Australian Government

Department of the Environment and Water Resources

EPBC Act
Policy Statements

# EPBC Act Policy Statement 2.1 –

## Interaction between offshore seismic exploration and whales

**Australian Government**

**Department of the Environment and Water Resources**

May 2007

## AIM

The aim of this Policy is to:

1. provide practical standards to minimise the risk of acoustic injury to whales in the vicinity of seismic survey operations;
2. provide a framework that minimises the risk of biological consequences from acoustic disturbance from seismic survey sources to whales in biologically important habitat areas or during critical behaviours; and
3. provide advice to operators conducting seismic surveys on their legal responsibilities under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This Policy updates and replaces the previous Guidelines (produced 2001). This Policy should be read in conjunction with the associated Background Paper.

## INTRODUCTION

Seismic surveying is widely used in the marine environment to define and analyse subsurface geological structures, mainly by the oil and gas exploration and production industry. Seismic surveying utilises a technique that directs acoustic energy (sound) into the rock beneath the sea floor from equipment towed behind a purpose-built seismic vessel. The loudest sound sources used in seismic survey operations are produced by air-guns which generate short, intense pulses of sound directed at the seafloor. The pulses are broad band, but most energy is concentrated in the 10 – 200 Hertz (Hz) frequency range, with lower energy levels in the 200 – 1000 Hz range. The air-guns are fired repeatedly as the ship traverses an area of interest. In a typical survey the sound levels from the air-gun array are in the range of 200 – 250 $dB_{rms}$ re 1uPa at 1m. When acoustic energy reaches the different layers of rock under the sea bed, it may be reflected back to the surface of the water where waterproof microphones (hydrophones) can receive and record the reflected energy signals. The hydrophones capture the different sound waves which have been reflected back by the rock beneath the sea bed enabling a map to be made of these layers. The signals can then be processed into cross-sections and maps showing the geological structures below the sea floor. These can then be used to identify potential areas where oil and gas deposits may occur.

The effects of human made sound in the marine environment is a concern for marine life, particularly whales and dolphins that may be sensitive to certain sound levels potentially resulting in physical and/or behavioral impacts. As the effects of seismic surveying on whales are not fully understood, precautionary mitigation measures aimed at preventing injury and minimising the risk of biologically significant behavioral changes should be applied to ensure their protection. Extensive research efforts over many years have been undertaken by the oil and gas industry, governments and other institutions to understand the possible effects from seismic exploration activities. This information has helped in preparing this Policy. Gaps in knowledge still exist, highlighting the need for further research in this area and this Policy may need to be amended as further information becomes available.

This Policy has been written with the goal of minimising the likelihood of injury or hearing impairment of whales based on current scientific understanding. Calculations are primarily based on received sound energy levels that are estimated to lead to a temporary threshold shift (TTS) in baleen whale hearing. This Policy is not intended to prevent all behavioral changes, which might occur in response to detectable, but non-traumatic sound levels. In fact, it is likely that whales in the vicinity of seismic surveying will avoid the immediate area due to an aversive response to the sound. This aversion is relied upon as a form of mitigation to prevent whales from approaching or being approached closely enough to cause acoustic injury from intense or prolonged sound exposure. At the scale of a seismic survey, such temporary displacements are unlikely to result in any real biological cost to the animals unless the interaction occurs during critical behaviours (e.g. breeding, feeding and resting), or in important areas such as narrow migratory corridors. In these biologically important habitats (defined below in Potential Impacts to be Considered), where the displacement of whales may have a more significant or biologically relevant effect, operators are encouraged to operate at different times of year to avoid overlap with the presence of whales. Applications for work in important habitat areas will be considered on a case by case basis to assess the degree to which displacement may impact the whales.

**Applicable Species**

Not all whales hear the same acoustic frequencies. Seismic survey sound sources are generally focussed at frequencies below 200Hz. Based on the best available scientific information it is generally understood that baleen whales and some toothed whales are likely to be sensitive to sounds in this lower frequency range.

Due to the difficulties in identifying whales to the species level, particularly at distance, appropriate Management Procedures (as recommended in Standard Management Procedures and Additional Mitigation Procedures below) should be applied whenever whales (including the larger Delphinidae species such as Killer whales, False killer whales and Pilot whales) are encountered. Smaller dolphins and porpoises that have peak sensitivities in the higher frequency ranges are likely to be less disturbed by these lower frequency sounds and less vulnerable to acoustic trauma. Accordingly, this Policy does not apply to encounters with the smaller dolphins and porpoises.

A full list of whale species known to occur in Australian waters can be found on the Department's web site at: www.environment.gov.au/whales.

**Other Matters of National Environmental Significance**

Proponents must also consider whether the survey operation is likely to have a significant impact on other matters of national environmental significance, particularly:

- other listed threatened and migratory species;
- World and National Heritage areas; and
- the Commonwealth marine area.

This Policy should be read in conjunction with other relevant EPBC Act Policy Statements, in particular, the ***Significant Impact Guidelines 1.1 – Matters of National Environmental Significance***, which is the primary source of guidance as to whether an action is likely to have a significant impact on a matter of national environmental significance.

This Policy is one of a range of EPBC Act Policy Statements which provide more detailed guidance in relation to specific industry sectors and activities or specific places, species, or ecological communities which are protected under the EPBC Act. EPBC Act Policy Statements can be obtained from the Department's Community Information Unit on 1800 803 772 or can be downloaded from the web site at:

www.environemnt.gov.au/epbc/policy/index.html

**Limitations**

This Policy does not provide definitive advice on avoiding significant impacts on whales for proposed seismic surveys, as different surveys may have unique consequences. The particular circumstances of each seismic survey have to be considered when decisions are made under the EPBC Act. This policy does not in any way limit the discretion or responsibilities of the Minister for the Environment and Water Resources under the EPBC Act.

This Policy does not address legal obligations under the *Petroleum (Submerged Lands) Act 1967* or other relevant Australian Government, state or territory legislation. Proponents are advised to contact the relevant authorities to address those obligations prior to undertaking seismic surveys.

The impact of sound from seismic acoustic sources is the subject of ongoing research in many parts of the world, including Australia. Updates and amendments to this Policy and to the application of the EPBC Act as it relates to seismic survey activities will occur as our knowledge of whales and the impacts of sound improve.

**LEGISLATIVE RESPONSIBILITIES**

Under the EPBC Act there are two obligations that persons wishing to undertake seismic surveys must consider. The first is the need to refer proposals that are likely to have a significant impact on a matter of national environmental significance (Parts 7-9 of the EPBC Act). The second obligation is the need to apply for a permit (Part 13 of the EPBC Act), when the action may kill, injure, take or interfere with a cetacean in Commonwealth waters.

## POTENTIAL IMPACTS TO BE CONSIDERED

When planning a seismic survey, proponents should obtain as much information about the area in which they intend to survey and consider the timing, duration and intensity of the survey. One of the most important aspects of assessing potential impacts is determining whether the proposed survey will have a low probability, or moderate to high probability of encountering whales as this will determine the level of management that should be implemented. In addition, it is necessary to identify whether the proposed survey will potentially occur in a **biologically important habitat** of a whale species, defined as breeding, calving, or resting areas, or confined migratory routes or feeding areas. In such habitats, displacement from areas or activities that are important to whale survival or recovery may have a greater impact than elsewhere.

If information on the area or the likely impacts is unavailable, proponents may need to consider conducting research into the likely presence of whales in the area and the potential impacts that the proposed activity may have on whales and other matters of national environmental significance.

Limited information is currently known and available for a number of species, habitat areas and migration paths. Specific research activities are underway to improve our knowledge for a number of species and areas. Additionally, information from ongoing marine industries encountering whales (including the oil and gas exploration activities) will assist in improving our knowledge.

Operators are encouraged to seek advice about the likelihood of surveys interacting with whales from the Department. Currently accessible information on whale distributions, migration times and conservation status is available on the web site at: www.environment.gov.au/whales.

In addition, local communities, conservation organisations, researchers, environmental consultants, state and territory governments, universities and museums are important sources of information on whale distribution, ecology and management.

## USEFUL WEB RESOURCES

Specific web sites, documents and databases that may also provide assistance are:

Species information: http://www.environment.gov.au/coasts/species/whales/cetaceans/threatened.html

SPRAT – detailed species information: http://www.environment.gov.au/sprat

Humpback whale Recovery Plan: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/m-novaeangliae/index.html

Southern Right whale Recovery Plan:
http://www.environment.gov.au/biodiversity/threatened/publications/recovery/e-australis/index.html

Blue Sei and Fin whales Recovery Plan:
http://www.environment.gov.au/biodiversity/threatened/publications/recovery/balaenoptera-sp/index.html

## REFERRALS

If a proposed seismic survey has the potential to result in a significant impact on a matter of national environmental significance (including listed species of whales), the action should be referred to the Australian Government Minister for the Environment and Water Resources under the EPBC Act.

Referrals will be assessed and may be determined to be:

- Non controlled actions;
- Non controlled actions provided they are undertaken in a specified manner; or
- Controlled actions requiring further assessment and approval.

The proponent should consider the implementation of appropriate mitigation measures before making a Referral, as this may influence the decision on whether the proposed survey is deemed a controlled action. If the proposed survey is deemed a *non controlled action*, the survey can proceed as outlined in the Referral.

The action may, however, be deemed a *non controlled action provided it is undertaken in a* ***specified manner***. To date, the majority of surveys referred under the EPBC Act have been determined non controlled actions provided they are undertaken in a specified manner consistent with the earlier version of this Policy.

If a seismic survey is deemed a *controlled action*, it will require further assessment and approval under Part 8 and 9 of the Act. Further information on the process and timeframes is available at:
http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

If the likelihood of encountering whales is low, the chance of a seismic survey having a significant impact on a whale species should be minimal, as long as proponents adopt the measures outlined in the Standard Management Procedures in this Policy.

While the Standard Management Procedures may be sufficient in locations where encounters with whales are unlikely or sporadic, proponents need to consider additional avoidance and mitigation measures for areas and/or seasons where the likelihood of encountering whales is moderate to high. In these circumstances, proponents should not only apply the Standard Management Procedures, but should also consider measures like those outlined in the Additional Mitigation Procedures of this Policy.

In situations involving **important habitats**, explicit justification for why the proposed survey should take place should be provided. It will be necessary to implement more extensive measures, such as greater safety zones, and additional marine mammal observer coverage. Such measures should be identified in the planning stage of a seismic survey. Accordingly, it is strongly suggested that proponents discuss these situations with the Department in the planning stages. The appropriateness of any additional measures to be applied will be considered on a case by case basis.

When submitting a referral for a seismic survey, proponents should include all relevant and available information including:

- Specific details on the location and timing of the survey (including maps with the survey route and bathymetry clearly marked);
- Specific details on the seismic sound sources to be used (i.e. airgun number, volume, pressure), and their operational characteristics like size, spacing (x,y,z) and depth of the seismic array, along with calculated operational source levels and sound propagation characteristics, if known. This information can be used to assess introduced sound energy and sound propagation;
- Details of whale species likely to occur in the area and any information known on the likelihood of encountering whales during the survey;
- Specific information on the management measures to be employed to detect whales and avoid interference or significant impacts;
- Details of the crew and any professional or trained observers to be employed in the application of the management measures;
- A copy of any environment management plans for the survey; and
- Details of any whale or other environmental research being conducted in association with the survey.

**PERMITS**

An action that will **kill, injure, take or interfere** with a whale or dolphin in Commonwealth waters is an offence under Part 13 of the Act, with limited exceptions, unless a permit has been granted. In general, permits will not be granted to injure or take cetaceans and the Minister may not issue a permit to kill a cetacean. Accordingly, these three circumstances are not discussed further in this Policy.

'Interference' is defined in the Act to include "harass, chase, herd, tag, mark or brand" a whale or dolphin. Seismic surveys in Commonwealth waters have the potential to affect some aspects of whale behaviour, particularly if they are to be conducted at times and places when encounters with whales are likely.

A seismic survey will generally not interfere with whales if the survey is undertaken in an area and time where the likelihood of encountering whales is low and the measures outlined in the Standard Management Procedures are applied.

If the likelihood of encountering whales is moderate to high, a seismic survey would be unlikely to interfere with whales provided that, in addition to the measures outlined in the Standard Management Procedures, appropriate measures from the Additional Mitigation Procedures are also undertaken.

Proponents must consider whether permits are required in other circumstances when interference (as defined above) with whales is likely. Details of the permitting process under Part 13 of the EPBC Act are available at: http://www.environment.gov.au/epbc/permits/cetaceans/index.html

Additionally, if the seismic survey is within an area declared as a Commonwealth Marine Reserve approval (under Section 359B(2) of the EPBC Act) from the Director of National Parks may be required. Further information is available at: http://www.environment.gov.au/epbc/permits/index.html

## MANAGEMENT MEASURES FOR ORGANISATIONS/VESSELS CONDUCTING SEISMIC SURVEYS IN AUSTRALIAN WATERS

These measures are divided into the following parts:

Safety Zones: defines the *Observation, Low power* and *Shut-down* zones to be used based on the likely sound levels surrounding the seismic sound source(s). These safety zones are to be used in the operational procedures that follow.

Management Procedures: defines the operational procedures which should be used when planning and carrying out seismic surveys. These include:

A. Standard Management Procedures which should be followed by all vessels conducting seismic surveys in Australian waters irrespective of location and time of year so as to avoid interfering with or having a significant impact on whale species. These procedures should be sufficient in areas which can be demonstrated, by available evidence, to have a **low probability** of encounters with whales.
B. Additional Mitigation Procedures which are designed to further minimise any possible impacts on individual animals or populations. These procedures may be employed in areas and/or seasons which have a **moderate to high probability** of encountering whales. These procedures are of particular importance in considering a seismic survey proposed to take place in a biologically important habitat.

### SAFETY ZONES

Different seismic surveys will have varying acoustic propagation characteristics depending on many characteristics including the seismic array used, bathymetry of the survey area and temperature profile of the water column. Safety zones should be delineated based on the sound levels whales are likely to receive. For example, a seismic air-gun array operating in shallow water will likely have much quicker attenuation of sound energy compared to a similar array operating in deep water. Accordingly, a survey producing lower sound levels as one ranges further from the seismic vessel should be able to operate with smaller safety zones than a survey that produces higher levels at similar ranges.

For proposed seismic surveys that can demonstrate through sound modelling or empirical measurements that the received acoustic signal at 1km will not likely exceed 160dB re $1\mu Pa^2 \cdot s$ for 95% of the time, the following safety zones are recommended:

- *Observation* zone: 3+ km horizontal radius from the acoustic source.
- *Low power* zone: 1 km horizontal radius from the acoustic source.
- *Shut-down* zone: 500m horizontal radius from the acoustic source.

For all other proposed seismic surveys:

- *Observation* zone: 3+ km horizontal radius from the acoustic source.
- *Low power* zone: 2 km horizontal radius from the acoustic source.
- *Shut-down* zone: 500m horizontal radius from the acoustic source.

See Diagram 1 below for an illustration of these zones. In the *observation* zone whales and their movements should be monitored to determine whether they are approaching or entering the *low power* zone. When a whale is sighted within or appears to enter the *low power* zone, the acoustic source should immediately be powered down to the lowest possible setting (e.g. a single small gun firing at ~10s intervals). When a whale is sighted within or appears to enter the *shut-down* zone, the acoustic source must immediately be shut down completely. Use the above values for application of both the Standard Management and Additional Mitigation Procedures outlined below.

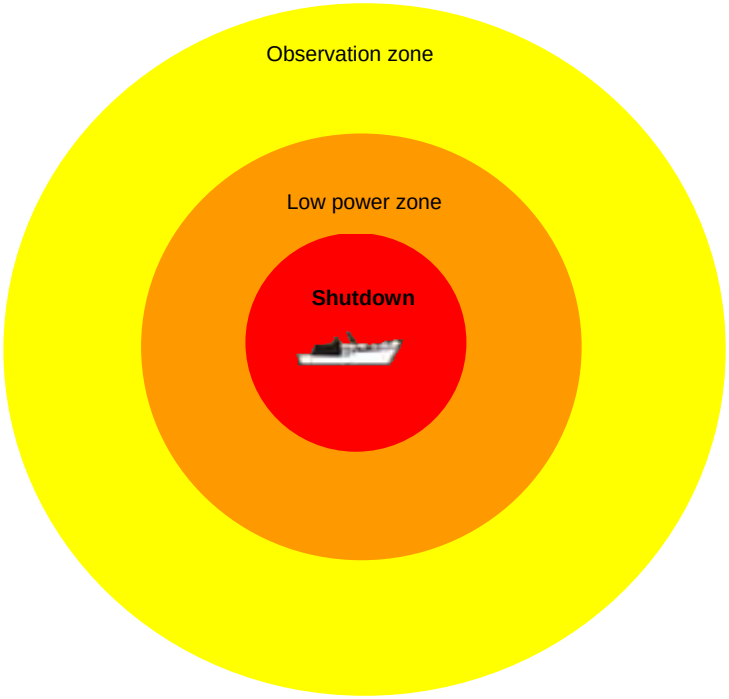


*Diagram 1 - Area surrounding the acoustic source that must be monitored for the presence of whales, showing the three safety zones.*

## MANAGEMENT PROCEDURES:

### A. STANDARD MANAGEMENT PROCEDURES

**These procedures should be followed by all seismic vessels conducting surveys in Australian waters irrespective of location and time of year.**

**Applicable Species:** Due to the difficulties in identifying whales to the species level, particularly at distance, the following Standard Management Procedures should be applied whenever whales (including the larger Delphinidae species such as Killer whales, False killer whales and Pilot whales) are encountered. Other (smaller) dolphins and porpoises that have peak sensitivities in the higher frequency ranges are likely to be less disturbed by these lower frequency sounds and less vulnerable to acoustic trauma. Accordingly, these Management Procedures do not apply to encounters with the smaller dolphins and porpoises. If there is doubt, precaution should be shown and the procedures outlined below should be applied.

#### A.1. PRE-SURVEY PLANNING

Do not program seismic surveys in areas where and when whales are likely to be breeding, calving or resting. If proposed, these surveys and associated mitigation measures will need careful consideration and may require further assessment under the EPBC Act.

Example: The endangered southern right whale breeds and calves at particular sites along the coast of southern Australia, such as the Head of the Bight, SA and near Warrnambool, Vic, in the winter months. Seismic surveys should be planned to avoid such areas and times, or at a minimum demonstrate that the measures to be employed will not have an impact on animals at important times, this may include application of all or some of the measures outlined in the Additional Mitigation Procedures. The *Recovery Plans for Australia's Threatened Whales (Humpback, Southern Right, Blue, Fin and Sei) 2005* contain detailed information on important habitat areas.

When planning seismic surveys, avoid where possible areas where and when whales are known or are likely to be migrating or feeding. Should it be necessary to conduct seismic surveys in areas where and when whales are known or are likely to be migrating or feeding then additional measures (Additional Mitigation Procedures) to ensure that impacts and interference are avoided and/or minimised are necessary. Details of the measures to be applied should be included in any Referral submitted under the EPBC Act.

Further environmental assessment of potential impacts may also be necessary if multiple seismic sources (eg. two vessels on one project or multiple, adjacent projects) are to be operated in the same general area. Operators proposing to conduct seismic surveys should liaise with government and industry bodies to ensure that surveys do not unnecessarily coincide or overlap.

The organisation conducting the seismic survey should prepare an environmental management plan for the survey that details the management and operational measures that will apply throughout the survey to detect whales and avoid interference or significant impacts. The plan and measures employed should be based on the likely presence and probability of encountering whales during the survey.

If during the operation of the survey the number of sightings/power-downs of whales are higher than were anticipated during the planning of the survey or the timing of the survey alters, the organisation conducting the survey should contact the Department to determine if additional management measures should be employed.

#### A.2. TRAINED CREW

The organisation conducting the survey should ensure that there is sufficient trained crew to fulfil the basic requirements outlined below. The trained crew members must have proven experience in whale observation, distance estimation and reporting.

A briefing should be provided to all crew on board the survey vessel (and any supporting craft) on environmental matters, including information on this Policy, whale identification and the environmental legal obligations for companies operating in Australian waters.

Where possible, provide reference material, including this Policy, the Department's Whale and Dolphin sighting report form and the APPEA CD Guide *Search Australian Whales and Dolphins* and provide appropriate visual aids, such as binoculars, on board the vessel to aid in the identification and reporting of any whales sighted.

### A.3. DURING SURVEYS

All seismic survey vessels operating in Australian waters must undertake the following basic procedures during surveys irrespective of location and time of year of survey:

- Pre start-up visual observation
- Soft start
- Start-up delay
- Operations
- Power- down and Stop work

These procedures are defined and described in greater detail below.

#### A.3.1 Pre Start-up-Visual Observation

During daylight hours, visual observations (using binoculars and the naked eye from the bridge on the survey vessel or preferably a higher vantage point) for the presence of whales should be undertaken by a suitably trained crew member for at least 30 minutes before the commencement of the soft start procedure. Observations should, where visibility allows, extend to 3+ km (*observation* zone) from the vessel but with particular focus on the *low power* and *shut-down* zones around the acoustic source - see Diagram 1.

During these 30 minute observations, the observer should make observations around the whole of the vessel (360°) and towed array out to a 3km distance and, if possible, beyond 3kms.

#### A.3.2 Soft Start (or ramp-up)

If no whales have been sighted within the *low power* and *shut-down* zones during the pre start-up procedure, the soft start procedure outlined below may commence.

**Ramp-up** or **soft start** procedures should be used each time the acoustic sources are initiated, gradually increasing power over a 30-minute period. Initiate ramp-up procedures by firing a single airgun. The preferred airgun to begin with should be the smallest airgun, in terms of energy output and volume. Additional acoustic source components should gradually be added in sequence until operating level is achieved. The full power operating level should be the minimum acoustic energy output that is necessary to achieve the survey's objectives.

A sequential ramp-up of the acoustic source is considered to be industry best practice. The slow increase in acoustic energy may alert whales in the area to the presence of the seismic array and enable animals to move and avoid (or stand off) at distances where injury is unlikely.

Visual observations by trained crew should be maintained continuously during soft starts to identify any whales within the safety zones.

At **night-time** or at other times of **low-visibility** (e.g. during fog or periods of high winds), start up may be commenced:

- provided that there have not been 3 or more whale instigated power-down or shut-down situations during the preceding 24 hour period; or
- if operations were not previously underway during the preceding 24 hours, the vessel (and/or a spotter vessel or aircraft) has been in the vicinity (approx 10km) of the proposed start up position for at least 2 hours (under good visibility conditions) and no whales have been sighted.

All other procedures outlined above should be applied during night-time surveys.

**A.3.3 Start-up Delay Procedure**

If a whale is sighted within the 3km observation zone during the soft start the operator of the acoustic source will be placed on stand-by to power down the acoustic source. An additional trained crew member or marine mammal observer should also be brought to the bridge to continuously monitor the whale whilst in sight. If a whale is sighted within or is about to enter the *low power* zone, the acoustic source should be powered down to the lowest possible setting (eg. a single gun). If a whale is sighted within, or enters the *shut-down* zone, the acoustic source should be shut down completely.

Soft start procedures should only resume after the whale has been observed to move outside the *low power* zone, or when 30 minutes have lapsed since the last whale sighting.

**A.3.4 Operations Procedure**

Trained crew should undertake visual observations continuously during survey operations.

Operators are encouraged to turn off arrays when not collecting data, or ramping up. Discharge of the acoustic source may be continued during line turns, changes, or other practical operational needs, although the acoustic source should be powered down to the lowest possible setting.

The firing of a single gun during turns is an industry standard and is generally considered a reasonable precaution. This sound source may alert whales in the area to the presence of the seismic array and reduce chances of entanglement or contact.

When the array has been completely shut down observations for whales should continue. If no whales are sighted during the shut-down period then start-up should commence using the soft start procedures. If whales are sighted during shut down or if observations for whales ceased, then start-up should not begin until pre start-up visual observations have been conducted.

**Night-time** or **low-visibility** operations may proceed provided that there have not been 3 or more whale instigated power-down or shut-down situations during the preceding 24 hour period. Where conditions allow, observations to spot whales should be maintained with a particular focus on the *low power* and *shut-down* zones. If whales are detected then operations should stop until visibility improves.

If sightings of whales have been frequent or are higher than were anticipated during the planning of the survey, the operator of the survey should contact the Department to discuss appropriate night-time provisions and whether additional management measures should be employed for day and/or night-time operations.

**A.3.5 Stop Work Procedure**

If a whale is sighted within the 3km observation zone the operator of the acoustic source will be placed on stand-by to power down the acoustic source. An additional trained crew member or marine mammal observer should also be brought to the bridge to continuously monitor the whale whilst in sight.

If a whale is sighted within or is immediately approaching the *low power* zone, the acoustic source should be powered down to the lowest possible setting. If a whale is sighted or enters within the *shut-down* zone, the acoustic source should be shut down completely.

Power-up of the acoustic source with soft-start procedures should only occur after the whale has been observed to move outside the *low power zone*, or when 30 minutes have lapsed since the last whale sighting.

## A.4 COMPLIANCE AND SIGHTING REPORTS

It is the responsibility of the organisation undertaking a seismic survey to maintain a record of procedures employed during operations. Such records should be auditable and account for aspects of the operation as it relates to legislative approvals and regulations. Additionally, information on any whales (or other species) sighted during the survey may be useful in the planning and assessment of future marine industry activities.

A report on the conduct of the survey, and any whale interactions, should be provided to the Department within two months of survey completion. The report should at a minimum contain:

- the location, date and start time of the survey;
- name, qualifications and experience of any Marine Mammal Observers (or research scientists) involved in the survey;
- the location, times and reasons when observations were hampered by poor visibility or high winds;
- the location and time of any start-up delays, power downs or stop work procedures instigated as a result of whale sightings;
- the location, time and distance of any whale sighting including species where possible; and
- the date and time of survey completion.

- Any whale sightings should be recorded on a sightings form (approved by the Director, Ports and Marine Section). An example reporting form for cetaceans sightings is available online at:
  For individual sightings:
  http://aadc-maps.aad.gov.au/aadc/whales/report sighting.cfm
  For multiple sightings:
  http://aadcmaps.aad.gov.au/aadc/whales/Whale_and_Dolphin_sightings_report_summary_v2.xls

The Report and completed sighting forms should be emailed to portsandmarine@environment.gov.au or posted to:

Director
Ports & Marine Section
Approvals and Wildlife Division
Department of the Environment and Water Resources
GPO Box 787
CANBERRA ACT 2601

## B. ADDITIONAL MITIGATION MEASURES

For seismic surveys operating in areas where the likelihood of encountering whales is moderate to high the application of additional measures to ensure that impacts and interference are avoided and/or minimised are necessary. The following measures are recommended, however, application of all these measures may not be necessary, applicable or possible for all seismic survey operations. In planning a seismic survey, operators should consider which of these measures best apply to their circumstances. Details of the measures to be applied should be included in any referral submitted under the EPBC Act.

### B.1 Marine Mammal Observers (MMO)

As the likelihood of encountering whales increases, proponents should engage MMOs. MMOs should be trained and experienced in whale identification and behaviour, distance estimation, and be capable of making accurate identifications and observations of whales in Australian waters. The MMOs should assist other observers (e.g. trained crew), and be available to provide advice should whales be encountered.

### B.2 Night-time/Poor visibility

For surveys in areas where whales are expected to be encountered, operators should include appropriate management measures to detect (or predict) whale presence and apply measures to reduce the likelihood of encounters. Depending on the situation a range of measures may be appropriate, possible measures include:

- Limiting initiation of ramp-up to conditions that allow visual inspection of the safety zone;
- Daylight spotter vessel or aircraft searches of the night-time survey area to determine if whales are present; and
- Pre survey research (including surveys) to detect and identify likely whale concentration areas, such as: peak migration paths and times, key feeding sites (eg. shelf breaks, sea mounts and trenches), or other aggregation areas.

### B.3 Spotter Vessel(s) and Aircraft

Where the likelihood of encountering whales is high, spotter vessels/aircraft could be used to assist in detecting the presence of whales. Spotter vessels and aircraft may be usefully employed to determine the presence and likelihood of encountering whales during day and night-time operations, information that can then be used to re-design the survey or tracks to be run to avoid whales that are in the vicinity. Spotter vessels/aircraft should maintain continuous contact with the seismic survey vessel. An MMO should be employed on board both the vessel and aircraft.

### B.4 Increased Safety zones and Buffer zones

In some locations and circumstances it may be advisable to apply increased distances for the instigation of power-down procedures than those outlined in Part A. For important habitats, such as feeding areas, when concentrations of food and whales are likely to occur, an increased low power zone (e.g. 3km) may be appropriate to ensure that disturbance or displacement of whales does not occur. Such a measure may not need to apply for the whole of the survey (time and area) but may be advisable for particular specific locations (eg along the shelf edge where food sources are most likely to occur).

For surveys being undertaken in the broad vicinity of known breeding or resting areas, a buffer (exclusion) zone should be established to ensure that operating survey vessels do not enter the vicinity where whales may be present. The size of the buffer zone should be established on a precautionary basis. Where available, scientific evidence and/or acoustic propagation modelling should be used to determine and justify the buffer zone.

### B.5 Passive Acoustic Monitoring

Passive acoustic monitoring (PAM) is an emerging technology that has some limitations. Deployment of PAMS with appropriate technologies and programs to detect whales in real time may provide an additional method of detecting and avoiding whales during surveys and may be particularly useful during night-time and low visibility operations. The use of PAMS as a detection tool should be considered by survey operators and, if deployed, details should be provided on their intended use as part of any Referral.