Angie Batchelor
Environmental & Social Seismic Advisor
Production & Operations
Gulf of Mexico

BP Exploration & Production Inc.
501 Westlake Park Blvd.
Houston, Texas 77079
Telephone: 281-658-7305
Email: angie.batchelor@bp.com

July 25, 2024

Data Acquisition and Special Projects Unit (DASPU)
Attn: Ms. Teree Campbell - Supervisor
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd.
New Orleans, LA 70123

Re: BP Exploration & Production Inc. – Program Modification for Permit #T24-002 to Conduct Geophysical Exploration on Outer Continental Shelf Gulf of Mexico Central Planning Area in the Paleogene (Triple G) 2024 OBN Survey

Ms. Campbell:

BP Exploration & Production, Inc. (bp) requests approval of a program modification for Permit #T24-002 to Conduct Geophysical Exploration on the Outer Continental Shelf Gulf of Mexico Central Planning Area in the Keathley Canyon, Garden Banks, East Breaks and Alaminos Canyon OCS blocks (Triple G that includes the prospect areas of Guadalupe, Gila and Gibson). bp proposes to commence this survey on or about September 1, 2024.

This program modification to Permit #T24-002 provides for the additional option for bp to use as an alternative option of conventional airguns for the seismic source to conduct the OBN survey. The current permit provides for the use of Gemini as the source but bp would like the option to modify Permit #T24-002 for the alternative option of using conventional airguns if bp decides not to use Gemini. One of the two seismic sources, Gemini or conventional airguns, will be chosen by bp to be used in this OBN survey and will notify your office no later than 30 days of the first production shot.

The conventional source of 4470 cu.in. with source depth at 12m, tow depth 50m apart. Enclosed is the relevant data and information for this program modification to Permit #T24-002.

If you have any questions, please contact me at (281) 658-7305 or angie.batchelor@bp.com.

Sincerely,

Angie Batchelor

Angie Batchelor
GoM Environmental & Social Seismic Advisor

Below is the updated table for BOEM Form-0327

Energy Source	Manufacturer	Model	Airgun size (cu. In)	Source Level (SL) in dB re 1µPa@1m in water (RMS)	Source Level (SL) in dB re 1µPa@1m in water (Peak to Peak)	frequency range	Ping Duration/cycle	Ping rate
Air guns	TGS	Gemini	8000	220	247	up to 204 Hz	impulse	8 seconds
Air Guns	Teledyne	1900LXXT	4430	239	266	Up to 204 Hz	Impulse	8 seconds
Pressure inverted Echo sounder	Sonardyne	PIES		190 to 202		14 to 20Khz		10 minutes

Basic array report

Technical Overview

The following report was compiled using the Gundalf source array modelling program.

Gundalf has been calibrated for all modern airgun types including the latest environmental e300 and e500 sources, long-life guns, G guns, and sleeve guns both singly and in clusters. Gundalf users can access calibration information directly within the product in a variety of environments. Gundalf calibration is revisited periodically whenever new data becomes available. The current calibration epoch is given in the header of this report. For more information

From 2022 it can optionally model a growing number of alternative types, including some sparkers, boomers and marine vibrators.

Array Summary

The following table optionally includes error bounds for the primary characteristics of the source signature where relevant: peak to peak, primary to bubble and bubble period. Error bounds for airguns are derived during calibration where possible, a time-consuming process involving optimally matching the model to many near- and far-field measurements of different quality, bandwidth and provenance, for both single and clustered airguns. Error bounds are not normally available for other source types modelled by Gundalf. For more on this, see the Modelling Notes at the end of this report and also the online help for calibration in Gundalf itself.

Note that it is important to state the conditions under which the RMS is computed since it depends directly on the length of the window used. Here an energy criterion determines the length when less than the full window must be used, specified as a precentage of the energy in the full window as is the case with drop-out computations. The energy window used is indicated in the table.

Note also that some of these parameters, most obviously the peak measurements will depend on the maximum model bandwidth, which is shown for reference. In addition some parameters for example those associated with bubbles are difficult to define for some source types

Where given, the error bounds shown in the table represent 95% confidence intervals for the Gundalf model against its calibration data.

Amplitude spectral scaling uses Parseval-compliant method throughout.

Number of guns	28 (4430.00 cu.in., 72.59 litres)
Peak to peak in bar-m.	193.5 (19.35 MPa, 266 dB re 1muPa. at 1m.)
Zero to peak in bar-m.	93.3 (9.33 MPa, 259 dB re 1muPa. at 1m.)
RMS pressure in bar-m. (full window)	9.30 (0.930 MPa, 239 dB re 1muPa. at 1m.)
Primary to bubble (peak to peak)	11.4
Bubble period (s.)	0.049
Maximum spectral ripple (dB)	49 (10 - 70 Hz.)
Maximum spectral value (dB)	220 (10 - 70 Hz.)
Average spectral value (dB)	212 (10 - 70 Hz.)
Total acoustic energy (Joules)	802135.1
Total acoustic efficiency (%)	80.1
Maximum model bandwidth (Hz)	0-1024

Array geometry

The following table lists all the guns modelled in the array along with their characteristics. Please note the following:-

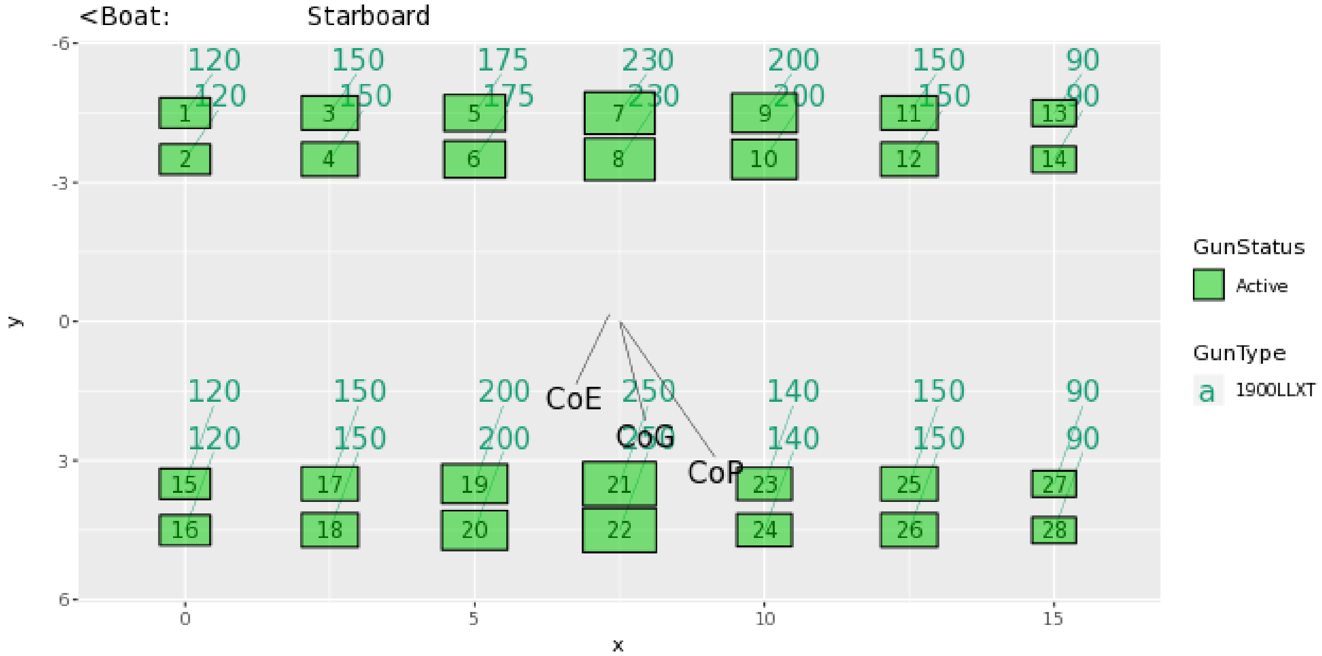
- The peak to peak varies only as the cube root of the volume for the same gun type so that even small guns contribute significantly. This is particularly relevant to drop-out analysis.
- The peak to peak can also be depressed due to clustering effects as reported long ago by Strandenes and Vaage (1992), "Signatures from clustered airguns", First Break, 10(8).
- The zero to peak is approximate and estimated from the peak to peak.
- A wave-shape kit value less than 1 indicates a wave-shape kit is implemented. This may impact the quality of calibration due to the paucity of relevant data.

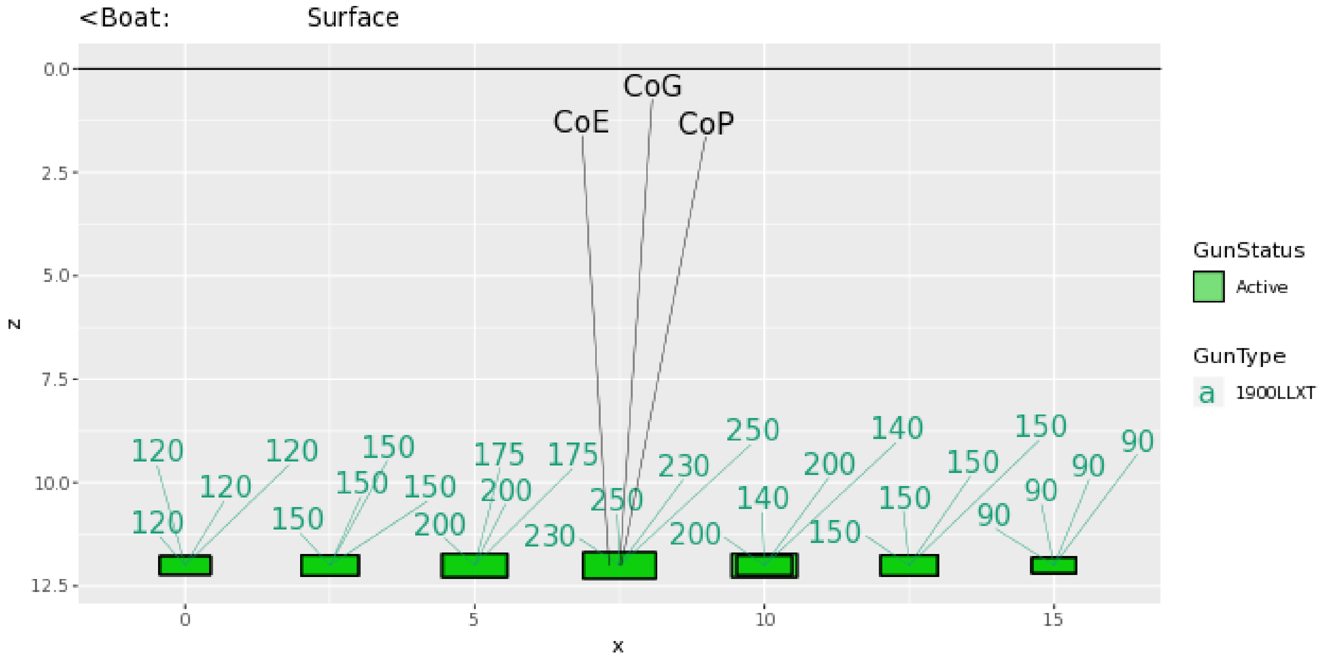
Gun number	Press. (psi)	Volume (cu.in)	Gun Type	x (m.)	y (m.)	z (m.)	Delay (s.)	Wave-Shape kit	Sub-array number	Peak to peak contrib. (percent)	Zero to peak contrib. (bar-m.)	Max. bub. rad (m.)	Source Type
1	2000.00	120.00	1900LLXT	0.000	-4.500	12.000	0.0000	1.00	1	3.8	3.6	0.3	Airgun
2	2000.00	120.00	1900LLXT	0.000	-3.500	12.000	0.0000	1.00	1	3.8	3.5	0.3	Airgun
3	2000.00	150	1900LLXT	2.500	-4.500	12.000	0.0000	1.00	1	3.6	3.4	0.4	Airgun
4	2000.00	150	1900LLXT	2.500	-3.500	12.000	0.0000	1.00	1	3.6	3.3	0.4	Airgun
5	2000.00	175.00	1900LLXT	5.000	-4.500	12.000	0.0000	1.00	1	3.5	3.2	0.4	Airgun
6	2000.00	175.00	1900LLXT	5.000	-3.500	12.000	0.0000	1.00	1	3.5	3.2	0.4	Airgun
7	2000.00	230.00	1900LLXT	7.500	-4.500	12.000	0.0000	1.00	1	3.2	3.0	0.5	Airgun
8	2000.00	230.00	1900LLXT	7.500	-3.500	12.000	0.0000	1.00	1	3.2	3.0	0.5	Airgun
9	2000.00	200.00	1900LLXT	10.000	-4.500	12.000	0.0000	1.00	1	3.4	3.1	0.4	Airgun
10	2000.00	200.00	1900LLXT	10.000	-3.500	12.000	0.0000	1.00	1	3.3	3.1	0.4	Airgun
11	2000.00	150	1900LLXT	12.500	-4.500	12.000	0.0000	1.00	1	3.6	3.4	0.4	Airgun
12	2000.00	150	1900LLXT	12.500	-3.500	12.000	0.0000	1.00	1	3.6	3.4	0.4	Airgun
13	2000.00	90.00	1900LLXT	15.000	-4.500	12.000	0.0000	1.00	1	3.9	3.6	0.3	Airgun
14	2000.00	90.00	1900LLXT	15.000	-3.500	12.000	0.0000	1.00	1	3.9	3.6	0.3	Airgun
15	2000.00	120.00	1900LLXT	0.000	3.500	12.000	0.0000	1.00	2	3.8	3.5	0.3	Airgun
16	2000.00	120.00	1900LLXT	0.000	4.500	12.000	0.0000	1.00	2	3.8	3.6	0.3	Airgun
17	2000.0	150	1900L	2.500	3.500	12.00		1.00	2	3.6	3.3	0.4	Airgun

Gun number	Press. (psi)	Volume (cu.in)	Gun Type	x (m.)	y (m.)	z (m.)	Delay (s.)	Wave-Shape kit	Sub-array number	Peak to peak contrib. (percent)	Zero to peak contrib. (bar-m.)	Max. bub. rad (m.)	Source Type
	0		LXT			0	0.0000						
18	2000.00	150	1900LLXT	2.500	4.500	12.000	0.0000	1.00	2	3.6	3.4	0.4	Airgun
19	2000.00	200.00	1900LLXT	5.000	3.500	12.000	0.0000	1.00	2	3.3	3.1	0.4	Airgun
20	2000.00	200.00	1900LLXT	5.000	4.500	12.000	0.0000	1.00	2	3.4	3.1	0.4	Airgun
21	2000.00	250.00	1900LLXT	7.500	3.500	12.000	0.0000	1.00	2	3.2	3.0	0.5	Airgun
22	2000.00	250.00	1900LLXT	7.500	4.500	12.000	0.0000	1.00	2	3.3	3.1	0.5	Airgun
23	2000.00	140.00	1900LLXT	10.000	3.500	12.000	0.0000	1.00	2	3.6	3.3	0.4	Airgun
24	2000.00	140.00	1900LLXT	10.000	4.500	12.000	0.0000	1.00	2	3.6	3.4	0.4	Airgun
25	2000.00	150	1900LLXT	12.500	3.500	12.000	0.0000	1.00	2	3.6	3.3	0.4	Airgun
26	2000.00	150	1900LLXT	12.500	4.500	12.000	0.0000	1.00	2	3.6	3.4	0.4	Airgun
27	2000.00	90.00	1900LLXT	15.000	3.500	12.000	0.0000	1.00	2	3.9	3.6	0.3	Airgun
28	2000.00	90.00	1900LLXT	15.000	4.500	12.000	0.0000	1.00	2	3.9	3.6	0.3	Airgun

Array plan and side views

The plan and side views appear below. These are annotated for gun type (colour of floating text indicating volume in cuin. for airguns), gun active status (fill colour) and also gun number, matching the table above. The side view is a view from the port side towards the starboard side and shares the same x-axis as the plan view. This is annotated identically to the plan view.





Array centres

In the plan and side views of the array above, the array geometric centre (CoG), the centre of pressure (CoP) and the centre of energy (CoE) are shown. They are defined as follows:-

- The array geometric centre is defined to be the arithmetic mean of the x,y,z positions for each gun (non-active guns are ignored).
- The centre of pressure is defined to be the array centre when each active gun position is weighted by its contribution to the overall peak to peak pressure value.
- The centre of energy is computed by weighting the coordinates by the self-energy of the active gun at that position. In an interacting array this may be a long way from the centre of pressure as some guns may absorb energy giving a negative self-energy.

Depending on how first breaks are calculated, these can be used for first break analysis.

Spare guns are shown as blue rectangles whilst live guns are shown as green rectangles.

Note that Gundalf by default uses the deepest gun to define time zero for the vertical far-field and it uses the nearest gun to the observation point to define time zero if an observation point is specified. This means that if one gun is accidentally run deep, this will cause the bulk of the signature to appear to be delayed. It is still a matter of debate how an airgun array should be timed. There are several candidates as defined above but it is not currently clear which if any is appropriate in complex scenarios such as Ocean Bottom Deployment. Positions are shown as (x,y,z).

CoG coordinates (m.)	CoP coordinates (m.)	CoE coordinates (m.)
(7.50, 0.00, 12.00)	(7.53, 0.02, 12.00)	(7.32, -0.15, 12.00)

Acoustic energy characteristics

The following table lists the individual gun contributions to the acoustic energy field in joules. A negative value means the gun is actually absorbing energy. This is very common in interacting arrays. It does not however mean that the gun is damaging the array performance. Rather it is acting as a catalyst to allow the other guns to perform more efficiently. The total acoustic energy gives the true performance of the array as a whole. See Laws, Parkes and Hatton (1988) Energy-interaction: The long-range interaction of seismic sources, Geophysical Prospecting (36), p333-348 and 38(1) 1990 p.104 for more details. Note that internal energy is not included in the data below. The true acoustic efficiency of airgun arrays was typically less than 5 percent of the total initial energy until gun clustering became common and the efficiency is now often above 25 percent.

Overall acoustic energy contribution

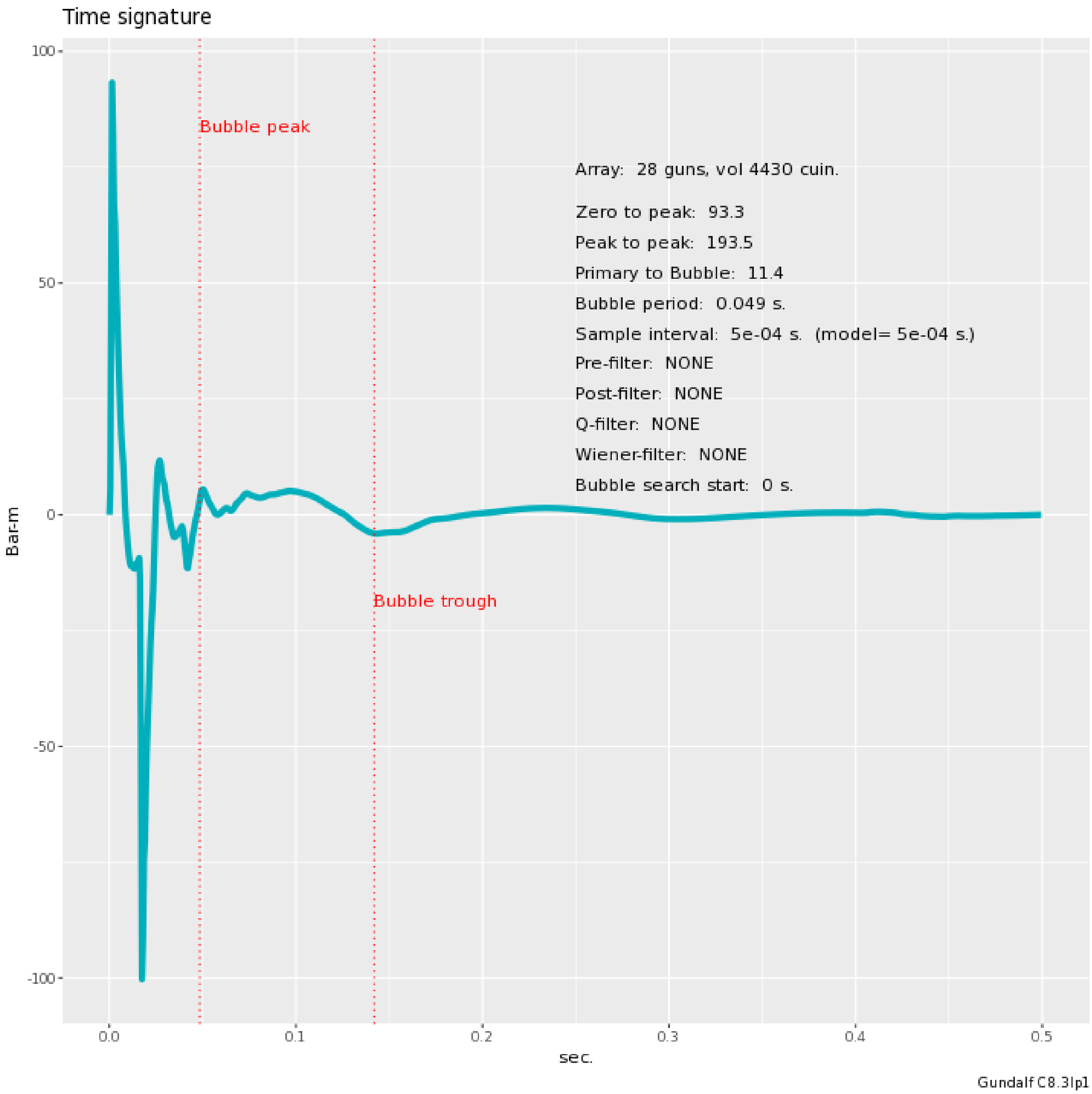
Total acoustic energy output (j.)	Acoustic energy output due to energy-interaction (j.)	Total potential energy available in array(j.)	Percentage of total potential energy appearing as acoustic energy
802135.1	55824.9	1001981.0	80.1

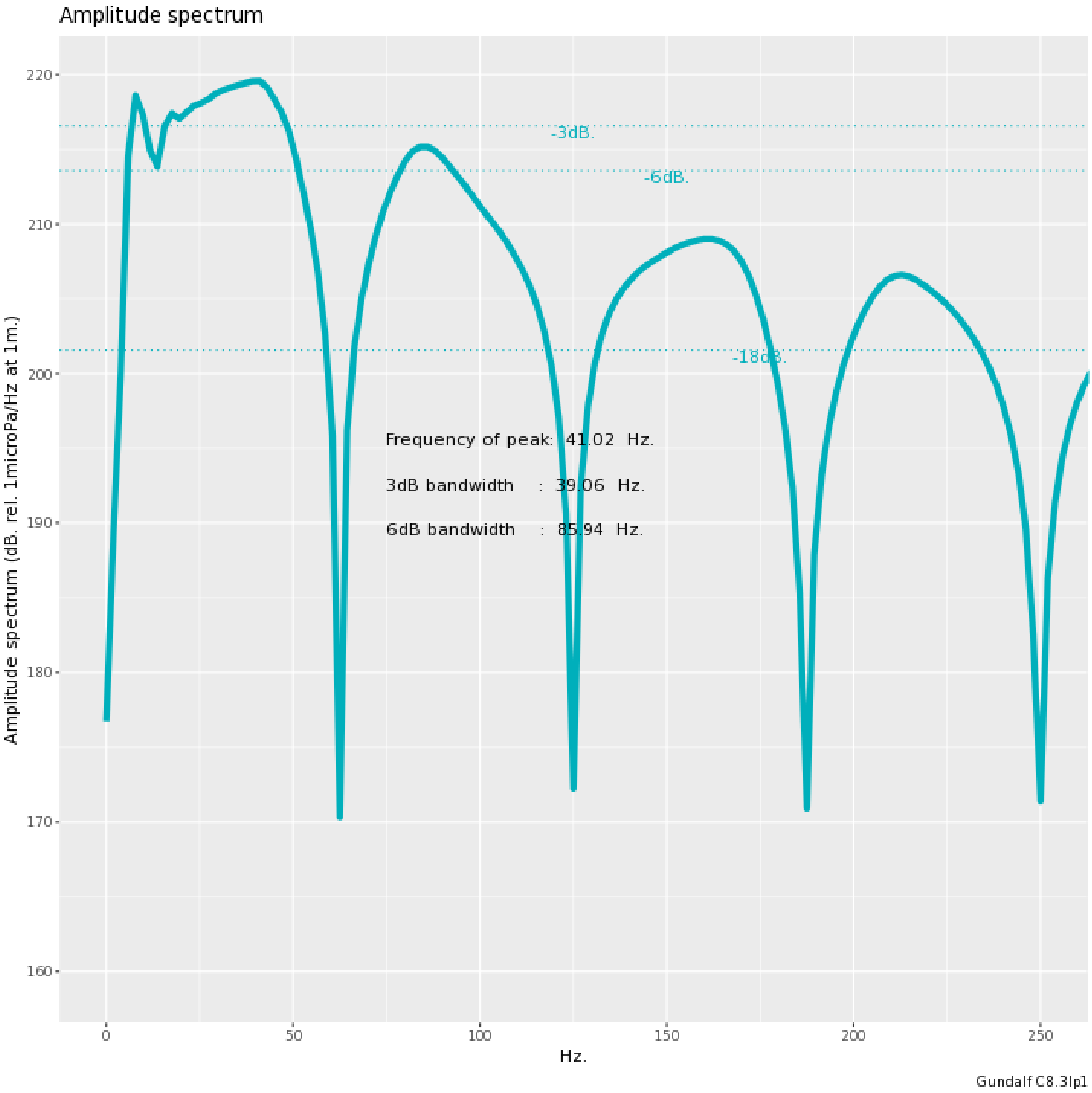
Individual acoustic energy contributions

Volume (cuin)	x (m.)	y (m.)	z (m.)	Acoustic energy contribution (j.)
120.0	0.00	-4.50	12.00	41055.2
120.0	0.00	-3.50	12.00	41471.7
150.0	2.50	-4.50	12.00	40075.4
150.0	2.50	-3.50	12.00	39889.3
175.0	5.00	-4.50	12.00	31274.0
175.0	5.00	-3.50	12.00	30370.8
230.0	7.50	-4.50	12.00	699.6
230.0	7.50	-3.50	12.00	-2436.6
200.0	10.00	-4.50	12.00	21892.1
200.0	10.00	-3.50	12.00	20361.5
150.0	12.50	-4.50	12.00	39679.6
150.0	12.50	-3.50	12.00	39530.1
90.0	15.00	-4.50	12.00	35718.3
90.0	15.00	-3.50	12.00	36374.7
120.0	0.00	3.50	12.00	41318.2
120.0	0.00	4.50	12.00	41052.5
150.0	2.50	3.50	12.00	40821.2
150.0	2.50	4.50	12.00	41203.2
200.0	5.00	3.50	12.00	25716.1
200.0	5.00	4.50	12.00	27909.3
250.0	7.50	3.50	12.00	-38034.7
250.0	7.50	4.50	12.00	-30769.0
140.0	10.00	3.50	12.00	44167.0
140.0	10.00	4.50	12.00	44129.9
150.0	12.50	3.50	12.00	37572.6
150.0	12.50	4.50	12.00	37914.4
90.0	15.00	3.50	12.00	36836.6
90.0	15.00	4.50	12.00	36341.9
The red entries denote guns which are catalysing the array by absorbing energy.				

Signature

This section shows the time signature and the amplitude spectrum of the modelled array. The bubble period was determined automatically. The bubble start time was input as 0s. The computed positions of the bubble peak and bubble trough are shown for QC purposes. If these do not match your visual estimate of the bubble, for example, if the filter you are using delays the peak somewhat, try again specifying your own bubble search start time, relative to time zero. The amplitude spectrum plot comprises two separate displays. One curve shows the amplitude spectrum itself in units of dB. relative to 1 microPa. per Hz. at 1m. If selected, the curve in red follows the SEG guidelines and shows the energy flux in dB. relative to 1 Joule/m^2/Hz. at 1m.




Amplitude spectrum
-3dB.
-6dB.
-18dB.
Frequency of peak: 41.02 Hz.
3dB bandwidth : 39.06 Hz.
6dB bandwidth : 85.94 Hz.
Amplitude spectrum (dB. rel. 1microPa/Hz at 1m.)
220
210
200
190
180
170
160
0
50
100
150
200
250
Hz.
Gundalf C8.3lp1

Modelling Summary

The following table lists the modelling parameters for the array quoted in various commonly used units for convenience.

General parameters ...	
Sample interval (s.)	0.0005
Modelling sample interval (s.)	0.0005
Number of samples in signature	1000
Duration of signature (s.)	0.500
Observation point	Infinite far-field
Gun controller variation (s.)	0
Pre-filter parameters ...	
Anti-alias/instrument filtering	No band pass pre-filter applied
Post-modelling parameters ...	
Band-pass filtering	No band pass filter applied
Q filtering	No Q filtering applied
Wiener filtering	No Wiener filtering applied

Signature filtering details

The details of any pre- or post-processing band-pass filters which have been requested for a Gundalf model, are shown here with filter information sheets. Special filters such Q or Wiener filtering are applied to the output signature if requested but do not have filter information sheets.

Pre-Filtering Impulse Response and Amplitude Spectrum

No pre-processing filtering was applied.

Post-Filtering Impulse Response and Amplitude Spectrum

No post-processing filtering was applied.

Signature filtering policy

For marine environmental noise reports, Gundalf performs no signature filtering other than anti-alias filtering in the modelling engine itself, along with any requested marine animal weighting functions.

For all other kinds of reports, Gundalf performs filtering in this order:-

- If a pre-conditioning filter is chosen, for example, an instrument response, it is applied at the modelling sample interval.
- If the output sample interval is larger than the modelling sample interval, Gundalf applies appropriate anti-alias filtering. (This can be turned off in the event that anti-alias filtering is included in the pre-conditioning filter, in which case Gundalf will issue a warning.)
- Finally, Gundalf applies the chosen set of post-filters, Q, Wiener and band-pass filtering as specified, at the output sample interval. If none are specified, (often known as unfiltered), only the above anti-alias and/or pre-conditioning are applied.

In reports, when filters are applied, they are applied to the notional sources first so that signatures, directivity plots and spectra are all filtered consistently. The abbreviation muPa is used for microPascal throughout.

Finally note that modelled signatures always begin at time zero for reasons of causality.

Physical parameters

The following table gives the values of the physical parameters used where relevant. The sea temperature, velocity of sound in sea water, wavelet dominant frequency and average wave height were input parameters.

The surface reflection coefficient was entered directly.

The physical parameters used were:-

Sea temperature (deg.C)	Velocity of sound in water (m.sec-1)	Wavelet dominant frequency (Hz.)	Average wave height (m.)	Surface reflection coeff.
10	1496	20	0	-1

Some notes on the modelling algorithm

The Gundalf airgun modelling engine is the end-product of 20 years of state of the art research. It takes full account of all air-gun interactions including interactions between sub-arrays. No assumptions of linear superposition are made. This means that if you move sub-arrays closer together, the far-field signature will change. The effect is noticeable even when sub-arrays are separated by as much as 10m. The engine is capable of modelling airgun clusters right down to the 'super-foam' region where the bubbles themselves collide and distort.

Calibration notes

Airgun modelling programs like Gundalf must be calibrated against real data and no computational model is any better than the quality of that calibration. Calibration datasets however are themselves subject to experimental error so Gundalf is calibrated to best fit the various datasets which are used across the extensive range of volumes, pressures and depths available.

In practice, such experimental errors arise for a variety of reasons including

- Depth inaccuracies. These are usually around 3-5% even in the best facilities particularly if there is sea surface movement.
- How frequently the gun is being cycled during measurement. This is rarely recorded but a warmed up gun might be 50deg C warmer than the sea, changing its normal peak-to-peak and other parameters by 5-10% compared with when it is first fired.
- Filtering differences. Filtering is recorded but filtering errors are still more frequent than we would like and analog filter v. digital filter differences are also sometimes a factor.

As a guideline, typical individual errors across different measurement datasets for the best-calibrated guns are of the order of 5% for peak to peak, 15% for primary to bubble and 2% for bubble periods.

Individual gun errors are calculated from the data shown in Help -> Calibration (which themselves accumulate gun data from different sources) and the resulting array error bounds are calculated by accumulating these errors for each gun in the array. The error bounds are calculated as 95% error bounds and for simplicity assume that errors are non-correlated although in practice some are systematic. The total error bound is always greater than any of the individual error bounds and is strongly influenced by the largest gun contributions.

The error bounds simply mean that *it is very likely that the true values for these primary characteristics will be within the ranges shown, but it is not possible to be more precise.* If other comparison data or models indicate values outside this range, this means that those data or models are very likely to be *incompatible* with Gundalf's calibration data. This may be due to several causes as described above. For more on calibration see Gundalf's calibration Help pages.

LETTER OF AUTHORIZATION APPLICATION

Requested period of effectiveness:

Start date: August 1st ,2024
End date: February 14th, 2025

A- Type of Survey

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

_X_ 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):

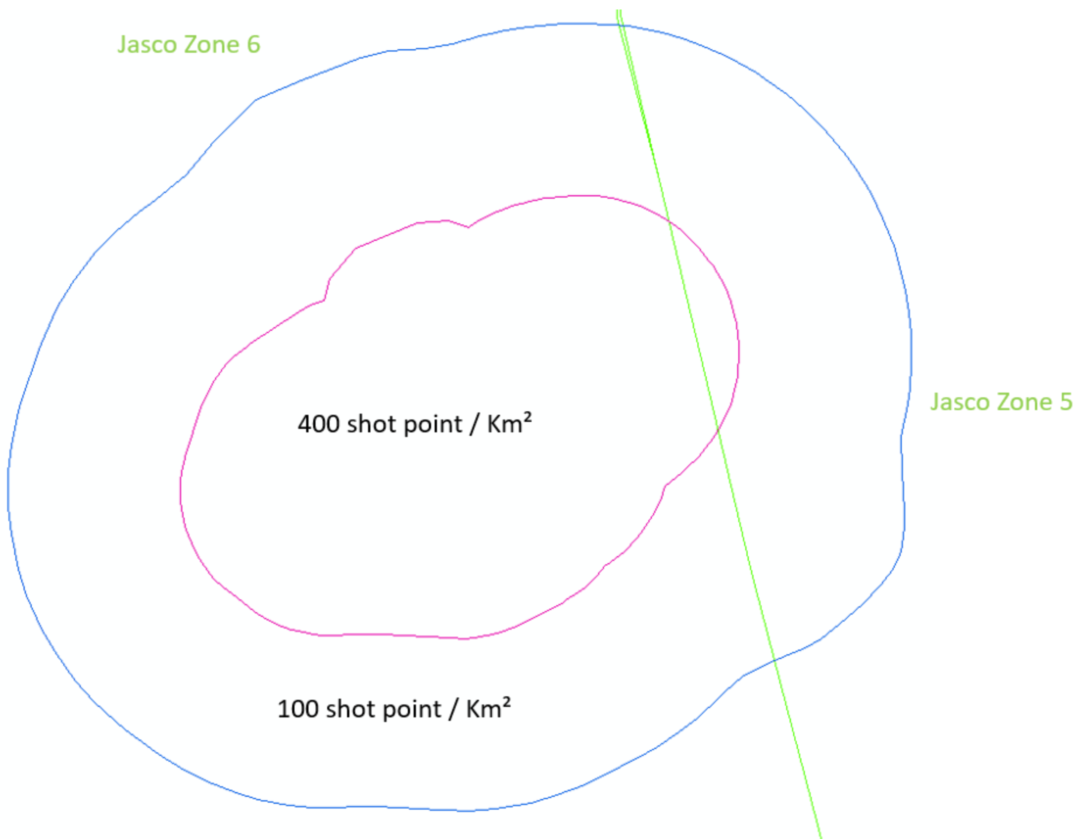
B Survey area and operational plan

Question:	Response:
Location: (lease block, facility or prospect name, lat/lon, etc.)	Alaminos Canyon, Garden Banks, Keathley Canyon and East Breaks.
Overall duration of the activity: (days from mobilization to demobilization):	142 days
Areal extend of the survey area: (in OCS lease blocks or Km² (Attach GIS file of the survey lines and/or survey area perimeter)	~325 OCS blocks – 7,500 Km² 579 impacted blocks – Area of source polygon on permit is 12233 sq km Shape file attached separately.
Water depth range: Node polygon water depth: Source Polygon water depth:	1,000 - 2,500 m 2800' – 5300' 1900' – 7100'
G&G ITR / PIES modeling zone(s) in which the activity will occur (1-7):	12.41 days in zone 5. 53.59 days in zone 7.
Number of days during the overall activity period on which the sound sources listed in section C will operate:	66 days

C Sound sources

The seismic source types use during this survey will be Gemini 8000 in³. 3 Gemini source are towed behind each source vessel, 2 source vessels will be used for this survey.

Gemini airgun arrays will fire using a conventional flip-flap-flop method every 24 seconds or 8 seconds between each source fire time. The source firing sequence will create a source density of 400 shot point per Km² for the regular density and 100 shot point per Km² for the low source density. The 2 source vessels separation distance will never be less than 1000 m.



4 PIES will be deployed in the survey area; their location is within the regular density area.

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 10 minutes	Placed on seabed	Placed on seabed	120 days
Extended Frequency Source	TGS	Gemini	8000 in3	~220 dB	~243 dB	0-100 Hz		24 pulse / minute	8 m	OBN receivers on seabed	66 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 300 m apart and up to 90 km in length. The source vessels will optimize line turns using a “racetrack” or “teardrop” pattern to sail on adjacent or nearby lines 300 m apart while maintaining a separation of >1.0 km between the source vessels. If survey activities occurred throughout the entire survey area of 7,500 km2 over the course of 66 days, the average area covered per day would be 113.63 km2. Therefore, the Coil Survey Type is the closest match to this survey.

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: