



WHY ARE SEISMIC SURVEYS NEEDED IN THE ATLANTIC OCS?

The last surveys of the Atlantic Outer Continental Shelf (OCS) were conducted 30 years ago. Due to technological advances, existing estimates of the available energy are out-of-date.

- Existing resource estimates for the Atlantic OCS are:
 - 3.3 billion barrels of oil
 - 31.3 trillion cubic feet of natural gas
- Today, seismic surveys using modern technology produce sub-surface images which are much clearer than those from decades ago.
- Exploration and development activities generally lead to increased resource estimates. For example, in 1987 the Minerals Management Service estimated only 9.57 billion barrels of oil in the Gulf of Mexico. With more recent seismic data acquisition and additional exploratory drilling, that estimate rose in 2011 to 48.4 billion barrels of oil — a 500 percent increase.

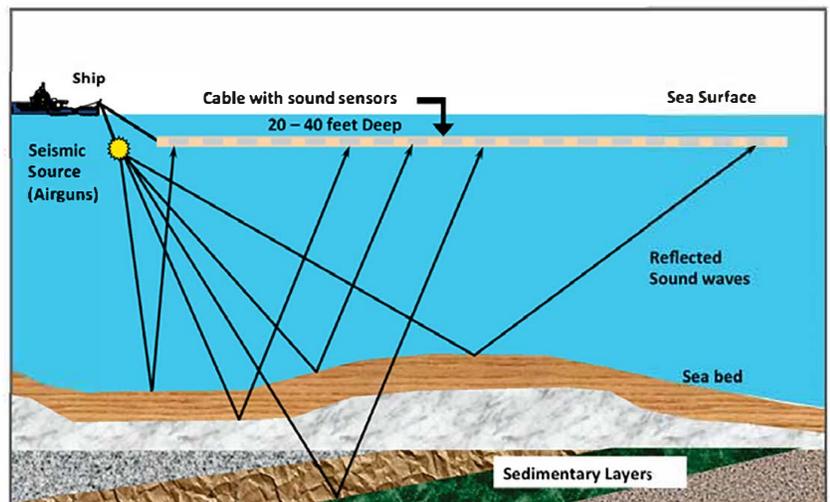
Modern offshore oil and natural gas exploration requires the use of seismic surveys.

- Seismic surveys are the only feasible technology available to accurately prospect for oil and natural gas reserves offshore.
- Seismic surveys have been used for decades to assess the location and size of potential oil and natural gas deposits, which often lay several miles beneath the ocean floor.
- Modern seismic surveys make offshore energy production safer and more efficient by greatly reducing the drilling of “dry holes” (where no oil or gas is found).

HOW ARE SEISMIC SURVEYS PERFORMED?

Seismic surveys use compressed air to create sound waves that reflect back to the surface.

- Seismic surveys are undertaken with consideration of potential impacts to the marine environment.
- The seismic source creates sound waves of short duration by releasing compressed air into the water.
- The sound generated is reflected from subsurface rock layers and “heard” by sensors that are towed behind the survey vessel.
- The data collected is analyzed and used to help locate potential geologic structures and energy resources beneath the ocean floor.
- The sound produced during seismic surveys is comparable in magnitude to many naturally occurring and other man-made ocean sound sources, including wind and wave action, rain, lightning strikes, marine life, and shipping.
- Survey operations are normally conducted at a speed of approximately 4.5 to 5 knots (~5.5 mph). As a result, the sound from the seismic source, which is typically activated every 10-15 seconds, does not last long in any one location and is not at full volume 24 hours a day.



WHAT PRECAUTIONS DOES THE INDUSTRY TAKE TO PROTECT MARINE MAMMALS?

The oil and gas industry has demonstrated the ability to operate seismic exploration activities in a manner that protects marine life. Marine seismic exploration is carefully regulated by the federal government and managed by the operator to avoid impacting marine animals.

- Four decades of world-wide seismic surveying activity and scientific research related chiefly to marine mammals have shown no evidence that sound from seismic activities has resulted in physical or auditory injury to any marine mammal species. Likewise, there is no scientific evidence demonstrating biologically significant adverse impacts on marine mammal populations.
- Nevertheless, the industry implements mitigation measures to further reduce the negligible risk of harm to marine mammals.



Mitigation measures are standard operating procedures designed to minimize impacts to marine life.

- Trained marine mammal observers are onboard to watch for animals. Operations stop if a marine mammal enters an “exclusion zone” around the operation and are not restarted until the zone is all-clear for at least 30 minutes.
- When starting a seismic survey, operators use a ramp-up procedure that gradually increases the sound level being produced, allowing animals to leave the area if the sound level becomes uncomfortable.

WHAT IS THE CURRENT STATE OF SCIENCE AND RESEARCH?

Peer-reviewed science and research suggest no evidence of injury to marine mammals as a result of sound emitted during seismic surveys.

- Based on both available scientific knowledge and operational experience, there is no evidence to suggest that the sound produced during an oil and gas industry seismic survey has resulted in any physical or auditory injury to a marine mammal.
- Research studies and operations monitoring programs designed to assess the potential impacts from seismic surveys have not demonstrated biologically significant adverse impacts on marine mammal populations.
- Industry continually monitors the effectiveness of the mitigation strategies it employs and funds research to better understand interactions between E&P operations and marine mammals.
- Not all marine life hears the same frequencies equally well. Much like the differences in hearing between humans and bats or dogs, some marine animals hear well at higher frequencies, and relatively poorly at lower frequencies. Others hear better at lower frequencies.
- Some studies have shown that marine mammal hearing sensitivity may be temporarily affected if exposed to sound at levels encountered very close to an operating seismic sound source. Other studies have found that marine mammals did not react to sounds that would only be realized within a few tens of meters of a typical seismic array.

The E&P industry remains committed to improving the scientific understanding of the impacts of our operations on marine life.

- To provide the utmost safety precautions, seismic surveys in the U.S. Outer Continental Shelf are only conducted with measures in place to protect animals from high sound exposure levels.
- The best available scientific information also indicates that the level of sound required to injure dolphins may be higher than previously thought.
- Animal strandings – which opponents of oil and natural gas production incorrectly claim are due to seismic surveys – can occur for a number of reasons, e.g., sickness, disorientation, natural mortality, extreme weather conditions or injury. Natural occurrences of stranded marine mammals have been documented in records dating from the 7th century.

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