



FISKERI- OG KYSTDEPARTEMENTET  
OLJE - OG ENERGIDEPARTEMENTET

Guide

# Implementation of seismic surveys on the Norwegian Continental Shelf

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# 1. Introduction

The petroleum and fishing industries are two important industries for Norway. Both generate large revenues and create many jobs. Ever since the dawn of Norway's petroleum industry in the late 1960s, it has been an important goal for the government to ensure sound coexistence, where both industries can thrive. Norway's parliament, the Storting, has stated on many occasions that we want and need both industries.

Our purpose in publishing this guide is to explain the significance of the two industries, and describe the legislation applying to seismic surveys. We expect the petroleum and fishing industries to do their best to follow up the authorities' intentions with regard to facilitating sound coexistence. Respect for the work of each other and the right to work on the Norwegian Continental Shelf is a prerequisite for good cooperation. We believe better coordination of the individual players' planning of activities in the various ocean areas will expand the basis for coexistence.

Coexistence means that both industries adapt to each other, and experience shows that fisheries and petroleum activities can coexist at sea. Coexistence has not been without problems, but with assistance from the Government the industries have mostly arrived at amicable solutions.

In recent years, the scale of seismic surveys on the Norwegian Continental Shelf has increased and new players have emerged. New and improved seismic data has been crucial for the detection of several of the major discoveries made on the Norwegian Shelf in the last few years, enabling good development solutions for discoveries and increasing recovery from existing fields. However, the increased scale of seismic surveys has also led to several cases of conflicting interests between fishing and seismic vessels. The authorities have consequently implemented a number of changes in the regulations to improve coexistence in the sea. The arrangement of having a fishery expert onboard seismic vessels has been improved and tracking of seismic vessels is required. Moreover, the two industries have established several arenas for systematic dialogue, contributing to the exchange of information and providing a better basis for coexistence.

We want this guide to help increase understanding between the parties and help clarify the rules and procedures that apply. We also hope that we can contribute to the necessary understanding that there must be room for both of these vital industries. In particular, we believe the guide makes it clear that Norway has a system and regulations that govern both the fisheries and the petroleum activities. Greater understanding of how the two industries can work together and affect each other is a prerequisite for acceptance of the industries' needs, which will facilitate better co-existence.

The production of petroleum and fisheries generate large revenues for the Norwegian society. With knowledge, good planning and not least dialogue, these industries can continue their coexistence at sea in the future.



Minister of Fisheries and  
Coastal Affairs  
Lisbeth Berg-Hansen



Minister of Petroleum and Energy  
Ola Borten Moe

## 2 Overview of relevant authorities and organisations

### 2.1 Authorities

#### 2.1.1 Ministry of Petroleum and Energy

The Ministry of Petroleum and Energy (MPE) shall facilitate sound and efficient management of petroleum resources and creation of value from Norway's oil and gas resources.

#### 2.1.2 Ministry of Fisheries and Coastal Affairs

The Ministry of Fisheries and Coastal Affairs (MFCA) is responsible for the management of living marine resources, aquaculture, maritime safety and emergency preparedness including the State's emergency preparedness against oil spills.

#### 2.1.3 Norwegian Petroleum Directorate

The Norwegian Petroleum Directorate (NPD) is a specialist agency under the Ministry of Petroleum and Energy. The NPD coordinates the notifications to be sent to the authorities in connection with seismic surveys. Courses for fishery experts are organised by the Norwegian Petroleum Directorate in collaboration with the Directorate of Fisheries, Institute of Marine Research and the Coast Guard.

#### 2.1.4 Directorate of Fisheries

The Directorate of Fisheries is a specialist agency under the Ministry of Fisheries and Coastal Affairs, with responsibility for day-to-day fisheries management. It provides advice and assesses fishing activities in areas where seismic surveys are planned and reported. The Directorate of Fisheries assists the NPD in the qualification process for fishery experts.

#### 2.1.5 Institute of Marine Research

The Institute of Marine Research (IMR) is an advisory research institute under the Ministry of Fisheries and Coastal Affairs. The Institute is the largest marine biological institute in Northern Europe, has extensive knowledge of Norwegian waters and is a key adviser on the impact of sound from seismic surveys on living marine resources.

#### 2.1.6 Norwegian Coast Guard

The Coast Guard is part of the Navy. The Coast Guard is the State's main enforcement authority at sea and carries out its work throughout Norway's maritime area of responsibility.

The Directorate of Fisheries, the Coast Guard and the NPD have a joint cooperation agreement. Through the cooperation agreement, the authorities intend to ensure that fishery experts on board seismic vessels and any other parties will receive round-the-clock assistance from the authorities in the event of incidents and for other reasons.

The Coast Guard is the primary contact of the fishery expert. Fishery experts shall at all times be able to contact the authorities through the Coast Guard.

## 2.2 Organisations

### 2.2.1 Norwegian Fisherman's Association

Norwegian Fishermen's Association is both a trade union and trade organisation for Norwegian fishermen. The Association organises individual fishermen working alone, fishing boat crew members and fishing vessel owners and is thus an association both for what in other industries would be called employees and employers, as well as sole proprietorships. The Norwegian Fishermen's Association is a politically independent, professional national organisation based on voluntary membership of fishermen through county fishermen's associations and professional group organisations. Today, the Norwegian Fishermen's Association has roughly 5,700 members spread across the country.

### 2.2.2 Norwegian Coastal Fishermen's Association

The Norwegian Coastal Fishermen's Association is an independent, democratic and politically independent trade union for Norwegian coastal fishermen. The organisation offers membership to crew and vessel owners in the coastal fleet. The Norwegian Coastal Fishermen's Association organises around 1,000 members spread across the country and has a number of local chapters along the coast. Almost 600 coastal fishing vessels are currently affiliated with the organisation.

### 2.2.3 Pelagic Association

The Pelagic Association is a professional organisation for fishing vessel companies. The members mainly have rights to fish for pelagic fish. The Association's purpose is to promote the common economic, professional and social interests of its members. Its members' fleet consists of purse seiners, pelagic trawlers and coastal seiners.

### 2.2.4 Norwegian Oil and Gas Association

The Norwegian Oil and Gas Association is a professional body and employers' association for oil and supply companies engaged in the exploration and production of oil and gas on the Norwegian Continental Shelf. The Norwegian Oil and Gas Association has published *Recommended guidelines for Coexistence with the fisheries sector when conducting seismic surveys*.

### 2.2.5 International Association of Geophysical Contractors (IAGC)

Professional body for companies providing geophysical services, including seismic services. In cooperation with the Norwegian Oil and Gas Association, the IAGC has published *Recommended guidelines for Coexistence with the fisheries sector when conducting seismic surveys*.

## 3 Acquisition of seismic data

Seismic surveys are the main source of mapping and geological understanding of the subsurface. While seismic data is essential for discovering oil and gas, it also makes it possible to extract more oil and gas from producing fields. Seismic data is therefore acquired in different phases of the petroleum operations. The use of seismic data and further development of seismic methods have been and are still important for the development of the Norwegian petroleum industry. New and better data and new tools for interpreting the data have made it possible to identify new major discoveries such as Johan Sverdrup and Johan Castberg, and increase recovery from fields such as Gullfaks and Draugen.

### 3.1 What is a seismic survey?

A seismic survey is a geophysical survey method used to map the geology of the subsurface. The main purpose of this type of survey is to identify potential petroleum traps (locations in the subsurface where petroleum can be found). An image of the subsurface can be obtained by using seismic data. Geologists use these data to interpret the subsurface to identify areas where petroleum may have accumulated.

Briefly described, low-frequency sound waves are transmitted from a source on the surface of the sea down into the subsurface. The sound waves are reflected between the geological layers in the subsurface, where the various layers reflect the sounds differently. These reflections of sound waves are then captured by receivers usually towed just below the sea surface behind the seismic vessel. The raw data is then processed by computers to produce images of the subsurface that geologists can interpret to gain better knowledge of the subsurface, including oil and gas deposits.

The following is a brief description of the different types of seismic data. 2D and 3D seismics are particularly important for the exploration for oil and gas, while other forms are particularly relevant for the development and operation of fields.

#### 3.1.1 2D seismics

When acquiring 2D seismic data, a single hydrophone cable (streamer) is towed behind the vessel. The streamer is usually between three to eight kilometres long, providing a two-dimensional cross-section of the subsurface.

#### 3.1.2 3D seismics

During 3D acquisition, several parallel streamers are towed behind the vessel, making it possible to produce images of the subsurface in three dimensions. A seismic survey vessel that acquires seismic data will have diminished manoeuvring capacity due to the number of streamers (up to 16) towed behind the vessel combined with the fact that they are usually three to eight kilometres long.

#### 3.1.3 4D seismics

4D seismics are 3D surveys that are repeated with a certain time interval. The fourth dimension is thus time. 4D seismics are used to track changes in the reservoir over time. Data from such seismic data provides information on local pressure changes and changes in the saturation of oil, water and gas, respectively, in the reservoir. This information will be used to find the best targets for new production and injection wells and to optimise injection and production to/from different zones for optimal recovery from the field.

#### 3.1.4 OBS (Ocean Bottom Seismic)

OBS is used to improve data quality and confirm findings from earlier measurements. In this case, no sensors in streamers are towed behind vessels. Instead, the sensors and cables are placed on the seabed. The advantage of this method is that you get a better and more accurate signal from difficult and complex structures.

This acquisition method is thus less demanding in terms of area during the actual acquisition phase. However, there will be a deployment and removal phase for the cables.

### 3.1.5 Permanent reservoir monitoring

In the past few years a new type of technology has been developed for 4D seismics based on burying cables with sensors permanently in the seabed, and only using vessels to tow the signal source during acquisition. This technology provides seismic data with better quality and better repeatability than ordinary data acquisition because the sensors are buried and firmly in place. In addition, this method is relatively independent of weather conditions. Such technology is often described as "Permanent Reservoir Monitoring - PRM".

## 3.2 When are seismic surveys conducted?

### 3.2.1 General Shelf mapping

The authorities carry out seismic surveys to conduct a geological survey of the Norwegian Continental Shelf. The purpose of this type of acquisition is to increase knowledge about the potential for oil and gas in an area. In connection with the opening of new areas with a view to awarding production licenses, the authorities undertake seismic surveys in order to provide a resource estimate.

### 3.2.2 Acquisition prior to licensing rounds

Prior to the licensing rounds, especially numbered licensing rounds, seismic data is often acquired in the areas proposed for announcement. As a rule, these acquisitions are carried out by seismic companies at their own risk. The seismic companies sell the acquired seismic data to oil companies that use the information in the application process.

### 3.2.3 Acquisition as part of work obligations

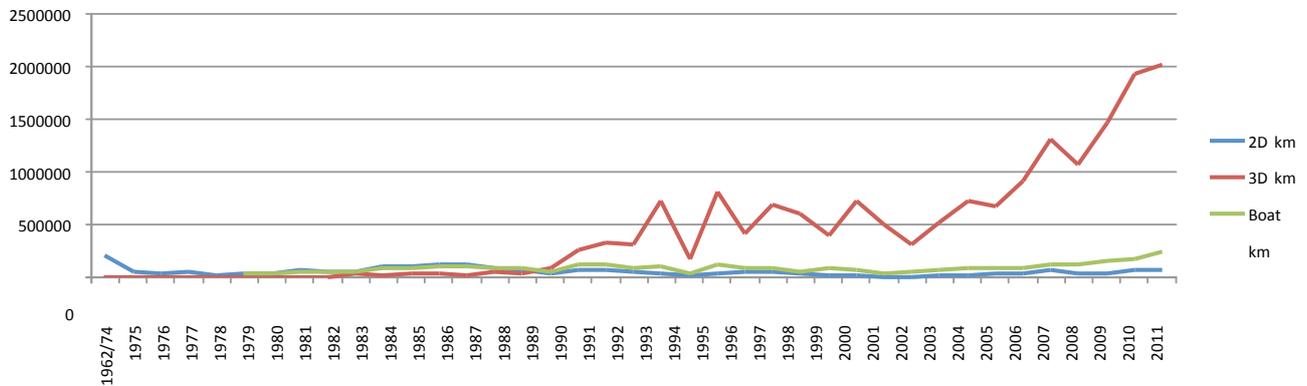
A production licence is usually awarded subject to a mandatory work programme laid down by the MPE. In areas with poor or lacking seismic coverage, acquiring seismic data is often a key part of the work programme. Such data is a prerequisite for making a rational decision on drilling an exploration well. An exploration well costs about NOK 350 million. It is therefore important to have the best possible information when a decision is to be made whether, and if so where, to drill an exploration well.

### 3.2.4 Fields in operation

Seismic data is one of the most important tools for achieving improved recovery from existing fields. An increase in the rate of recovery of, for example, one percentage point for fields currently in operation, will increase oil production by an estimated 570 million barrels of oil. The seismic data contributes to increased understanding of the reservoir and mapping of the movements and changes of the petroleum resources. Among others, this enables licensees to optimise the location of production and injection wells.

In high-pressure, high-temperature fields it is, for safety reasons, especially important to have good knowledge of the subsurface and reservoir in order to drill the wells in the right location.

### 3.3 Scope of acquisitions



The figure shows the number of line kilometres (cdp-km) per year from 1975 to 2012. Although the amount of acquired seismic data measured in line-kilometres (cdp-km) has increased dramatically in recent years, there has been little increase in sailed kilometres (boat km). This is because 3D seismic data is acquired with multiple streamers, up to 16 across. Drilling site surveys are not included as the only information available is from 2009. Source: NPD

### 3.4 Weather conditions and acquisition of seismic data

Weather conditions affect the acquisition of seismic data. Normally, one is dependent on good weather and wave heights of less than 2 to 4 metres to ensure a satisfactory quality of the data. If weather conditions are poor, the seismic vessel has to wait for better weather. Wave height in particular is an important factor in seismic acquisitions, which means that acquisition is halted if the wave height is too high. The vulnerability of seismic data acquisition to wave height depends on the water depth of the streamers. While acquisition with streamers deeper in the water column is less dependent on wave height, deep streamers normally also weaken the quality of the seismic data.

Average weather conditions vary throughout the year, which means that acquisition of seismic data is seasonal. In the summer months, lower average wave height and better weather can normally be expected, ensuring high acquisition uptime and cost-effective acquisition. Seismic companies often send their ships overseas during the winter, due to limited opportunity for seismic acquisitions during the season.

## 4 Fishery activities

Fisheries can be divided into many different types, based on area and time of year, type and size of vessel and, not least, the stocks that are fished.

The cases where conflicts have occurred between seismic vessels and fishing vessels largely pertain to seasonal fisheries. Typical seasonal fisheries involve harvesting fish concentrated in particular areas at particular times, either on spawning grounds, en route to spawning grounds or in concentrated feeding areas. Fishing for cod that feed on capelin en route to spawning grounds off the coast of Finnmark is one example, while the spring cod fishery in Lofoten is an example of fishing for cod migrating to spawn and on spawning grounds. Seasonal fisheries use a variety of different gear and types of vessels, from the smallest boats with a single fisherman on board to large ocean-going combined seiner/trawlers.

Norwegian fishing and hunting take place in the Norwegian economic zone, in other countries' zones and in international waters. Based on scientific data from the Institute of Marine Research and other national marine research institutes, the International Council for the Exploration of the Sea (ICES) undertakes stock assessments and provides advice on quotas. The quota advice forms the basis for Norway's annual fisheries negotiations with other countries and the national quota allocation.

Annual regulations relating to quota size, allocation between vessel groups, technical aspects, etc. are laid down for each fishery and hunting activity. Proposals for regulations are drawn up by the Directorate of Fisheries and established by the Ministry of Fisheries and Coastal Affairs. The regulations for most fisheries are laid down at the beginning of the year.

Norway also hunts some minke whales under catch quotas set by the Ministry of Fisheries and Coastal Affairs based on advice from the International Whaling Commission (IWC). Hunting takes place from April to August.

By 31 December 2012, Norway had 6,214 fishing vessels registered in the Register of Fishing Vessels. The total fishing and hunting volume in 2012 was just over 2.1 million tonnes.

Most fisheries are seasonal. Although the regulations for some species permit fishing year round, fishing is generally limited to one or more periods of the year. This is mainly due to the fact that it is only then and there that a particular species can be profitably harvested. Fishing can essentially be divided into two groups: passive gear fishing and active gear fishing.

Passive or fixed gear is gear where one or both ends are anchored at the sea bottom and marked with surface buoys displaying the fishing vessel's registration number. Nets and lines are the most important fishing gear in this group. Fishing with such gear takes place both close to the coast with smaller vessels and larger vessels at sea. The extent of the gear can vary from chains of nets with a length of 0.5 km to a single row of lines of up to 75 km. Such gear is usually set and retrieved once a day.

Active fishing gear is characterised as fishing gear that must seek out fish to catch it. In practice, this means that satisfactory stocks of fish must be registered before fishing gear is deployed. The duration of the catching operation for gear in this group varies between 1-6 hours. Trawls, purse seines and Danish seines are the most important gear in this category.

The Directorate of Fisheries has prepared more detailed information on the various fisheries. This is available in Norwegian and English on NPD's website under seismic: <http://www.npd.no/en/Topics/Seismic/Description-of-relevant-fishing-gear/>

# 5 How are fish and the fishing industry affected by seismic acquisition?

## 5.1 How are fish stocks affected by seismic surveys?

The sound waves transmitted through the water during the acquisition of seismic data can affect marine organisms directly (physiologically) or indirectly (behavioural influence).

### 5.1.1 Direct effects - fish, eggs, larvae and fry

Fish exposed to sound waves from seismic acquisition will attempt to swim away from the source. Except for the metres closest to the sound source, adult fish are not directly injured by seismic sound waves.

Eggs, larvae and fry do not have the same ability as large fish to escape the sound source. The sound energy from seismic activity can injure or kill larvae and fry near (less than five metres) the source by causing injuries to hearing and the kidneys, heart and swim bladder. 20 metres away there is very little likelihood that fry suffer damage. The natural mortality of larvae and fry is so high that the negative effect of seismic activity is small in comparison, and the consequences at the population level are considered insignificant and the uncertainty is negligible. On this basis, no restrictions are placed on seismic surveys out of consideration to injuries to fish eggs, larvae and fry.

### 5.1.2 Indirect impact - spawning production

Fish react to sound in various ways. The weakest form of behavioural response is small changes in swimming activity where the fish changes direction and increases swimming speed, while the most powerful form of behaviour in response to sound is a quick flight reaction.

The success of spawning could conceivably be affected if, during migration to spawning grounds or during spawning, the fish change behaviour due to acquisition of seismic data. The spawning migration pattern may change and spawning may be more or less displaced in time and space. Consequently, the larvae may miss the time window of optimal biological conditions for survival and growth.

Restrictions on seismic activity have therefore been implemented in areas with important spawning grounds and in areas when concentrated spawning migrations take place. Time and area restrictions are block specific and are stipulated in the the individual licensing round announcements.

## 5.2 How do seismic surveys affect fishing?

The acquisition of seismic data impacts fisheries both by area use in that seismic vessels use gear in the sea that requires a large amount of space and by seismic shooting, which could scare the fish away. Consequently, the acquisition of seismic data may in some situations lead to lost catches and catch income or increased fishing time and higher operating costs.

However, some fisheries are more at risk than others; in particular, this applies to small vessels with short fishing seasons and a limited action radius.

### 5.2.1 Startle effect

The issue of how the acquisition of seismic data impacts fish and the practice of fishing has been the subject of considerable attention for many years.

An important question with respect to the startle effect on fish is how far away from the sound source the effect manifests itself. There is relatively little research on the startle effect. Research reports provide different results and are also somewhat contradictory, which has led to affected commercial parties having different views on the issue of minimum distance. However, how far and how the sound waves propagate depends on the prevailing horizontal and vertical salinity and temperature conditions. These change throughout the year and often from region to region. The authorities have therefore not determined a general minimum distance between seismic surveys and fishery activities, fish farming and hunting, but the regulations contain requirements that vessels carrying out seismic surveys must keep an appropriate distance to vessels engaged in fishing and from fixed and floating fishing gear, cf. Chapter 6.4.

Relatively few studies have been carried out on the startle effect, and results vary from species to species. For example, the Institute of Marine Research conducted a survey on the Nordkapp bank in 1992, where reduced trawl catches were recorded 18 nautical miles from the seismic vessel. In the summer of 2009, the Institute of Marine Research conducted a so-called consequential research project in conjunction with NPD's acquisition of seismic data outside Lofoten and Vesterålen. The results here showed that fish behaviour and catches changed. Catches both increased and decreased depending on the method of fishing. There were no reports of any specific distance for the startle effect, but it was significantly less than the one observed on the Nordkapp bank. Experiments have also shown that seismic surveys per se do not damage marine life if the distance from the sound source is more than 5 metres.

For example, mackerel is a shoal fish that swims relatively high up in the water where it can be caught with trolling lines. It is a fast-swimming fish that can easily move away from an area if it is startled.

### 5.2.2 Area occupation

Potential challenges related to the area occupied by the acquisition of seismic data are most relevant for the part of the fishing fleet that has a limited action radius and during seasonal fisheries.

The Marine Resources Act and the Petroleum Act and Regulations provide guidelines for the obligation on seismic vessels to yield and other factors such as maintaining a safe distance to fixed fishing gear and fishing vessels in fisheries. Moreover, the general maritime rules apply, provided that they apply only to avoid collision between vessels.

Unlike what is the case for fixed facilities, the Petroleum Regulations do not require a formal safety zone to be established around seismic vessels.

## 6 Regulation of seismic activity

A number of measures have been implemented in recent years to reduce the potential for possible conflicts between fisheries and seismic surveys. For those cases where losses still occur in the performance of fishery activities, a claim for compensation may be submitted, cf. the discussion of the compensation scheme in Chapter 10.

### 6.1 Requirement for authorisation

According to the Petroleum Act, none other than the State may conduct petroleum activities without authorisation. This means that anyone who acquires seismic data in connection with petroleum activities must be authorised pursuant to the Petroleum Act. Such permission may be either an exploration or a production licence<sup>2</sup>.

A prerequisite for obtaining an exploration or production licence is that the area in question has been formally opened for petroleum activities.

#### 6.1.1 Exploration licence<sup>3</sup>

Exploration licences are awarded by the Norwegian Petroleum Directorate<sup>4</sup>. An exploration licence entitles the holder to explore for petroleum, i.e. geological, petrophysical, geophysical, geochemical and geotechnical activities, including shallow drilling, as well as the operation and use of facilities to the extent they are used for exploration. The licence is not exclusive. This means that several companies may be entitled to conduct surveys in the same area.

An exploration licence may, in principle, include the entire Norwegian Continental Shelf, except for those areas that are not opened and areas awarded by production licences<sup>5</sup>. Licences may be granted for up to 3 years.

#### 6.1.2 Production licence<sup>6</sup>

Production licences are awarded by the King in Council. The production licence gives the licensee an exclusive right to survey and carry out exploratory drilling and production of petroleum resources in the area covered by the licence. This means that only the licensee may conduct petroleum activities within the area covered by the licence. The production licence thus provides more extensive rights than an exploration licence.

The duration of a production licence is determined in the individual licence.

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1 Section 1-3 of the Petroleum Act

2 Seismic data may also be acquired in connection with route and seabed surveys, cf. Section 30 of the Petroleum Regulations, cf. Section 7 of the Resource Management Regulations, but such surveys are very limited in extent.

3 Section 2-1 of the Petroleum Act

4 By law, the authority to grant exploration licences is vested in the Ministry, which has delegated the authority to the NPD.

5 Section 2-2 of the Petroleum Act

6 Section 3-3 of the Petroleum Act

## 6.2 Co-existence with other industries

Petroleum activities shall be conducted in a prudent manner, in co-existence with other industries. This important overall requirement for prudent activities is enshrined in Section 10-1 of the Act.

Section 10-1, second paragraph, first sentence of the Petroleum Act reads:

*The petroleum activities must not unnecessarily or to an unreasonable extent impede or obstruct shipping, fishing, aviation or other activities, or cause damage or threat of damage to pipelines, cables or other subsea facilities.*

This implies that the actors engaged in the petroleum industry must take other industries and users of the sea into account when they plan their activities.

In relation to the fishing industry, this means that the licensee, before conducting a seismic survey, must decide whether the survey could have been undertaken in a different place, at another time or in a manner that would have been better for fishermen, without having significant practical or economic consequences for the licensee. If licensees have not included such considerations and assessments in their planning, it could be difficult to assess whether the survey unnecessarily complicates or impedes other business interests. It is therefore important that licensees demonstrate and document that they have taken these factors into account in their planning. The Institute of Marine Research and the Directorate of Fisheries can assist licensees with relevant information, and early contact with them is recommended.

If a licensee does not comply with the provisions of Section 10-1 of the Petroleum Act, it could provide a basis for the Government to intervene and suspend activities<sup>7</sup>. The cause of an injunction to suspend activities may be violation of both the first and second subsections of Section 10-1. Such injunctions to suspend activities are invasive and will have major economic consequences. The Act therefore stipulates that any suspension of activities is subject to "special circumstances". The Norwegian Oil and Gas Association has published *Recommended guidelines for Coexistence with the fishing sector when conducting seismic surveys*, which offers considerable advice and suggestions on how to achieve coexistence. It is recommended that planning is started early, preferably the year before the planned start of a seismic acquisition, and no later than early that same year. The work going on in the early planning phase is important for achieving good coexistence, and it is recommended in this phase that the operator of the acquisition:

- Establish an overview of all stakeholders,
- Establish a list of other acquisition activities planned in the same area at the same time,
- Establish an overview of fishery activities and any spawning and spawning migration in the area,
- Establish contact with relevant fisheries organisations,
- Make its own organisation aware of the conditions surrounding the acquisition of seismic data in Norway.

In addition, the guideline describes recommended and regulatory measures in later planning phases and during implementation of the acquisition.

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<sup>7</sup> Cf. Section 10-1, third subsection of the Petroleum Act

The authorities see the guideline as a good and important tool, and require the petroleum industry to follow the guidelines faithfully.

However, it cannot be expected that all seismic acquisitions only take place during periods of low fishing activity. Weather conditions and time constraints due, for instance, to spawning can imply that the licensee has a very limited amount of time to conduct the surveys, and thus must conduct the surveys even though there are substantial fishery activities in the area.

### **6.3 Time and area restrictions**

Seismic has little effect on eggs, larvae and fry, but can affect fish behaviour and migration patterns, adversely affecting spawning production. Time limits have therefore been introduced for seismic activity in areas with important spawning grounds and in areas where there are concentrated spawning migrations.

Time and area restrictions are in relation to the individual block and are stated in the wording of the individual licensing round announcements.

### **6.4 Safe distance - Section 5, first subsection of the Resource Management Regulations:**

Section 5, first subsection of the Resource Management Regulations, reads:

*"Vessels carrying out seismic surveys shall maintain a safe distance from vessels carrying out fishing activities and from fixed and floating fishing gear. Particular attention must be exercised when an accumulation of fishing vessels is observed."*

This means that the seismic vessels shall keep such good distance to fishing vessels that no ongoing fisheries are unduly affected or that deployed fishing gear is physically destroyed.

### **6.5 Marine Resources Act**

The Act relating to the management of wild living marine resources (Marine Resources Act) aims to ensure sustainable and socio-economically profitable management of wild living marine resources and associated genetic material, and to contribute to securing employment and settlement in coastal communities.

Section 24 of the Act deals with the rules of due care by the following: *"Any person arriving at harvesting grounds where gear has been set shall acquaint himself with the location of such gear. All persons shall conduct themselves in such a way that fishing gear is not damaged or unnecessarily endangered. It is prohibited to impede harvesting or spoil harvesting opportunities by means of shooting, noise or other improper conduct. The Ministry may adopt further provisions on the manoeuvring of vessels and conduct on harvesting grounds."*

The ban must be viewed in light of the materiality criterion, cf. also Chapter 6.4 and the compensation provisions in Chapter 10.2.1 and 10.2.2.

## 6.6 Other matters that are regulated

Requirements for fishery experts on board the seismic vessel, reporting system, tracking seismic vessels and the compensation scheme for Norwegian fishermen are also regulated in the Petroleum Regulations. These are important and often comprehensive rules, and are therefore referred to as separate topics in the following chapters.

### **Mackerel fishing and seismic acquisition the summer of 2012**

In connection with mackerel fishing and seismic surveys on Tampen the summer of 2012, the Norwegian Fishermen's Association and Statoil agreed to carry out a pilot project.

The pilot project involved close monitoring of the inflow and distribution of mackerel, as well as regular communication with the Norwegian Fishermen's Association. Based on close follow-up and communication, information was to be obtained on the need for a possible hiatus in acquisition on Kvitebjørn, and the proper timing and length of such a pause.

A working group was established consisting of representatives from the Norwegian Fishermen's Association, the Directorate of Fisheries and Statoil, as well as an independent fisheries adviser at Statoil's office. The working group met 1-2 times a week and discussed the fisheries' development.

Based on the discussions and recommendations of the working group, Statoil paused seismic acquisition on Kvitebjørn from 5 August

to let mackerel enter the area undisturbed. Little fishing was done in the Oseberg/Kvitebjørn area over the next 12 days. Towards the end of the period the fishery was established closer to land. The Fishermen's Association agreed to the resumption of acquisition on 17 August in confidence that Statoil would pause seismic acquisition at the request of the Fishermen's Association should the situation warrant it. Seismic acquisition on Kvitebjørn was later paused from 3 to 5 October due to dense accumulation of purse seiners in the area.

The Norwegian Fishermen's Association, Statoil and the Directorate of Fisheries later evaluated the project. The season was completed without any major conflicts between troll fishery for mackerel and seismic acquisition. This is a common opinion shared by all parties involved, and the situation has improved compared to previous years. The pilot project has made a decisive contribution to achieving this. In addition, mackerel migration changed in 2012, also contributing to fewer area conflicts. Statoil and the Norwegian Fishermen's Association intend to continue the pilot project in 2013, should seismic acquisition be necessary during the trolling season.

## 7 Fishery expert and escort vessels

The Petroleum Regulations stipulate that vessels carrying out seismic surveys must have a fishery expert on board when it is necessary for fishing operations in the area<sup>8</sup>.

### 7.1 The role of the fishery expert

The fishery expert plays an important role. The person shall actively contribute to enabling the petroleum industry and fisheries to coexist at sea. It is therefore essential for the fisheries expert to be objective in his dealings with all parties, and that he gives his advice on a free and independent basis. The fishery experts shall serve in an advisory capacity to the ship's management, and the management of the survey on the vessel. He shall provide information about any fishery activities in the area, including for example what particularly characterises the drift pattern of the different gear groups, vessel movements and fixed gear.

The fishery expert shall aid communication between the seismic vessel and fishing vessels in the area. He shall be available within the framework of what is reasonable to expect, based on the staffing the licensee has chosen. Advice from fishery experts that is rejected shall be recorded in the log.

The fishery expert shall preferably be involved prior to the survey, but no later than the kick-off meeting, at which the role of the fishery expert shall be clarified. At this meeting, the fishery expert should give a briefing on any expected fishery activities based on obtained information and information contained in the assessment from the Directorate of Fisheries. He shall obtain an overview of the vessels in the area and should well ahead of the start of acquisition contact fishing vessels that may be affected by the seismic surveys and hear their views and what their plans are. Based on this, the seismic acquisition can be adjusted and adapted to the benefit of both industries.

In some cases, the licensee collecting seismic data elects to have two fishery experts on board. The advantage of this is that a fishery expert will then be present on the bridge at all times. It is recommended that the need to have two fishery experts on board is always considered. This can be useful in connection with acquisitions in areas with high fishing activity.

### 7.2 Qualifications of the fishery expert

To enable the fishery expert to carry out his assignment in a sound manner, it is important that the person has in-depth knowledge of the fishery activities. The expert must accordingly meet certain requirements. More information about these requirements is available on NPD's website.

NPD organises courses for fishery experts in collaboration with the Directorate of Fisheries. More information about the course is available on the [NPD website](#). The NPD website also contains a list of qualified fishery experts, along with a manual for fishery experts.

The fishery expert shall keep a log according to a specified format. The logbook must be submitted to the NPD and the Directorate of Fisheries no later than two weeks after the acquisition is concluded.

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<sup>8</sup> Section 5 of the Resource Management Regulations

### **7.3 Seismic vessels**

Relevant regulations related to the activities carried out by the vessel on the Norwegian Continental Shelf shall be available on board in Norwegian and English.

The ship's captain, navigators and management of the seismic survey shall familiarise themselves with Norwegian regulations affecting the interaction between seismic activity and fishery activity.

The advisory response from the authorities shall be available on board in Norwegian and English before the survey starts. The ship's captain, navigators and management of the seismic survey shall familiarise themselves with the contents.

### **7.4 Escort vessels**

Escort vessels shall have a passive role vis-à-vis third parties<sup>9</sup>. This means that escort vessels may not order fishing vessels to move out of the way of the seismic vessel, and that communication with the fishing vessels shall mainly take place via the seismic vessel.

The licensee shall ensure that the crew of the escort vessel has familiarised itself with applicable regulations and Norwegian conditions.

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<sup>9</sup> Section 5, subsection eight of the Resource Management Regulations.

# 8 Coordination meeting and information about the survey to be submitted to the authorities

## 8.1 Coordination meeting

Together with industry representatives, the Ministry of Petroleum and Energy and the Ministry of Fisheries and Coastal Affairs will initiate an annual meeting before the survey season starts. The purpose of such meetings is that the authorities must inform companies about matters of importance in terms of time and areas where fish stocks and/or fisheries can be especially affected by seismic surveys. The annual meeting will be held early enough to have a direct bearing on the planning of future seismic surveys.

## 8.2 Notifications that must be sent prior to start-up

No later than five weeks prior to the start up of survey activities, the licensee shall submit details of the survey to the Norwegian Petroleum Directorate, Directorate of Fisheries, Institute of Marine Research and Ministry of Defence<sup>10</sup>. The licensee shall report the time and area of the survey. When the State itself collects seismic data these acquisitions shall also be reported according to this system.

On the basis of the information submitted, the authorities will provide advisory feedback within their area of expertise. Thus, to incorporate the consideration of living resources and fishery activities in the best possible manner, the Directorate of Fisheries will comment on any fisheries activity, and the Institute of Marine Research on fish resources, such as spawning. To achieve the most optimal handling of questions about living resources and fishery activity, licensees are advised to contact the Directorate of Fisheries and Institute of Marine Research as early as possible in the planning phase of their seismic surveys.

The NPD provides overall feedback to the licensee. Given the advisory statements that have been made, the licensee should to the extent possible adapt its acquisition in accordance with the advice.

Before the start of each survey the NPD announces the survey area, time period, call sign of the vessel, etc. by publishing this on the [NPD website](#), which also provides an overview of ongoing seismic acquisitions.

It is very important that the licensee carefully considers the time required for the individual survey before submitting the notification. Experience has shown that the extension of surveys is one of the main causes of conflicts. Furthermore, it is important that information about ongoing seismic acquisitions is correct and up to date. The Petroleum Regulations therefore require that changes in surveys must be reported to the authorities. Change means both those situations where the survey starts later than planned, and the situations in which the survey continues beyond the period stipulated. Changes must be reported as soon as possible and no later than ten business days before the scheduled date of termination if the survey is to continue beyond the stipulated period.

## 8.3 Reports to be submitted when the survey is under way

The licensee shall send reports to the authorities also when the survey is under way. The licensee shall on a weekly basis send information that includes startup, expected conclusion and status of the survey. This information enables the authorities to monitor the activity on the Continental Shelf, and provide updated information.

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<sup>10</sup> Section 6 of the Petroleum Regulations, cf. Section 4 of the Resource Management Regulations.

# 9 Tracking of seismic vessels

## 9.1 Background

Vessels carrying out seismic surveys shall carry and use equipment that monitors and reports the activity of the vessel, such as satellite tracking equipment and a voyage data recorder<sup>11</sup>.

Fisheries legislation stipulates that Norwegian fishing vessels with an overall length of 15 metres or more must be able to be tracked. In the Skagerrak, the requirement applies to fishing vessels with an overall length of 12 metres or more operating outside 4 nautical miles from the baseline<sup>12</sup>. Such tracking of seismic vessels and fishing vessels makes it possible to retrospectively reconstruct movements on the sea, as one of several means of documenting and clarifying allegations about incidents. The Coast Guard will also be able to follow movements in real time. The authorities find that the ability to reconstruct events and conflict situations helps to reduce the level of conflict in connection with the acquisition of seismic data.

Licenses performing seismic surveys in Norwegian waters must contact their contractors at an early stage in order to verify that the vessel that is to collect seismic data has the mandatory equipment and software. The Directorate of Fisheries is the technical operator for tracking seismic vessels.

## 9.2 Position reporting

An electronic message must be sent from the seismic vessel no later than at the start-up to the Directorate of Fisheries' tracking centre to activate the reception of signals. The vessel shall then automatically report the position of the vessel to the Directorate of Fisheries twice every hour for the duration of the activity. The Directorate of Fisheries may, at the request of the NPD, obtain confirmation of the individual vessel's position more than twice every hour.

The position report shall contain:

- |   |   |
|---|---|
| a) unique identification of the vessel,   | c) the time and date of the vessel position,      |
| b) the geographical position of the vessel at the time of reporting with a position fault of less than 500 metres and a confidence interval of 99%, | d) the speed and course at the time of reporting, |
|   | e) identification of the type of report submitted |

## 9.3 Use and storage of tracking data

Tracking information received from vessels is saved in a tracking register. The register and rules on the use of the information will ensure that confidentiality issues are adequately addressed.

The register's primary users are authorised personnel in the NPD, the Directorate of Fisheries and the Coast Guard, as well as the Main Rescue Coordination Centre.

The information in the register is protected under the rules of the Public Administration Act pertaining to confidentiality, the Freedom of Information Act and Personal Data Act. More detailed information about tracking equipment on board seismic vessels is found on [NPD website](#).

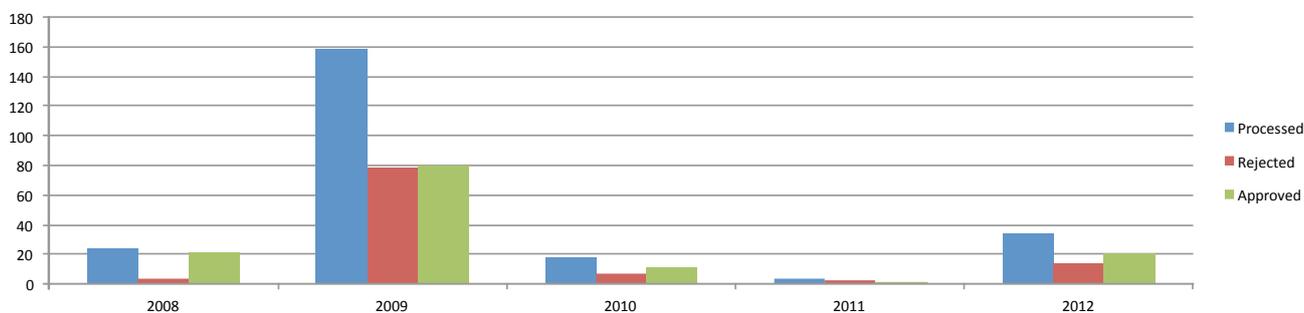
<sup>11</sup> Section 10-19, fifth subsection of the Petroleum Act, cf. Section 5a of the Resource Management Regulations

<sup>12</sup> In Regulation No. 1743 of 21 December 2009 on position reporting and electronic reporting for Norwegian fishing and hunting vessels, amendments were made as at 10 August 2012 with regard to the size of vessels for which position reporting is required, cf. Regulations No. 454 of 24 March 2010 concerning requirements for equipment and installation of position reporting equipment

# 10 Compensation scheme for Norwegian fishermen

## 10.1 Background

The intention of the Petroleum Regulations is to help ensure joint use of the sea in all phases of the activities. The regulations include a number of measures for achieving this, including impact assessments in advance of the opening of areas to petroleum activities, time and area restrictions on the acquisition of seismic data, the requirement to have a fishery expert onboard seismic vessels and that facilities on the seabed must be overtrawlable. The authorities nevertheless see that offshore petroleum activities on the Shelf may at times inconvenience fishermen. Chapter 8 of the Petroleum Act therefore has special rules on compensation for Norwegian fishermen for financial losses resulting from petroleum activities, including losses resulting from occupied fishing grounds, pollution/waste and losses due to damage caused by facilities. In the exploration phase, compensation for financial losses resulting from occupied fishing grounds will be relevant.



The figure shows the number of cases heard by the compensation board in the period 2008–2012. Source: The Directorate of Fisheries.

## 10.2 Further details on conditions for compensation

### 10.2.1 Occupation of fishing grounds

Section 8-2, first subsection of the Petroleum Act reads: *In the event of petroleum activities within an area entirely or partly occupying a fishing field, the State is obliged, to the extent that fishing becomes impossible or is substantially impeded, to award compensation in respect of any resulting financial loss.*

Exploration activities, including seismic acquisitions, are part of the petroleum activities and are therefore covered by the said provision.

### 10.2.2 Full or partial occupation

It is a condition for compensation under the provision that petroleum activities wholly or partly occupy a fishing ground. Legislators primarily had occupation as a result of the placement of permanent facilities in mind when the rule was issued. Nevertheless, it cannot be excluded that seismic activity also may be regarded as complete or partial occupation in specific cases, and this is also applied in practice when dealing with compensation claims.

Seismic acquisition is, however, a time-limited activity. In this respect, the criterion of whole or partial occupation would only be considered to be met in very special cases.

For the criterion of occupation to be met, the individual fisherman must have a clear connection with the fishing grounds in question, i.e. have fished in the relevant area for some time. The criterion concerning association with the fishing grounds means that the system is most important for fishing operated by small vessels relatively close to land and that they, due to their size and/or equipment have limited opportunities to seek alternative fishing areas. Also larger, ocean-going vessels may in certain circumstances be entitled to compensation, if relevant

association with the respective fishing grounds is ascertained.

### 10.2.3 The fishing must be made impossible or significantly impeded

Further, it is a condition that fishing becomes impossible or significantly impeded due to the seismic activity. In other words, any inconvenience will not entitle a fisherman to compensation. For example, fishing is not rendered impossible or substantially impeded if fishing can take place at a reasonable level, without significant additional costs or time lost.

### 10.2.4 Financial loss

Each fisherman must prove that he has suffered a financial loss. The financial loss may have occurred as a result of, among others, lost catches and fishing time. Additional expenses that the fisherman has incurred in order to limit his losses or fill his quota, for example by searching for fish in other areas, are covered by the compensation scheme.

It is a general principle of the law of damages to seek to limit one's financial losses. This also applies to compensation under Chapter 8 of the Petroleum Act. Each fisherman is obliged to seek to limit his financial losses. For example, this implies that within reasonable limits, there is an obligation to search for fish in other areas if possible.

The financial loss must be documented. One method of documenting a possible reduced catch can for example be to refer to contract note data for one or more corresponding periods without seismic acquisition, and compare this with contract note data for the period in which seismic acquisition takes place.

## 10.3 Review by commission

Claims made under Chapter 8 of the Petroleum Act Chapter is dealt with by a commission<sup>13</sup>. The commission consists of representatives from the fishing industry and the petroleum industry, and is chaired by a representative who meets the requirements to serve as a judge. The composition of the commission shall ensure that both industries are represented, and that the requirements are addressed by representatives who have knowledge of fisheries and petroleum activities.

The commission's decisions may be appealed to an appeals board.

The Directorate of Fisheries is the secretariat for the appeals board.

The compensation claims are sent to the appeals board via the Directorate's regional office in the relevant district. The Directorate of Fisheries has prepared a [standard form](#) for filing a compensation claim.

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<sup>13</sup> Section 8-6 of the Petroleum Act, cf. Chapter 8 of Regulations of 12 December 2008 to Act No. 72 of 29 November 1996 on Petroleum Activities concerning compensation of fishermen.

# 11 Guidelines for disagreement

Licensees who have an exploration or production licence are obliged<sup>14</sup> ahead of the impending exploration activity to give notification of the planned survey to the NPD and the Directorate of Fisheries.

In some cases, the directorates may disagree on whether a survey should be carried out as notified or not. This will typically be cases where the Directorate of Fisheries believes the survey cannot be completed out of consideration for the fishery activities. Formally, the licensee has the right to conduct the survey, but it is unfortunate when this takes place contrary to feedback from the authorities. To ensure a comprehensive assessment of these matters, as well as quick resolution, the MFCA and MPE have agreed on guidelines for handling notifications pursuant to Sections 6 and 30, cf. Section 4 of the Resource Management Regulations.

The guidelines facilitate the raising of the issues to the director general level in the directorates, and if agreement cannot be reached here, the NPD shall raise the issue before the MPE for a decision in consultation with the MFCA.

The MFCA and MPE assume that the directorates will do their utmost to resolve disagreements at the directorate level, and that there will only in exceptional cases be a need to raise the issues to the ministry level.

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<sup>14</sup> Sections 6 and 30 of the Petroleum Regulations, cf. Section 4 of the Resource Management Regulations.

# 12 Material collection

## 12.1 Acts and regulations

[Petroleum Act](#)  
[Petroleum Regulations](#)  
[Resource Management Regulations](#)  
[Marine Resources Act](#)

## 12.2 Websites

[Norwegian Petroleum Directorate](#)  
[Directorate of Fisheries](#)

