Volume (in^3)	5,110
SL (Lpk) in dB re 1 µPa m	255
SL (SPL) in dB re 1 µPa m	239
Frequency Range (Hz)	10–2,000
Peak Frequency (Hz)	45
Pulse Duration (s)	0.5
Pulse Rate (s)	0.08

µPa = micropascal; dB = decibel; OBN = ocean bottom node; PK = zero-to-peak sound pressure level; re = referenced to; SL = source level; SPL = root-mean-square sound pressure level.

2.0   Survey Dates, Duration, and Specific Geographic Region

2.1   SURVEY ACTIVITY DATES AND DURATION

Survey activities considered under this Application will begin 27 April 2024 and will occur over approximately 60 operational days (**Table 2**).

2.2   SPECIFIC GEOGRAPHIC REGION

The Applicant's survey activities will occur within the Atlantis proposed prospect area within BOEM's Central Planning Area of the GOMx (**Figure 1**). The proposed prospect area falls within ITR assessment zones 5 and 7.

3.0 Species and Numbers of Marine Mammals

Marine mammal species occurring in the U.S. GOMx were identified and provided in the published ITR (86 FR 5322) and updated with new information in the 2023 proposed update (88 FR 916). Information about each species distribution, abundance, and status can be found in that document. A summary of the GOMx species with modeled abundance estimates from the ITR (86 FR 5322; 88 FR 916) is provided in **Table 4**.

Table 4. Summary of marine mammals of the northern Gulf of Mexico.

Common Name	Scientific Name	Stock	ESA/MMPA Stock Status	Modeled Abundance Estimates[2]
Rice's whale[1]	*Balaenoptera ricei*	Northern Gulf of Mexico	E/S	37
Sperm whale	*Physeter macrocephalus*	Northern Gulf of Mexico	E/S	3,007
Atlantic spotted dolphin	*Stenella frontalis*	Northern Gulf of Mexico	NS	1,782[3]
Beaked whale	*Ziphius cavirostris* and *Mesoplodon* spp.	Northern Gulf of Mexico	NS	803[4]
Common bottlenose dolphin	*Tursiops truncatus*	Northern Gulf of Mexico	NS	9,672[5]
Clymene dolphin	*Stenella clymene*	Northern Gulf of Mexico	NS	4,619
False killer whale	*Pseudorca crassidens*	Northern Gulf of Mexico	NS	494
Fraser's dolphin	*Lagenodelphis hosei*	Northern Gulf of Mexico	NS	1,665
Killer whale	*Orcinus orca*	Northern Gulf of Mexico	NS	267
Melon-headed whale	*Peponocephala electra*	Northern Gulf of Mexico	NS	6,113
Pantropical spotted dolphin	*Stenella attenuata*	Northern Gulf of Mexico	NS	67,225
Pygmy killer whale	*Feresa attenuata*	Northern Gulf of Mexico	NS	613
Risso's dolphin	*Grampus griseus*	Northern Gulf of Mexico	NS	1,501
Rough-toothed dolphin	*Steno bredanensis*	Northern Gulf of Mexico	NS	4,853
Short-finned pilot whale	*Globicephala macrorhynchus*	Northern Gulf of Mexico	NS	2,741
Spinner dolphin	*Stenella longirostris*	Northern Gulf of Mexico	NS	5,548
Striped dolphin	*Stenella coeruleoalba*	Northern Gulf of Mexico	NS	5,634
Kogia spp.	*Kogia breviceps* and *Kogia sima*	Northern Gulf of Mexico	NS	980[4]

ESA = Endangered Species Act; E = endangered; MMPA = Marine Mammal Protection Act; NS = non-strategic stock; S = strategic stock.

[1]The original 2021 rule (86 FR 5322) referred to the Bryde's whale (*Balaenoptera edeni*), and these whales were subsequently described as a new species, the Rice's whale (Rosel et al. 2021).

[2]Abundance estimates from modeled estimates in the proposed 2023 incidental take regulation (ITR) update (88 FR 916), or the most recent draft 2023 stock assessment report from the National Marine Fisheries Service (NMFS 2024) for species for which the ITR did not have any predicted abundances (i.e., pygmy killer whale, false killer whale, killer whale).

[3]The mean abundance for Atlantic spotted dolphins is based on the oceanic population in the proposed 2023 ITR update (88 FR 916).

[4]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.

[5]The mean abundance for common bottlenose dolphins is based on the oceanic population in the proposed 2023 ITR update (88 FR 916).

4.0 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) and the proposed 2023 update (88 FR 916).

5.0   Type of Incidental Taking Authorization Requested

The Applicant requests an LOA pursuant to Section 101 (a)(5)(D) of the Marine Mammal Protection Act (MMPA) for incidental take by behavioral harassment of small numbers of marine mammals during geophysical surveys conducted as part of oil and gas exploration and production activities within the U.S. GOMx. Proposed activities, as outlined in **Section 1.0**, have the potential to impact marine mammals from sounds generated by the vessel and survey equipment.

The seismic source used during the proposed OBN/DAS survey produces sound levels that may exceed established acoustic thresholds for marine mammals (Wood et al., 2012; NMFS, 2023). Acoustic thresholds are received sound levels that meet current scientific criteria as sufficient for eliciting the onset of a permanent threshold shift (PTS), termed Level A harassment, or a behavioral response, termed Level B harassment.

Level A harassment is not expected to result from the proposed activities due to the expected source levels and implementation of mitigation measures. Level A takes were assessed in the Application but are not requested. Level B harassment may occur as a result of proposed activities; therefore, the Applicant 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. Each species has a geographic distribution that includes the lease areas in which survey activities may occur and has at least a minimal potential to occur.

To ensure that only small numbers of marine mammals are exposed during the proposed survey activities, the maximum number of exposures for each species that can reasonably be expected to occur were estimated in this Application using the GOMx exposure estimation tool provided by NMFS (2021) and developed in May 2021. This tool applies modeling conducted by Zeddies et al. (2015) using an 8,000 in³ source array in various survey configurations, including coil, which were used to represent the OBN and DAS survey in this assessment. As discussed in **Section 1.1.2**, estimated SLs for air gun arrays used in propagation modeling often do not fully capture the near-field characteristics of the source that can have substantial bearing on the propagation of that source. This results in reported SLs that are conservative, often overestimated, and lacking in specific spectral information. Additionally, the exposure modeling in the proposed 2023 ITR update (88 FR 916) includes updated marine mammal densities from Litz et al. (2023) and updated species movement and behavior data used in the animal movement model (Weirathmueller et al., 2022) which have not been incorporated into the GOMx exposure estimation tool (NMFS, 2021). Furthermore, mitigation was not accounted for in the exposure estimation tool when calculating potential exposures. Therefore, the number of exposures for each species estimated in this Application should be considered as highly conservative estimates. Requested takes from the Applicant are provided in **Section 6.2**; however, the 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 (2021) exposure estimation tool to estimate takes which may result from the OBN and DAS survey activities are provided in **Table 5**.

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

Parameter	OBN/DAS Tool Input
Survey Type	Coil
Survey Days[1]	Zone 5 = 30 Zone 7 = 30

3D = three-dimensional; NAZ = narrow azimuth; OBN = ocean bottom node.
[1]All survey days input into the exposure estimation tool will occur in the summer season as identified in the ITR modeling assessment. Because the survey area of the proposed survey covers both zones 5 and 7 (see Figure 1 of this Application), the total number of operational survey days were split evenly between the two zones.

6.1.1   Level A Harassment of Marine Mammals

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 and animal movement and behavior that would serve to avoid Level A exposures. The ITR assessment determined there was a negligible potential for Level A exposures of mid-frequency cetaceans, so the NMFS exposure estimation tool does not calculate incidents of Level A exposure for this group (86 FR 5353; NMFS, 2021). Level A exposures calculated for low-frequency (i.e., Rice's whale) and high-frequency (i.e., *Kogia* spp.) cetaceans, reduced in the exposure estimation tool by 80% to account for the effects of aversion (NMFS, 2021) are provided in **Table 6** using the parameters provided in **Table 5**.

Table 6. Maximum annual Level A exposures[1] for the proposed ocean bottom node (OBN) and distributed acoustic sensing (DAS) survey estimated using the National Marine Fisheries (NMFS) exposure estimation tool (NMFS, 2021).

Common Name	Abundance[3]	Zone 5 Exposures	Zone 7 Exposures	Maximum Population Affected
Low-frequency cetaceans				
Rice's whale[2]	37	0.27	<0.01	1%
Mid-frequency cetaceans				
Sperm whale	3,007	0	0	0%
Atlantic spotted dolphin[4]	1,782	0	0	0%
Beaked whale[5]	803	0	0	0%
Common bottlenose dolphin[6]	9,672	0	0	0%
Clymene dolphin	4,619	0	0	0%
False killer whale	494	0	0	0%
Fraser's dolphin	1,665	0	0	0%
Killer whale	267	0	0	0%
Melon-headed whale	6,113	0	0	0%
Pantropical spotted dolphin	67,225	0	0	0%
Pygmy killer whale	613	0	0	0%
Risso's dolphin	1,501	0	0	0%
Rough-toothed dolphin	4,853	0	0	0%
Short-finned pilot whale	2,741	0	0	0%
Spinner dolphin	5,548	0	0	0%
Striped dolphin	5,634	0	0	0%
High-frequency cetaceans				
Kogia spp.[6]	980	15.78	7.48	2%

[1]Level A takes were calculated for some marine mammal species; however, it is unlikely an animal will remain in an ensonified area around the source to receive sound sufficient to result in Level A take and they are therefore not expected to occur and are not requested for this project.
[2]The original 2021 rule (86 FR 5322) referred to the Bryde's whale (*Balaenoptera edeni*), and these whales were subsequently described as a new species, the Rice's whale (Rosel et al., 2021).
[3]Abundance estimates from modeled estimates in the proposed 2023 incidental take regulation (ITR) update (88 FR 916), or the most recent draft 2023 stock assessment report from the National Marine Fisheries Service (NMFS 2024).
[4]The mean abundance for Atlantic spotted dolphins is based on the oceanic population in the proposed 2023 ITR update (88 FR 916).
[5]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.
[6]The mean abundance for common bottlenose dolphins is based on the oceanic population in the proposed 2023 ITR update (88 FR 916).

6.1.2 Level B Harassment of Marine Mammals

Level B exposures, like the Level A exposures provided in **Section 6.1.1**, were calculated using the NMFS exposure estimation tool (NMFS, 2021) using the parameters provided in **Table 5**.

Exposures in **Table 7** assume the OBN and DAS survey will have a duration of 60 days and only one survey will be conducted under the scope of this Application.

Table 7. Maximum annual Level B exposures for the proposed ocean bottom node (OBN) and distributed acoustic sensing (DAS) survey estimated using the National Marine Fisheries (NMFS) draft exposure estimation tool (NMFS, 2021).

Common Name	Abundance[2]	Zone 5 Exposures	Zone 7 Exposures	Total Exposures	Maximum Population Affected
Low-frequency cetaceans					
Rice's whale[1]	37	3	0	3	7%
Mid-frequency cetaceans					
Sperm whale	3,007	334	61	394	13%
Atlantic spotted dolphin	1,782	315	0	315	18%
Beaked whale[4]	803	342	131	473	59%
Common bottlenose dolphin	9,672	766	2	767	8%
Clymene dolphin	4,619	459	165	624	14%
False killer whale	494	119	62	180	37%
Fraser's dolphin	1,665	54	28	82	5%
Killer whale	267	3	6	9	4%
Melon-headed whale	6,113	322	114	436	7%
Pantropical spotted dolphin	67,225	2,084	1,640	3,724	6%
Pygmy killer whale	613	75	55	129	21%
Risso's dolphin	1,501	138	28	167	11%
Rough-toothed dolphin	4,853	167	64	231	5%
Short-finned pilot whale	2,741	93	9	102	4%
Spinner dolphin	5,548	558	38	597	11%
Striped dolphin	5,634	179	86	265	5%
High-frequency cetaceans					
Kogia spp.[4]	980	102	30	132	14%

[1]The original 2021 rule (86 FR 5322) referred to the Bryde's whale (*Balaenoptera edeni*), and these whales were subsequently described as a new species, the Rice's whale (Rosel et al., 2021).
[2]Abundance estimates from modeled estimates in the proposed 2023 incidental take regulation (ITR) update (88 FR 916), or the most recent 2022 stock assessment report from the National Marine Fisheries Service (Hayes et al,. 2023).
[3]The mean abundance for Atlantic spotted dolphins is based on the oceanic population in the proposed 2023 ITR update (88 FR 916).
[4]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.
[5]The mean abundance for common bottlenose dolphins is based on the oceanic population in the proposed 2023 ITR update (88 FR 916).

6.2   REQUESTED TAKES

The Level B exposures provided in **Section 6.1.1** assume that the largest source array will be used for the entire OBN survey and that exposures will occur for the full duration of the survey. In actuality, animals would only be exposed to above-threshold noise for a portion of the survey duration. Additionally, the draft exposure estimation tool (NMFS, 2021) significantly overestimates exposures. Therefore, requested take needs to reflect more realistic exposure estimates. For this reason, takes for beaked whales have been revised to reflect a more realistic percentage of the population that would be taken during the proposed OBN and DAS survey activities. Requested takes for these species were adjusted to provide a more realistic expectation of the modeled exposures versus actual takes by harassment. The draft exposure estimation tool is not reflective of the proposed survey activities (e.g., uses an 8,000 in³ source array). However, the requested takes, even with adjustments, are still based on the modeling conducted for the

ITR. It is understood that an animal can only be taken once in a 24-hour period, and it is unlikely that animals will be taken every day throughout the 60-day survey. To maintain a conservative estimate, the largest mean group sizes reported in either Barkaszi and Kelly (2019) or Maze-Foley and Mullin (2006), both of which are referenced in the ITR (86 *FR* 5322), were used to estimate takes with the assumption that a maximum of two groups per day throughout the 60-day survey could potentially receive sound levels above Level B thresholds. Requested takes for OBN and DAS survey are provided in **Table 8**.

Table 8.   Requested Level B exposures for the proposed ocean bottom node (OBN) and distributed acoustic sensing (DAS) survey.

Common Name	Abundance[1]	Total Estimated Level B Exposures	Maximum Population Affected
Low-frequency cetaceans			
Rice's (Bryde's) whale[2]	37	3	7%
Mid-frequency cetaceans			
Sperm whale	3,007	394	13%
Atlantic spotted dolphin	1,782	315	18%
Beaked whale[3,4]	803	360	45%
Common bottlenose dolphin	9,672	767	8%
Clymene dolphin	4,619	624	14%
False killer whale	494	180	37%
Fraser's dolphin	1,665	82	5%
Killer whale	267	9	4%
Melon-headed whale	6,113	436	7%
Pantropical spotted dolphin	67,225	3724	6%
Pygmy killer whale	613	129	21%
Risso's dolphin	1,501	167	11%
Rough-toothed dolphin	4,853	231	5%
Short-finned pilot whale	2,741	102	4%
Spinner dolphin	5,548	597	11%
Striped dolphin	5,634	265	5%
High-frequency cetaceans			
Kogia spp.[4]	980	132	14%

[1]Abundance estimates from modeled estimates in the proposed 2023 incidental take regulation (ITR) update (88 FR 916), or the most recent 2022 stock assessment report from the National Marine Fisheries Service (Hayes et al., 2023).

[2]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 (Rosel et al., 2021).

[3]Requested takes for beaked whales were revised to reflect takes of two groups per day throughout the 60-day survey using mean group size from Barkaszi and Kelly (2019); and Maze-Foley and Mullin (2006), providing a more realistic expectation of the modeled exposures versus actual takes by harassment.

[4]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.

7.0   Effects on Marine Mammal Species or Stocks

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) and proposed 2023 ITR update (88 FR 916).

Effects of proposed seismic survey activities for a period of up to 10 years throughout the U.S. GOMx were assessed in the ITR, following the expert working group (EWG) framework developed by Southall et al. (2014). This framework considers the context within which acoustic exposures will occur, along with the vulnerability of individual marine mammal stocks, to determine the likelihood of stock-related population-level impacts. The results of this analysis found that the total take from proposed activities will have only negligible impacts on all affected GOMx marine mammal stocks. A more detailed explanation can be found in the published ITR (86 FR 5322). Furthermore, the revised 2023 ITR assessment (88 FR 916) also resulted in a negligible impact determination based on the updated information from the revised modeling (Weirathmueller et al., 2022) and marine mammal density information (Litz et al., 2023).

Given that the scope of activities proposed in this Application are less than that of the ITR, both the original (86 FR 5322) and the 2023 proposed update (88 FR 916), both in terms of spatial and temporal extent, the activities in this Application are expected to remain within this finding of only negligible impacts. The take estimates provided in **Section 6.1** represent estimates for the entirety of zones 5 and 7, when in actuality the proposed activities would only cover up to 1,751 km^2 for the survey, reducing the spatial extent of potential marine mammal encounters. Additionally, the take estimates do not account for mitigation which would be expected to negate any potential for Level A takes and reduce the risk of marine mammals experiencing biologically significant Level B harassment. Therefore, it is reasonable to assume that the project activities would not negatively affect stocks.

8.0 Minimization of Adverse Effects to Subsistence Uses

This section addresses NMFS' 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 or stock of marine mammal for subsistence uses. Consequently, there are no available methods to minimize potentially adverse effects to subsistence uses.

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) and the proposed 2023 ITR update (88 FR 916).

10.0   Anticipated Effects of Habitat Impacts on Marine Mammals

Anticipated effects of habitat impacts 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) and the proposed 2023 ITR update (88 FR 916).

11.0 Mitigation Measures

This section addresses NMFS' LOA requirement to assess the availability and feasibility (economic and technological) of methods and manner of conducting these proposed survey activities that have the least practicable impact upon affected species or stock, their habitat, and their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

The Applicant has demonstrated a strong commitment to minimizing impacts to marine mammal species through a comprehensive and progressive mitigation and monitoring program. The Applicating 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^3. These monitoring and mitigation measures were not revised or changed in the proposed 2023 ITR update (88 FR 916), and the only additional measures identified in the 2023 update include a process for adaptive management wherein NMFS, BOEM, the Bureau of Safety and Environmental Enforcement (BSEE), and the operators will participate in the adaptive management process through the annual comprehensive reports required of the LOA holders (detailed further in 88 FR 916).

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 (86 FR 5322) and the NMFS 2020 Biological Opinion and its appendices (NMFS, 2020), as they apply to the proposed survey activities.

This requirement is applicable only for activities that occur in Alaskan waters north of 60° N latitude. The proposed survey activities will not take place within the designated region and, therefore, will not have an adverse effect on the availability of marine mammals for subsistence uses. As such, there is no need to form such a plan.

The Applicant will comply with all monitoring and reporting guidelines provided in the published ITR (86 FR 5322) and the proposed 2023 ITR update (88 FR 916) as they pertain to Protected Species Observer and passive acoustic monitoring data, and reporting injured or dead marine mammal species.

14.0 Suggested Means of Coordinated Research

Relevant research efforts which may effectively supplement the monitoring and reporting requirements pursuant to issued LOAs are described in detail by NMFS in the published ITR (86 *FR* 5322) and the proposed 2023 ITR update (88 FR 916).

15.0   List of Preparers

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- Kayla Hartigan, Project Scientist

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50 Code of Federal Regulations (CFR) § 216.104. 2009. Submission of Requests.

86 Federal Register (*FR*) 5322. 2018. Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Geophysical Surveys Related to Oil and Gas Activities in the Gulf of Mexico. 19 January 2021.

88 Federal Register (*FR*) 916. 2023. Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Geophysical Surveys in the Gulf of Mexico. 5 January 2023.

Barkaszi MJ, Kelly CJ. 2019. Seismic survey mitigation measures and protected species observer reports: synthesis report. U.S. Department of the Interior, Bureau Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. Contract No.: M17PD00004. OCS Study BOEM 2019-012.

Bureau of Ocean Energy Management (BOEM). 2020. Notice to Lessees and Operators of Federal Oil and Gas, and Sulphur Leases in the Gulf Of Mexico Outer Continental Shelf: Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program. https://www.boem.gov/sites/default/files/documents/oil-gas-energy/BOEM-NTL-No-2016-G02.pdf. Effective Date: 30 September 2016. Reissued: 19 June 2020. 11 pp.

Litz J, Aichinger Dias L, Rappucci G, Martinez A, Soldevilla M, Garrison L, Mullin K, Barry K, Foster M. 2023. Cetacean and sea turtle spatial density model outputs from visual observations using line-transect survey methods aboard NOAA vessel and aircraft platforms in the Gulf of Mexico from 2003-06-12 to 2019-07-31. NOAA National Centers for Environmental Information. Dataset. https://doi.org/10.25921/efv4-9z56.

Maze-Foley K, Mullin KD. 2006. Cetaceans of the oceanic northern Gulf of Mexico: Distributions, group sizes and interspecific associations. Journal of Cetacean Research and Management 8(2): 203-213.

National Marine Fisheries Service (NMFS). 2023. National Marine Fisheries Service: Summary of Marine Mammal Protection Act Acoustic Thresholds. https://www.fisheries.noaa.gov/s3/2023-02/MMAcousticThresholds_secureFEB2023_OPR1.pdf. February 2024. 7 pp.

National Marine Fisheries Service (NMFS). 2020. Endangered Species Act, Section 7, Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources. 13 March 2020. 720 pp.

National Marine Fisheries Service (NMFS). 2021. Gulf of Mexico exposure estimation tool. Unpublished tool received with permission for use 21 May 2021.

National Marine Fisheries Service (NMFS). 2024. Draft 2023 Atlantic Marine Mammal Stock Assessment Report. https://www.fisheries.noaa.gov/s3/2024-01/Draft-2023-MMSARs-Public-Comment.pdf. February 2024. 317 pp.

Rosel PE, Wilcox LA, Yamada TK, Mullin KD. 2021. A new species of baleen whale (Balaenoptera) from the Gulf of Mexico, with a review of its geographic distribution. Marine Mammal Science 37(2):577-610.

Southall BL, Ellison WT, Clark CW, Tollit D. 2014. Analytical Framework for Assessment Potential Effects of Seismic Airgun Surveys on Marine Mammals in the Gulf of Mexico (GOMEX). Expert Working Group (EWG) Final Report. 55 pp.

Weirathmueller M., Zammit K, Koessler M, Zeddies D. 2022. Memo: Gulf of Mexico Exposure Estimation. Jasco Applied Sciences. 16 pp. https://www.fisheries.noaa.gov/s3//2023-01/GOM_RuleRevision_2022%20Acoustic%20Modeling%20Update_OPR1.pdf.

Wood J, Southall BL, Tollit DJ. 2012. PG&E offshore 3-D Seismic Survey Project EIR – Marine Mammal Technical Draft Report. SMRU Ltd. SMRUL-NA0611ERM. 124 pp.

Zeddies DG, Zykov M, Yurk H, Deveau T, Bailey L, Gaboury I, Racca R, Hannay D, Carr S. 2015. Acoustic Propagation and Marine Mammal Exposure Modeling of Geological and Geophysical Sources in the Gulf of Mexico: 2016-2025 Annual Acoustic Exposure Estimates for Marine Mammals. Technical Report by JASCO Applied Sciences for the U.S. Department of the Interior, Bureau of Ocean Energy Management. JASCO Document 00976, Version 3.0. 385 pp.