CORE VALUES

Selected cores from the Norwegian continental shelf

138 000 metres of cores

The Norwegian Petroleum Directorate (NPD) manages a unique collection of cores from exploration and production wells on the Norwegian continental shelf (NCS). That includes a total of 138 000 metres of samples from 1 600 wells, embracing most of those drilled for exploration purposes since offshore operations began in these waters almost 50 years ago. They are held in a store covering 2 879 square metres.

Operators are legally obliged to report general drilling data to the government, including rock materials, logs and fluids. They also have to report seismic survey results and submit data on discoveries. In addition, details on resources in each discovery and field must be provided, along with projections for production, costs and emissions/discharges to the environment.

Data required by the activities regulations on the NCS are the nation's property. Employing them efficiently allows the companies to make better use of their resources. That's why the core repository is open and easily accessible to the whole petroleum industry – and in daily use by oil companies who want to form a picture of an area before possible further investigation. Consultants, research institutes and academics are also frequent users of this vast stock of material.

The following samples symbolise Norway's wealth, resource management and commitment to future generations. They are our core values.

Balder

Well: 25/11-1

Early Eocene sandstone, Balder Formation, 55 million years old. Acquired in 1967 from a depth of 1 735 metres.

Oil was first discovered on the NCS in 1967 with a well in block 25/11 west of Haugesund, in what is now the Balder field. This discovery was so small that it initially ranked as non-commercial.

The geology was also so complex that seismic data were inadequate. It only proved possible to map the thin sandstone beds many years later, following the transition from two- to three-dimensional seismic, and production began in 1999.

The 1967 discovery was nevertheless historic because it proved the presence of oil on the NCS, and persuaded several oil companies to continue exploring. Balder is unusual in having only one licensee – Esso, later ExxonMobil. To ensure diversity, the government normally requires three or four partners per licence.

Ekofisk

Well: 2/4-B-19a

Chalk from the Tor Formation, Maastrichtian age, 67 million years old. Acquired from a depth of 3 218 metres.

Discovering oil and gas in Ekofisk in the autumn of 1969 represented the breakthrough for Norway's petroleum industry. At the time, developing offshore production installations posed major technological challenges.

A field accordingly had to be large to justify the investment, and Ekofisk lived fully up to expectations. It ranked in 1969 as the world's largest offshore petroleum discovery. And Ekofisk will probably be Norway's longest producing field.

It represents Norwegian oil history at its best and worst, including the first uncontrolled blowout on the NCS in 1977. The Alexander L Kielland disaster of 1980, which cost 123 lives, took place on another field in the "Ekofisk Area".

Ekofisk has also faced big technological challenges. In 1984, for example, it was found that the seabed had begun subsiding because of reservoir collapse. This meant that all the field installations had to be jacked up.

A groundbreaking waterflooding programme was launched in the 1980s and boosted the recovery factor substantially. The government played a crucial role here.

Experience gained from Ekofisk has created parameters for development solutions, safety routines and government follow-up, and the field is a monument to the Norwegian oil adventure.

Statfjord
Well: 33/12-1

Middle Jurassic sandstone, Brent Group, about 170 million years old. Acquired in 1974 from a depth of 2 512 metres.

Statfjord is Norway's biggest oil field measured by recoverable reserves. It extends into the UK continental shelf, and the division of its resources led to discussions between the Norwegian and British governments.

The water depth and geological formations prompted the choice of concrete gravity base structures to support the platforms, and deep Norwegian fjords were perfect for mating these with their steel topsides.

Statfjord A was built as an integrated platform, with personnel living and working on the same facility. This led to discussions about safety.

When Statfjord B was to be built on the same model, the government dispatched "the most expensive letter" in Norwegian history to demand a clearer division between processing facilities and living quarters. This delayed production from the field for several years.

Statfjord's gas was also the first to come ashore in Norway. Crossing the deepwater Norwegian Trench with the Statpipe line in the mid-1980s was groundbreaking, and laid the basis for the Kårstø processing facility north of Stavanger.

Troll
Well: 31/2-6

Late Jurassic sandstone, Sognefjord Formation, 160 million years old. Acquired from a depth of 1580 metres.

Troll is one of the world's largest offshore gas fields, and the cornerstone of Norway's gas production. A thin oil layer beneath the gas is so difficult to access that it was initially regarded as non-commercial. However, a combination of government pressure, advanced technology and horizontal drilling eventually made recovery possible.

Estimates for recoverable oil reserves in Troll have gone from zero to a formidable 1.6 billion barrels – a success story in terms of technology, resource management and value creation. So much crude was present in Troll, in fact, that it ranks today as one of Norway's most productive oil fields.

It is also renowned for the 472-metre-high Troll A platform, which ranks as the tallest moveable structure built by humans – and one of the most complex installations ever constructed.

This 656 000-tonne unit was towed 200 kilometres from the Vats Fjord to Troll in 1995. It represents outstanding concrete construction technology, and continues to attract attention and admiration worldwide.

Snøhvit

Well: 7121/4-1

Middle Jurassic sandstone, Stø Formation, 174 million years old. Acquired in 1984 from a depth of 2 390 metres.

Snøhvit was the first field development in the Barents Sea, and the largest industrial project ever in northern Norway. This big gas field was discovered in 1984, but no less than 18 years passed before the Storting (parliament) resolved that it should be developed.

The process took that long because the project was technologically demanding and very expensive. It also generated much political debate and strong protests from the environmental movement. However, Snøhvit incorporates very advanced environmental technology. It was the first field on the NCS developed entirely with subsea facilities – all production takes place under water and is remotely operated from the Melkøya island outside Hammerfest.

The unprocessed wellstream is transported to shore through a 160-kilometre multiphase pipeline – the longest of its kind in the world.

Carbon dioxide is extracted at Melkøya and piped back to the field for deposition beneath the seabed. The gas is liquefied at Melkøya and shipped to market in LNG carriers.

Ormen Lange
Well: 6305/5-1

Early Paleocene sandstone, Egga Formation, 65 million years old.
Acquired in 1997 from a depth of 2 733 metres.

Ormen Lange lies in the Norwegian Sea, north-west of Kristiansund, and is the first deepwater field developed north of the 62nd parallel. It meets up to 20 per cent of UK gas requirements, corresponding to Norway's entire energy consumption.

Located in 800-1 000 metres of water, Ormen Lange is the second-largest gas field on the NCS. The water depth and extreme weather conditions made the development very challenging, and prompted the development of new technology.

Ormen Lange is one of the first gas fields developed without surface installations. Everything takes place on the seabed, with the gas transported in a 140-kilometre pipeline for processing at Nyhamna in Møre og Romsdal county. Local fishermen participated in determining its route.

Johan Sverdrup
Well: 16/2-7

Late Jurassic sandstone, Draupne Formation, 150 million years old. Acquired from a depth of 1 957 metres.

Johan Sverdrup represents the beginning of a new Norwegian oil adventure. Found in 2010 on the Utsira High in the North Sea, this oil discovery was established in 2011 as one of the largest on the NCS.

The news attracted much international attention, not least because the discovery lies in an area which had been “written off”. Many companies drilled several exploration wells in the area over a number of years without success.

Johan Sverdrup thereby demonstrated the value of the awards in predefined areas (APA) scheme. This aims to encourage more detailed exploration of areas with established infrastructure, and Johan Sverdrup proved that new ideas can pay off.

Johan Castberg
Well: 7220/7-1

Early Jurassic sandstone, Nordmela Formation, 190 million years old. Acquired in 2011 from a depth of 1 952 metres.

Johan Castberg lies north-west of Snøhvit and ranks as the biggest oil discovery in the Barents Sea. It was made in 2011 and, together with Johan Sverdrup, created new optimism within Norway's offshore industry.

Although seen as the driving force in this part of the NCS, Johan Castberg's location represents major challenges. It lies 200 kilometres from shore, and infrastructure costs are likely to be substantial.

The government is engaged in ensuring area-wide, longterm solutions, and requires that the Johan Castberg development takes account of other possible discoveries in the vicinity.

The development concept will probably be decided during the summer 2015.

Aasta Hansteen
Well: 6707/10-1

Late Cretaceous sandstone, Nise Formation, 80 million years old.
Acquired in 1997 from a depth of 2 974 metres.

Aasta Hansteen lies in 1 300 metres of water in the Norwegian Sea, one of the deepest gas discoveries on the NCS. The field represents a number of challenges.

It is a long way from established infrastructure, and the solution will be a 480-kilometre pipeline called Polarled to Nyhamna in Møre og Romsdal county. Devided jointly by a number of oil companies, this facility will be the deepest of its kind in the world.

Polarled opens up a new region and lays the basis for further exploration in a part of the Norwegian Sea where activity has so far been limited.

Moreover, development of Aasta Hansteen is one of the most technologically demanding projects to date on the NCS, and includes a cylindrical Spar floating platform. Production is due to start in 2017.

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