

Recommended monitoring and mitigation measures for cetaceans during marine seismic survey geophysical operations



Scope

The geophysical and wider upstream oil and gas industry believes that mitigation measures should be appropriate to the level of risk that is identified as being associated with an activity.

The measures outlined in this report are recommended for use during all marine seismic surveys that use compressed air source arrays.

This report does not apply to geophysical/geohazard site surveys that use other non-compressed air type sources, such as Multi Beam Echo Sounders (MBES), Sub-Bottom profilers, etc.

These recommended monitoring and mitigation measures are intended to be implemented for cetaceans (whales, dolphins, and porpoises) only.



Geophysical and wider E&P Industry's Core Commitment

Our seismic survey operations should not have a significant effect on a cetacean population. It is recommended that, in the absence of any regulations or operation-specific monitoring and mitigation requirements, the geophysical and wider upstream oil and gas industry will implement the following measures during marine seismic survey operations.

Procedure for commencement of operations

Implement an exclusion zone for monitoring purposes:

- At least 500 m horizontal radius from centre of source array.

Visually observe the exclusion zone for at least 30 minutes prior to the seismic source being activated:

- Observer(s) should be trained to an acceptable standard.
- Observer(s) may be crew members, other employees, or third party contractors.
- Observer(s) should have no other duties or distractions while serving observer duties.
- If cetaceans are present within the defined exclusion zone, delay the start of soft-start procedure until at least 20 minutes after the last sighting of a cetacean.
- If there are no cetaceans present, initiate soft-start procedure.

Soft-start procedure¹:

- The first stage will involve activating the smallest volume element in the array.
- Subsequent stages will involve doubling the number of active elements at the start of each stage.
- All stages should be of approximately equal time duration.
- The total duration of the soft-start should be at least 20 minutes, no longer than 40 minutes or as specified in applicable regulatory requirements.
- As there will generally be one stage in which doubling the number of elements is not possible (due to the number of elements in the full array not being, for example, 8, 16 or 32), it is preferable to make this stage the last one of the soft-start sequence (as opposed to adjusting the increments of other stages or placing a lower increment early in the soft-start sequence).

Periods of poor visibility and darkness:

- Initiate soft-start procedure as above.
- Consider the use of alternative monitoring technologies, such as Passive Acoustic Monitoring (PAM) prior to initiation of soft-start procedures. In addition to the existing IAGC PAM guidance², the following recommendations are provided.

¹ The intent of a soft-start (ramp-up) procedure is to warn cetaceans of a pending sound source becoming louder and to allow sufficient time for those animals to leave the immediate vicinity. Under normal conditions, it is assumed that cetaceans that find the source sound aversive will move away before hearing damage or physiological effects occur. Following this logic, if an animal moves into the 500 m exclusion zone after the source array is operating at its full intended capacity, it is reasoned that the sound pressure level is not negatively impacting that particular animal.

² For example, see IAGC Guidance on the Use of Towed Passive Acoustic Monitoring during Geophysical Operations (2014).



Where a towed PAM system is used, operators are encouraged to use a data processing and user interface display software that ideally provides the following functionality in order to enable interpretation of acoustic data and support timely decision making:

- Documentation to explain how to set up and operate the user interface.
- Documentation to explain how the detection, classification and localization of species is achieved.
- Ability to process data input from multiple hydrophones in real time or near real time:
 - For PAM systems using independent³ in-sea data collection equipment: flexible, user defined configurations of hydrophones.
- Flexible multiple displays to facilitate classification of sounds and appropriate mitigation decisions, for example:
 - Spectrogram displays to identify characteristics of received signals from multiple marine mammal species.
- Mapping displays that include bearing and distance to sounds of interest relative to towing vessel trackline, sound source location and user defined mitigation exclusion zone distances.
- User selectable settings for both manual and automatic detection options.
- User defined sampling and management options for archiving data.

Monitoring data:

- All cetacean observations, details of monitoring effort and relevant operations are documented electronically and may be made available externally within a reasonable time frame of completing a survey activity for evaluation and study so that the biological value of the observation data can be realized.
- In the absence of any national reporting forms, monitoring data is documented using standardized recording forms, such as those developed as part of a review study supported by the IOGP E&P SML JIP⁴. <http://www.iogp.org/sound-and-marine-life/>

³ Not integrated into proprietary seismic data acquisition systems.

⁴ The IOGP E&P SML JIP forms have since been adopted by the UK JNCC.



Procedure for interruptions to ongoing operations

If seismic sources are silent for 20 minutes or more, use soft-start procedure (above) to re-initiate operations.

If seismic sources are silent for less than 20 minutes, re-initiate operations.

Procedure for testing source elements

If a source test is necessary whereby one or a limited number of source elements has to be activated for maintenance purposes.

Visually observe the (500 m) exclusion zone for at least 30 minutes prior to the seismic source being activated:

- Observer(s) should be trained to an acceptable standard.
- Observer(s) may be crew members, other employees, or third party contractors.
- All visual observations and operations should be electronically documented. (See recommendations above regarding recording forms and external availability).
- If cetaceans are present within the defined exclusion zone, delay the start of the source test until at least 20 minutes after the last sighting of a cetacean.
- If cetaceans are absent from the exclusion zone, initiate the seismic source test.
- If more than one source element is being tested at the same time, starting with the smallest volume source element and working up to the larger volumes.

Acknowledgements

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