

Joint Industry Programme on E&P Sound and Marine Life - Phase III

Request for Proposals Number: JIP III-19-001

Determining the Environmental Impact of Marine Vibrator Technology

Release Date: 8 April 2019

Introduction

This Request for Proposals (RFP) seeks proposals for independent studies to advance understanding of the potential environmental impact of Marine Vibrator (MV) technology. Building upon previously completed JIP work on this topic, this study will further evaluate potential environmental impacts of prototype MV device output signals on marine mammals. The impacts of most interest for investigation are related to auditory masking and behavioural response.

The research called for in this RFP is required to meet the information needs of the above JIP, specifically Research Category 3 Behavioural Reactions and Biological Significance - see www.soundandmarinelife.org website. The JIP commissioned a desktop study on the Environmental Impact of Marine Vibrator Technology in 2016 which has now been completed. This RFP will advance work on the identified key recommendations from this desktop study (*see Background and Description of Proposals Being Requested*).

The proposals being requested must address the Proposal Description, Proposal Features, and Project Deliverables detailed below.

Organizations submitting Proposals should also adhere to the Application Procedure set out below. In addition, the Terms & Conditions referred to in the RFP shall apply.

Application Procedure

To respond to this RFP, please follow the relevant instructions given on the **Funding** page of the JIP website. Proposals should refer to the above RFP number and should be submitted electronically to info@soundandmarinelife.org.

Those organizations submitting Proposals should refer to the **outline contract** on the JIP website. This sets out the terms & conditions under which any contract will be carried out under the management of the International Association of Oil & Gas Producers (IOGP). In particular, attention is drawn to the specific term relating to management of health, safety, security and environment aspects of a contract. All IOGP contracts have such a section, but the specific wording that will appear in this section depends on the type of activity (desk-top study, field work, etc.) to be conducted.

Critical Dates

Proposals are due by: 10th May 2019

We will confirm receipt of proposals. If you have not received confirmation of receipt of your proposal within 1 week of the above deadline, please contact Wendy Brown at IOGP (Tel +44 (0) 20 3763 9700; e-mail info@soundandmarinelife.org). The review of proposals will aim to conclude within 2 months of the submission deadline, after which applicants will be notified by the JIP.

Background

Several projects have been launched in response to growing interest to provide an alternative source technology to compressed air sources. These projects aim to help make available alternative source technology that may contribute to reducing potential impacts of underwater sound on marine life associated with geophysical data acquisition, whilst maintaining Health, Safety and Environment (HSE) standards, and the current level of quality of geophysical data produced.

The SML JIP is aware of the range of alternative source technologies and source methods currently under development, however for the purpose of this RFP, the alternative source technology of specific interest is the Marine Vibrator (MV) technology applicable to geophysical acquisition. The SML JIP has recently finalized a desktop study which delivered an environmental assessment of MV technology using a set of detailed hypothetical source characteristics (based on latest available geophysical acquisition technology) compared to a conventional seismic source array. Several overall conclusions can reasonably be made from the results of that study. Conclusions related to behavioural responses and masking are summarized below:

Behavioural Response: Differences between the two source types in their potential behavioural impacts on marine mammals vary greatly depending on which threshold criteria and related frequency weighting are applied. When the frequency-weighted and multiple-step functions proposed by Wood et al. (2012) and DoN (2012) are used, the results indicate that predicted behavioural responses will be less for MV arrays compared to air gun arrays. This is primarily caused by the higher source amplitudes of air gun arrays resulting in longer distances to nearly equivalent behavioural response threshold levels for the two source types. Behavioural responses of other marine taxa are even less well understood than for marine mammals, but the lower source amplitudes and shorter distances to response thresholds from MV arrays means they are likely to have less impact than air gun arrays.

Masking: The analyses of potential impacts from masking provides similarly complex results. The longer duration of MV array output signals relative to air gun array pulses means there is less opportunity for “dip-listening” between MV sounds (between 1/3 and 2/3 less time in a given period). The duration of the MV signal may present situations with greater masking potential, however the lower source amplitudes of MV array sounds means the distances within which masking may occur may be 2 to more than 5 times less than for air guns. Additionally, if the harmonic content of MV array sounds above 100 Hz is reduced, the potential masking of mid- and high-frequency cetaceans will be almost entirely eliminated and greatly reduced for low-frequency cetaceans.

Description of Proposals Being Requested

The recently completed desktop Environmental Assessment of MV technology represents the most thorough quantitative comparison of potential impacts to marine life between air gun and MV sources completed to date. In the event that the desktop study is not published at the time that this RFP is released, those organizations preparing submissions are invited to contact info@soundandmarinelife.org for access to this document to aid preparation of their proposal. Given the broad range of environments, source sizes, signal types, impact categories, and evaluation criteria considered in this study, several assumptions were required to complete the modelling. These assumptions result in some uncertainty about the applicability of modelled results and conclusions in real-world situations; hence this RFP seeks to address concerns identified in the desktop study. Additionally, some uncertainty is inherent to all such assessments given the existing knowledge gaps and variability of observed impacts to marine fauna from anthropogenic sounds. The desktop study identified the following relevant areas for future research to address topics that are specific to improving our knowledge of sounds produced by MV arrays and their potential impact on marine life:

Masking

- The relative potential impact caused by masking from MV arrays versus air gun arrays is likely to vary depending on the signal characteristics, location, species present, and activities of those species. Determining the context and cues resulting in masking for species exposed to MV is needed to evaluate their potential impacts.
2. Behavioural Disturbance
 - In general, any studies that aid in the development of appropriate metrics and behavioural response criteria for MV sounds would be useful.

The JIP is requesting proposals which address the requirements of either of these two recommendations, both of which are further described below:

JIP expects each proposal to include field work - either in a controlled test environment or as a small scale field study. Given the current research funding status the JIP cannot, at this time, accept proposals for large scale multi-year projects which exceed 3 years and \$2M USD in cost, the JIP would also be interested to fund multiple small scale, or shorter term projects.

Due to the lower source amplitudes and limited bandwidth of MV array sounds any studies proposed should focus on low frequency hearing organisms. Where use of specific test subjects is difficult (e.g. mysticete whales) use of suitable surrogate species for extrapolation of results is acceptable.

Access to available ¼ or full scale prototype MV designs will be provided to the successful bidder by the JIP for completion of the project(s). The bidder should include costs within their budget estimates for operation of the provided transducer. Those organizations preparing submissions are invited to contact info@soundandmarinelife.org for contact details of the technology supplier who will provide the appropriate shipping/operation costs specific to the scope of the proposed study for inclusion within budget estimates.

Masking

Masking is the process by which the ability to detect a sound signal is degraded by the presence of background or other sound - natural or anthropogenic. A concern when using non-impulsive sources is the reduced amount, or even absence of 'quiet' time between signals during which animals could sense the environment and/or communicate therefore, due to the longer signal duration, MV arrays have a greater potential for masking than air gun arrays, albeit closer to the source.

Several studies have determined that marine mammals are capable of compensating for at least some level of masking sound in the environment, but the extent to which compensatory mechanisms can reduce masking impacts is poorly understood. Erbe et al. (2016) made several useful masking-specific study recommendations for progressing our understanding and/or refining models to adequately address masking and its effects on marine mammals/fish. A number of these recommendations are valid for investigation for MV technology, and therefore the JIP will encourage proposals in the area of masking aligned with any of the following areas:

1. Test for, and assess degree of, spatial release from masking.
2. Test and assess how signal levels relative to background sound levels or 'signal-to-noise' ratio affects masking.
3. Conduct a field study to measure marine mammal communication ranges under different masking scenarios.
4. Conduct behavioural studies to determine how variations in both signal and background sound levels affect detection thresholds in terms of masking.
5. Test how different source encoding affects masking

Behavioural Disturbance

The results of the desktop study, and research into the potential injury impacts to marine mammals associated with exposure to underwater sound from seismic sources, indicate that the likelihood of injury from exposure to MV signals is negligible. Therefore, in addition to masking, the evaluation of potential impacts should be focused on the extent and circumstances under which operation of MV technology have the potential to elicit behavioural responses. Controlled exposure experiments, like those that have evaluated behavioural responses to military sonar and air guns would of course provide valuable data, however carefully planned and conducted smaller scale studies using appropriate monitoring methods could be equally as informative. In general, any studies that aid in the development of appropriate metrics and behavioural response criteria for MV sounds would be useful.

Desirable Features of Proposals

Responses to this RFP should address each of the following (see also **RFP Response Format** page of website):

- A detailed scope of work to prepare and provide the deliverables detailed below.
- A detailed work plan to show how the terms of the contract will be met.
- Timeframe for completion of project and significant milestone events during the project.
- A detailed cost estimate in US dollars, which includes:
 - Support for travel in order to interface with related company representatives or others with expertise in this subject area;
 - Assumptions to support the cost estimate; and
 - Any contingencies to address unknowns.
- A list of personnel to be involved in the project and their qualifications, and their proposed role in this project.
- Researcher experience in this area and previous work.
- Where appropriate to the project, a discussion on how you manage animal care and use in your proposed work (*see also Application Procedure above*)
- An overall proposal summary (one paragraph).

Project Deliverables

Project deliverables shall include:

- a) **Monthly Progress Reports** that summarize the work conducted, tasks planned for the coming month, amount spent (vs. budget), and forecasts a spend plan for the duration of the project. The specific reporting formats will be determined following contract award.
- b) **Draft and Final Project Report** to include:
 1. A report detailing overall study, results and recommendations (as outlined in description of proposal)
 2. A separate data set of modelling outputs (provided in native format).
- c) **One or more manuscripts** submitted for publication in a peer-reviewed journal.

In addition to preparation of draft and final reports, the selected bidder should take in to account (in budgeting and resources planning) the potential for developing a peer-reviewed paper or manuscript (including the cost of open access to a publication), participation at a relevant conference and involvement in the production of a non-technical factsheet for this project.

Terms & Conditions:

By submitting a proposal to JIP, the potential contractor accepts the terms and conditions set out in this RFP. This RFP does not commit the JIP, through IOGP, to contract for any supply or service and the JIP shall not be deemed to have accepted any proposal submitted by any potential contractor unless and



until a duly executed written agreement is in place and then only for such scope as specifically identified in the written agreement. The potential contractor acknowledges that IOGP and the JIP participants may accept or reject any proposal for any reason whatsoever. The JIP may decide to fund a study in part or as a whole.

Those responding to this RFP are advised that the JIP will not pay for any costs incurred in preparation of a response to this invitation, including without limitation costs and expenses of attending meetings and worksite visits related to this RFP.

All correspondence and documentation associated with this invitation will be in English. Submissions and information will not be shared with other potential contractors.