April 30, 2020

**To**
Instituto Brasiliero do Meio Ambiente e dos Recursos Naturais Renovaveis - IBAMA
Coordenacao de Exploracao e Producao - COEXP

Ref.: Public Consultation on Oil and Gas Reference Matrix - Seismic - 1st Stage

**RE: Suggestions to the draft Oil and Gas Reference Matrix - Seismic**

Dear Sirs,

The IAGC appreciates the opportunity to present comments to the Oil and Gas Reference Matrix related to seismic acquisitions. We would like to start highlight that the existence of a standard matrix for impact assessment for reference in the permitting is a very positive initiative, from which all parties involved in permittin may benefit, and may thus contribute to the quality of studies, as well as to the objectivity and agility of licensing.

Founded in 1971, The International Association of Geophysical Contractors (IAGC) is the global trade association for the geophysical and exploration industry, the cornerstone of the energy industry. The IAGC optimizes the business and regulatory climate and enhances public understanding to support a strong, viable geophysical and exploration industry essential to discovering and delivering the world's energy resources.

The IAGC works vigorously on behalf of its members to advance the industry's freedom to operate. Considered to be the most credible and effective voice for promoting and ensuring a safe, environmentally responsible and competitive geophysical industry, the IAGC engages governments and stakeholders worldwide on issues central to geophysical operations and exploration access.

With more than 80 companies in nearly 50 countries, our membership includes onshore and offshore survey operators and acquisition companies, data and processing providers, exploration and production companies, equipment and software manufacturers, industry suppliers, and service providers.

Seismic surveys are the only feasible technology available to accurately image the subsurface before a single well is drilled. For the energy industry, modern seismic imaging reduces risk by increasing the likelihood that exploratory wells will successfully tap hydrocarbons and decreasing the number of wells that need to be drilled in a given area, reducing associated safety and environmental risks and the overall footprint for exploration. Because survey activities are

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temporary and transitory, it is the least intrusive and most cost-effective means to understanding where recoverable hydrocarbons likely exist offshore and onshore all over the world.

In general terms, before commenting by topic below, we would like to strongly recommend that the Matrix will have an introduction clarifying that the document is for reference and that not all mitigations measures will be applied to all activities. We suggest making clear that the mitigation measures will be applied on a case-by-case basis, as a result of the specific analysis to the specific permitting. Likewise, to clarify that the list of mitigation measures does not intent to present all possible projects and that projects not listed may be requested depending upon the sensitivity of the areas and periods.

Apart from that, we understand that in this stage of the effort the mitigation measures are not going to be detailed, but instead in the second and third stage. Otherwise we would suggest mentioning in the Matrix the applicable Guides and Technical Notes in each specific item.

The Association supports with enthusiasm this effort and as announced in the Public Consultation webpage, the upcoming development and publication of guides aiming to: *"(i) promote more technical security for analyzes and decisions ii) provide more transparency to LAF procedures; iii) reduce the discretion of the entrepreneur and the licensing body; and iv) increase the predictability of the licensing process"*

Please find below our comments to the Matrix by topic:

**1. PLANNING**
**1.1. Environmental licensing and preparation of environmental studies**
1.1.1. Preparation and dissemination of the Terms of Reference
1.1.1.1. Mobilization of civil society and participation of intervening bodies

Although the participation of the civil society is fundamental to the transparency of the permitting process, the experience leads us to believe that this should happen as usual at a later stage, with the presentation of the EIA. Bringing forward the public participation may be detrimental to the permitting by causing delays or generating false expectations to the population that may not be able to understand the activities and its impacts without the Environmental Study, not ready at this stage yet.

**2. OPERATION**
2**.1. Mobilization and support activities**
**2.1.1. Demand for labor**
2.1.1.1. Generation of direct and indirect employment
2.1.1.1.1. Temporary increase in the employed population
2.1.1.1.1.1. Prioritize hiring local labor

Following IBAMA's suggestion in the Technical Opinions the environmental aspect "generation of direct and indirect employment" was excluded in the past from the impact assessments. That was

due to the fact that the seismic activity is temporary and transient generating little or insignificant hiring of labor. The presentation of this aspect in the studies can generate false expectations to the population.

**2.1.2. Demand for goods, supplies and services**
2.1.2.1. Transport of goods, inputs and waste
2.1.2.1.1. Increased pressure on maritime, port, air and road traffic
2.1.2.1.1.1. Provide qualified information to the population and municipalities
2.1.2.1.1.2. Plan operations to minimize interference with existing traffic

Regarding **2.1.2. Demand for goods, supplies and services** please consider the same comment as the previous topic about generating false expectations to the populations.

**2.2. Seismic data acquisition**
2.2.1. Seismic vessel operation and movement

As a general comment we suggest changing the title of item 2.2.1 to **"Operation and movement of vessels involved in the activity"**. The macro activity, activity, aspects and impacts described in "item 2.2.4. Operation and movement of support vessels and assistants are the same as this item and duplication can lead to confusion, redundancy or information conflict.

**2.2.1.1. Risk of introduction and dispersion of invasive alien species**
2.2.1.1.1. Reduction of the diversity of native species
2.2.1.1.1.1. Implement ballast water management measures

We would like to remind that according to NT 01/11 (Pollution Control Project), there are no ballast water management measures for vessels involved in the seismic activities. The vessels follow MARPOL's instructions for ballast water.

Regarding topics **2.2.1.2. Discharge of oily effluents and drainage waters**; **2.2.1.3. Discharge of sanitary effluents, wastewater and organic waste; 2.2.1.4. Generation of solid and oily waste** and **2.2.1.5. Air emissions,** we understand that the instructions for waste and effluents management will be included during the second and third stages of the initiative, with the publication of new guides or reference to existent ones.

**2.2.1.6 Generation of area restriction**
2.2.1.6.1. Reduction of the area available for fishing
2.2.1.6.1.1. Avoid sensitive areas and periods for fishing activity

In relation to this topic we would like to recommend making it clear that the measures are related and applicable to **artisanal and subsistence** fishing only (not commercial) as per below:

2.2.1.6 Generation of area restriction for **artisanal and subsistence fishing**
2.2.1.6.1. Reduction of the area available for **artisanal and subsistence** fishing
2.2.1.6.1.1. Avoid sensitive areas and periods for **artisanal and subsistence** fishing activity

**2.2.1.7. Risk of collision with vessels or fishing gear**
2.2.1.7.1. Damage to equipment and people
2.2.1.7.1.1. Avoid sensitive areas and periods for fishing activity
2.2.1.7.1.2. Implement communication measures on land and at sea
2.2.1.7.1.3. Make reparation for accidental damages

Please consider changing topic **2.2.1.7.1.3. Make reparation for accidental damages** to **2.2.1.7.1.3. Make reparation for proven material direct damages to fishing boat and fishing gears caused by accident during the activities.**

As responsible business partners, IAGC members are engaged during all stages of their operations to make reasonable efforts to limit the potential impacts of exploration projects on fish and fishing activities, respecting the specific time exclusions specified by governments and maintaining open communication with the communities in the areas.

Regulatory requirements and customary practices may vary in different fisheries, regions and operational contexts. Therefore, a single set of recommended practices would not be appropriated. IAGC has solicited from its members a variety of options for facilitating successful interaction with local, commercial, recreational and subsistence fisheries and developed a checklist. From this checklist, IAGC members may select those actions appropriate for the relevant jurisdiction and most likely to lead to success.

This options checklist is useful for industry where there are no processes defined through regulation in the country of operations and may contribute a supplementary source of related procedures. IAGC members may choose to utilize the checklist for informing their interactions with fishery interests and with regulators.

**2.2.1.8. Risk of collision with marine fauna**
2.2.1.8.1. Death or injury to marine fauna
2.2.1.8.1.1. Monitor marine biota
**2.2.1.8.1.2. Perform beach monitoring**

Following our general comment in the first part of this letter on the understand that the exceptional mitigation measures (Beach Monitoring, Aerial and Satellite Monitoring, Generate knowledge about the impact to reduce uncertainties) established in the Matrix will be request on case-by-case basis, depending on the sensitivity of the area and period. Therefore, we suggest including “if applicable” in such cases, as pointed below:

2.2.1.8.1.2. Perform beach monitoring **if applicable**
2.2.2.1.3.5. Perform monitoring using other methodologies (telemetry, aircraft, dedicated vessels, drones, acoustic methods, etc.) to investigate groups or species of interest **if applicable**
2.2.2.1.3.10. Generate knowledge about the impact to reduce uncertainties **if applicable**
2.2.2.1.4. Physical, physiological damage and death of invertebrate animals
2.2.2.1.4.3. Monitoring strandings on the coast **if applicable**
2.2.2.1.5.4. Monitoring strandings on the coast **if applicable**

2.2.2.1.5.5. Perform monitoring using other methodologies (biopsies, sensors, telemetry, aircraft, dedicated vessels, drones, acoustic methods, etc.) to investigate groups or species of interest **if applicable**
2.2.2.1.5.10. Generate knowledge about the impact to reduce uncertainties **if applicable**
2.2.2.1.6.2. Generate knowledge about the impact to reduce uncertainties **if applicable**

**2.2.1.8.1.3. Adjust routes or navigation speed according to the sensitivity of the area**

Regarding the measure 2.2.1.8.1.3. *Adjust routes or navigation speed according to the sensitivity of the area* we would like to remind that when the seismic cables are deployed the seismic vessel must ensure specific speed to avoid entanglement. Therefore, proposing an adjustment in the navigation speed may not be feasible.

2.2.1.9. Attraction of birdlife
2.2.1.9.1. Stress or death of individuals
**2.2.1.9.1.1. Monitor and record occurrences**

In relation to **2.2.1.9.1.1. Monitor and record occurrences** According to NT 89/15 and PMAVE Guide, the occurrence registration must be done in specific cases only. Healthy birds that use the vessels without posing a risk to the operation or the animal, do not need registration nor handling. Therefore, we suggest changing this topic to **2.2.1.9.1.1. Monitor and record occurrences of debilitated or injured birds that needs veterinary care.**

On topics **2.2.1.10.1**., **2.2.4.6.1**., **2.2.5.2.1**. and **2.2.5.3.1**. there is an indication to "View risk matrix" which, according to clarifications sought by the Association with CGMAC is not yet finalized. We suggest, therefore, to consider offering these topics for comments at a later date, when the Risk Matrix is available.

In general terms, about **2.2.2** that encompasses mitigation measures, for a better description of the impact and proposition of mitigation measures, this item could be separated into mammals / turtles and fish. Suggestion:
- Displacement or change in migration routes of marine mammals and turtles
- Displacement of preferred areas and fish reaction to sound

Regarding this topic, it is worthwhile to highlight that the IAGC supports seismic survey mitigation measures that are grounded in the best available science and consistent with existing practices that are proven to be effective and operationally feasible.

The geophysical and exploration industry supports utilizing effective mitigation measures based on corresponding levels of potential risk or significant potential impacts on marine animals. Such an approach helps to ensure that the scope of mitigation measures implemented in the field are appropriate to the level of potential risk and specific to the local population of marine animals. Stewardship is a priority for the geophysical industry and part of its core values. The seismic industry is committed to conducting its operations in an environmentally responsible manner and utilizes mitigation measures, such as exclusion zones, soft-starts and protected species observers to further reduce any possibility of impacts to marine populations.

**2.2.2 Air guns activation**
We suggest replacing “air guns” with “seismic source”. We understand that “air gun” is the traditional expression historically used by the industry. Nonetheless, we have been encouraging stake holders to replace it by a more accurate expression such as “seismic source”.

**2.2.2.1. Underwater noise generation**

The impacts resulting from noise generation were grouped disregarding the difference in auditory sensitivity of the taxonomic groups. Considering that the emission of noise is one of the main impacts of seismic research on biota, the impacts could be separated according to the main groups and their applicable mitigation measures.

As the impact refers to communication through sound, this should be specific to marine mammals and the mitigation measures should be targeted only to this group, excluding marine animals from impact and chelonians from mitigation measures. Therefore, we suggest changing these topics to:
**2.2.2.1.1. Negative interference (masking) in the communication of marine mammals**
**2.2.2.1.1.7. Pre-scan the area around the seismic source to detect marine mammals ~~and turtles~~**

**2.2.2.1.2. Scare away marine animals**
**2.2.2.1.2.1. Use the lowest possible operating volume and pressure**
**2.2.2.1.2.2. Prioritize seismic sources with reduced frequency spectrum**
**2.2.2.1.2.3. Perform visual and acoustic monitoring of marine biota**
**2.2.2.1.2.4. Monitoring strandings on the coast**
**2.2.2.1.2.5. Implement shutdown of the seismic source after sighting of mammals and turtles in the exclusion area**
**2.2.2.1.2.6. Implement a gradual increase in the power of the seismic source**
**2.2.2.1.2.7. Pre-scan the area around the seismic source to detect mammals and turtles**
**2.2.2.1.2.8. Avoid sensitive areas and periods**
**2.2.2.1.2.9. Generate knowledge about the impact to reduce uncertainties**

For a better description of the impact and proposition of mitigation measures, this item could be separated into marine mammals / turtles and fish as follows:
-Displacement or change in migration routes of marine mammals and turtles
-Displacement of preferred areas and fish reaction to sound

**2.2.2.1.5.5. Perform monitoring using other methodologies (biopsies, sensors, telemetry, aircraft, dedicated vessels, drones, acoustic methods, etc.) to investigate groups or species of interest**
Same as the comment made in item 2.2.1.8 on mitigation measures that are not applicable to all activities. Therefore, we suggest including “if applicable” as follows:
2.2.1.5.5. Perform monitoring using other methodologies (biopsies, sensors, telemetry, aircraft, dedicated vessels, drones, acoustic methods, etc.) to investigate groups or species of interest **if applicable.**

**2.2.2.1.1.1 – Use the lowest possible operating volume and pressure**

The idea that seismic surveys can be adjusted to a "lowest practicable source level" by reducing array parameters such as total array air volume has increasingly been touted by environmental organizations as a viable means of reducing sound production. Unfortunately, total volume of sound produced during surveys is misperceived as a simple metric of loudness despite the fact that source volumes do not correspond linearly with source output levels (in fact, it is a cube root relationship, with a 2000 cubic inch array only being about 3 dB lower in amplitude - SPL - or "loudness" than an 8000 cubic inch array).

Other features of a seismic array, such as the number of elements and their arrangement, figure more effectively in setting array amplitude; however, these complex design features are also critical to reducing the percentage of high-frequency sound produced as well as shaping the array output to minimize lateral sound propagation in the water.

A simple universal solution that would limit or reduce array output without loss of data quality while yielding meaningful benefit to the marine environment is impractical and will likely increase the potential for adverse environmental consequences rather than decrease the potential. Additionally, any suggestion of such a reduction or limitation is not supported by current best available scientific understanding of the relevant issues.

Seismic operators fully consider environmental concerns when designing their acoustic arrays as they consider the geophysical imaging needs and will continue to seek additional win-win solutions for improved geological imaging while minimizing ocean ambient sound. The IAGC cautions against implementation of seemingly simple solutions like striving for lower practicable source levels which can have unintended negative consequences and should be fully thought out when making any decisions about array design.

It seems appropriate to quote the Science Note of the Bureau of Ocean Energy Management - BOEM of August 22, 2014, in which it mentions that, obviously respecting protection measures, such as soft-start and exclusion zones, "To date, there is no documented scientific evidence of noise from [sound sources] used in geological and geophysical seismic (G&G) activities that negatively affect marine animal populations or coastal communities. This technology has been used for over [50 years extensively] worldwide. It is still used in U.S. waters off the Gulf of Mexico, with no known detrimental impact on marine animal populations or commercial fishing."[1].

[1] https://www.boem.gov/sites/default/files/boem-newsroom/Library/Science-Note/BOEM-Science-Note-August-2014.pdf, vide pag.1, paragrafo 1º

**References**

*IAGC - Lowest Practicable Source Levels (LPSL) Working Paper*
https://securisync.intermedia.net/us2/s/file?public_share=ZnABbwEHwpdJ0Zm5PlaNju003d33b6

*IAGC - Marine Mammal Strandings*
https://securisync.intermedia.net/us2/s/file?public_share=alB03aRqK7SPRKY0Fg4deb003d33b6

IAGC - *Fundamentals of Sound in the Marine Environment*
https://securisync.intermedia.net/us2/s/file?public_share=tKNGtTMpmGdeizZfrj9swJ003d33b6

*IAGC - Sound and Marine Seismic Surveys*
https://securisync.intermedia.net/us2/s/file?public_share=ZnABbwEHwpdJ0Zm5PlaNju003d33b6

**2.2.2.1.6. Death of planktonic organisms**

Over 50 years of worldwide seismic surveying activities and scientific research indicate that there is a negligible potential for impacts on zooplankton populations.

In the Gulf of Mexico, an area of particularly concentrated seismic surveying activity, zooplankton populations are thriving and support a robust marine ecosystem. No population level adverse effects to zooplankton have been identified in any area of seismic surveying operation.

However, after more than decade of intense scrutiny by hundreds of scientists, there is still no scientific evidence that indicates sound from seismic operations has biologically significant negative impacts on marine animal populations.

The IAGC remains open to all emerging new scientific information. However, we are troubled with the results of the zooplankton study by McCauley et al. (2017) which suggests but does not prove the conclusion that seismic survey air sources negatively impact zooplankton. The small sample size, inconsistency in the data and questionable "pruning" of the raw data undermine confidence in the reported values for degree of impact. The results are not consistent with other research on this same topic. The researchers' conclusion that there is a significant and unacknowledged potential for negative impact to ocean ecosystem function and productivity is pure speculation beyond the data and unsupported by the data.

In this sense, a follow-up study by the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) indicated that even if the effects detected by McCauley et al. *were* real, there were no significant regional-scale effects to zooplankton with normal ocean current

circulation[2]. The IAGC has carefully reviewed the study by McCauley et al, and produced detailed comments which can be found in the attached letter to the National Parks and Wildlife Service (NPWS) of Ireland in April 2018.

After more than a decade of intense scrutiny by hundreds of scientists, there is still no scientific evidence to indicate that seismic operations have biologically significant negative impacts on marine animal populations. At this point, it is timely to point out that the BOEM of the United States has invested more than $50 million in research related to protected species and noise, without finding evidence of significant adverse effects. Similarly, the oil and gas industry, through the IOGP, has contributed a comparable amount of research funding on this topic, obtaining the same results.

The IAGC and the geophysical industry support ongoing efforts to scientifically evaluate whether potential effects exist, utilizing statistically and methodologically sound high quality, independent, peer-reviewed research.

The geophysical industry is committed to operating in an environmentally responsible and sustainable manner. Seismic surveying remains the most effective, least intrusive tool for locating oil and gas resources safely and efficiently. Through the use of seismic survey data, operators are able to minimize the number of exploratory wells drilled and substantially reduce potential environmental impacts.

**References**

*IAGC Debunking Offshore Oil & Gas Exploration myths: Seismic Survey*
https://securisync.intermedia.net/us2/s/file?public_share=z8WwtU49kvjBXwqp4ZtiXJ003d33b6

**2.2.2.1.7.3. Monitor fishing landings**

Regarding item 2.2.2.1.7.3. Monitor fishing landings. It has been proved not to be effective to monitor fishing landings to assess the impacts of seismic activity on fishing resources, mainly due to the short duration of this activity. Therefore, we suggest excluding this mitigation measure.

**2.2.4.1. Generation of oily effluents and drainage waters**
**(…)**
**2.2.4.6.1. View risk matrix**

[2] Richardson A.J., R.J. Matear, and A. Lenton. 2017. Potential impacts on zooplankton of seismic surveys. CSIRO, Australia. 34 pp. https://doi.org/10.4225/08/59724f38211cd

In alignment to our comment in item 2.2.1, we suggest deleting all item 2.2.4.1 and changing the title of item 2.2.1 to **"Operation and movement of vessels involved in the activity"**. The macro activity, activity, aspects and impacts described in "item 2.2.4. Operation and movement of support vessels and assistants are the same as this item and duplication can lead to confusion, redundancy or information conflict.

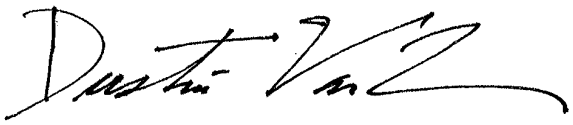
**2.2.5.2. Accidental spillage or leak of contaminants**
**2.2.5.2.1. View risk matrix**
**AND**
**2.2.5.3. Accidental spillage of oil or contaminants**

The risk matrix for assessing the environmental aspect has not been made available. We suggest, therefore, to consider offering these topics for comments at a later date, when the Risk Matrix is available.

Please note that all documents indicated here as references can be found appended to this letter.

Should you wish to discuss our suggestions in more detail or have any clarification me (dustin.vanliew@iagc.org; +1 713-957-8080) or Andreia Leao Owens (andreia.l.owens@iagc.org; +1 832-5714892).

Sincerely,



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