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Press Kit Alvheim Production
Alvheim FPSO, and subsea including pipeline

No. of Sheets: 8

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1 Introduction

1.1 Purpose of document

This document contains information about the Alvheim field in production.

All content is free to use for editorial purposes.

1.2 Det norske oljeselskap

With Alvheim in production Det norske oljeselskap ASA (DETNOR) is a fully fledged oil company with exploration, development and production of the petroleum resources on the Norwegian shelf.

Det norske is headquartered in Trondheim, with offices in Oslo and Harstad.

2 About the Alvheim field

The Alvheim field (PL 036C, PL 088BS og PL 203) includes the reservoirs

- Kneler
- Boa
- Kameleon
- Øst-Kameleon

The Alvheim field has been developed with a specially designed FPSO-vessel (Floating Production Storage and Offloading)

The infrastructure on the seabed consists of five production manifolds with associated flowlines back to the Alvheim PFSO.

The development of the field is based on transporting oil with shuttle tankers. Gas is exported through the UK SAGE system. Improved reliability and work optimization increased the FPSO production capacity from 120,000 to 150,000 barrels a day.

The field is operated by Det norske oljeselskap with a 65% share. Partners are ConocoPhillips Skandinavia AS (20%) and Lundin Norway AS (15%).

Facts:

- The Alvheim field consists of Kneler, Boa og Kameleon.
- Gross reserves: 180 million boe.
- The Kneler reservoir is at approximately 2200 meters depth and is located in the Heimdal formation.
- The Boa reservoir is at approximately 2300 meters depth. Its discovery well identified a 25-meter gas column on top of 28 meters of oil in high-quality sands.
- The Boa reservoir straddles the Norway-UK median line. A cross-border unit has been established between the Alvheim group and British owners Maersk Oil & Gas og OMV.
- 10 producing wells and two water disposal wells were finalized in phase 1 of the drilling program.
- Three more production wells were finalized in phase 2 of the drilling program in 2010/2011.
• Oil is transported by shuttle tanker. Gas is transported through the U.K. Scottish Area Gas Evacuation (SAGE) system to St Fergus, Scotland.
• First production began on June 8, 2008.

2.1 Vilje

Det norske oljeselskap holds a 46,9 percent working interest in the Vilje field (PL036D) in the North Sea, and is the operator. Statoil and Total E&P Norge are partners with 28,9 and 24,2 percent respectively. Vilje has two templates and two production wells, and is tied back to the Alvheim PFSO through a 19 kilometer long pipeline.

Facts:

• Developed with two subsea wells tied to Alvheim FPSO.
• First production began on July 31, 2008
• Vilje was discovered in 2003. The reservoir was found in the Heimdal formation, and the well has a total depth of 2270 meters. The discovery well encountered a gross oil column of approximately 68 meters. Vilje is estimated to contain recoverable reserves of approximately 54.6 million barrels of oil equivalent.

2.2 Volund

Det norske oljeselskap holds a 65 percent working interest in the Volund field (PL 150), and is the operator. Lundin Norway AS is partner with 35 percent. Volund has four production wells and one water injection well.

Facts:

• Initial production from Volund started on September 9, 2009.
• Regular production started mid-April 2010, when processing capacity on the Alvheim FPSO became available. Before that, Volund was utilized as a swing producer.
• The Volund field (PL150) is located 8 kilometers south of the FPSO-vessel at Alvheim
• Volund has four production wells and one water injection well.
• Estimated reserves: 30 million barrels of oil equivalent.
• Volund crude oil is part of Alvheim Blend being transported to market by shuttle tankers. Gas will be transported via Alvheim to the SAGE pipeline to St Fergus.

2.3 Bøyla

The Bøyla field (PL 340) consists of two production wells and one water injection well tied to Alvheim FPSO. PUD was approved by the Ministry of Petroleum and Energy in Oktober 2012, including a so called EPIC contract with Technip (Engineering, Procurement, Installation and Commissioning). The first production from Bøyla is scheduled for Q1 2015. Det norske oljeselskap holds a 65 percent working interest in the Bøyla field, and is the operator. Core Energy and Lundin Norway are partners with 20 and 15 percent respectively.
2.1 Location

The Alvheim field is located in block 25/7 og 25/8, 120 nautical miles west of Haugesund, and 7 nautical miles south of the Heimdal field. Water depth in the area is about 120 meters.
EC 225
Besætning
Anesthesisygepleier
FLIR

Statfjord B

EC 225
Besætning 5
Anesthesisygepleier
FLIR

Oseberg SAR

UK SAR Sumburgh

S-92
Besætning 4
Maskinist og redningsmønster medisinsk trenet
FLIR

Super Puma L-2
Besætning 4
Minimum er en paramedic (Winch operator eller Winchman)
FLIR

ALVHEIM FPSO

Miller Jigsaw SAR
3 Available oil spill response vessels

When in need of 7 systems, 2 vessels are mobilized from pool of 20 oil response-vessels that will acquire equipment and personnel in Stavanger and at Mongstad.

Balder: Stril Power
Sleipner/Volve: Esvagt Bergen
Oseberg/Troll: Havila Troll
Oseberg/Troll: Esvagt Stavanger
Tampen: Stril Herkules

6. system: Stril Mermaid – Det norske Stavanger
7. system: Stril Orion – Det norske Stavanger

Disperse:

The following vessels within 1 hour of sailing has dispersants:

Esvagt Contender 8 m³
Esvagt Capril 25 m³
Stril Power 75 m³

Stril Mermaid is under contract with Det norske and has 19 m³ of dispersants on board.
4 Helicopter

Super Puma AS 332 L2, Sola
The Super Puma is based at Sola, and will transport personnel to and from Alvheim FPSO. The Super Puma AS 332 L2 can carry 19 passengers and has got medical equipment on board. Helicopter crew 24/7 og 1 hour mobilization.

![Super Puma AS 332 L2](image)

Picture: Super Puma AS 332 L2

AWSAR Sea King, Sola
The nearest land based rescue helicopter is the Sea King of the 330-squadron at Sola, operated by Luftforsvaret (Air Force), and at stand by 24 hours. Mobilization is 15 minutes, twentyfour seven. There is a doctor on board.

![AWSAR Sea King](image)

Picture: AWSAR Sea King

BP Miller JIGSAW, Miller-feltet
BP Miller's AWSAR-helicopter (Super Puma AS332 L2) is a standby resource for SAR in case of an incident within the 500 meter zone and in case of «red evacuation». The helicopter is operated by Bond Helicopters and is based on the BP Miller-platform in the UK sector. The helicopter is ready 24/7. Mobilization for the helicopter is 10 minutes between the hours of 07:00-19:00 and 30 minutes between 19:00-07:00. There is a doctor on board.
5 Reception centre for next of kin

In the case of an incident, Sola Airport Hotell will be the reception centre for next of kin.

6 The environment and natural resources in the area

Environmental challenges for the Alvheim, Volund and Vilje fields

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<tr>
<td>Seabed conditions and benthic fauna</td>
<td>Several species of cold water corals are known in Norwegian waters. Stony coral <em>Lophelia pertusa</em> is the only species known to build reefs and the species is distributed along the whole coast of Norway from Østfold to Finnmark (Moen &amp; Svendsen, 2003). Cold water gorgonian corals (soft corals) do not form reefs and their distribution are more scattered. High density communities of gorgonian corals are known as coral gardens. Soft corals are often associated with Lophelia reefs and together they constitute a diverse habitat. Both Lophelia reefs, coral gardens and deep-sea sponge aggregations are included on the OSPAR list of threatened and/or declining species and habitats (OSPAR, 2008). <em>L. pertusa</em> and gorgonian corals grows on hard bottom and lack of suitable substrate is the likely reason for the absence of coral reefs in central North Sea. Thus, there are no know observations of corals in the area around Alvheim.</td>
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### Artifacts on the seabed

Within the Norwegian territorial limit of 12 nautical miles from the base line all traces of human activity dated earlier than 1537 and ship wrecks older than 100 years are automatically secured. In practice these regulations are applied in the rest of the Norwegian Economic Zone as well. The exact position of the wrecks in the Norwegian Coastal Administrations database is not available for the public due to ownership relations and danger of plundering of the wrecks.

### Water current conditions

Inflowing warm Atlantic water and the northward coastal current constitute the dominating currents in the area. Both major and local currents may affect the drift of oil in the area, and potential oil spills from Alvheim may affect resources located both north and south.

### Seabirds

Sea birds in general have a very high probability of being affected by oil spills, and are vulnerable to both direct and indirect effects when exposed to oil. Loss of insulation due to soiled feathers can lead to mass mortality within short time after an oil spill (Lorentsen et al., 2010). Birds are also subject to poisoning and toxic effects from grooming soiled feathers and through eating oil-polluted prey. During the moulting period (autumn), sea birds are particularly vulnerable to oil spills. The seabird species at highest risk are pelagic divers. The North Sea is an important area for many seabird populations. The area outside Karmøy and Jæren houses large breeding colonies. The area from Utvær to Stadtlandet is very important for coastal diving species.

### Marine mammals

There are several species of whales and seals in the North Sea. Common whale species are porpoise, killer whale, white-beaked dolphin, sperm whale, long-finned pilot whales and mink whale. Whales are in general not considered vulnerable to oil spills, chemical spills or operational discharges from drilling operations on a population level. Seals are affected by oil spills through inhalation of volatile organics from oil and digestion of oil. The populations are most vulnerable during the breeding and
moult
ning seasons when individuals
congregate in small areas.
Harbor seals live in the inner parts of the
coastal zone, including the fjords. The
breeding season is June-July, followed by
a molting period in August-September.
Harbor seals are listed as Vulnerable
(VU) on the Norwegian Red List
(Artisdatabanken, 2012). In Rogaland, the
Karmøy-Bokna fjorden area is a very
important breeding area for the harbor
seal. In Sogn og Fjordane, the population
has been estimated to count
approximately 700 individuals, and the
area Bremanger-Ytre Sula houses
several important breeding sites
(Henriksen, 2006). Grey seals live mainly
in the outer parts of the coast of Norway,
and give birth to skerries in the period
November-December. The molting period
is February-April.

Fisheries
The main fisheries in the North Sea are
conducted with bottom trawl and pelagic
gear like purse seine and pelagic (mid-
water) trawl. The pelagic fisheries are
generally not attached to specific areas,
but vary depending on the pelagic
species’ migration. Fisheries with bottom
trawl are more attached to specific areas.
In periods, rather small coastal vessels
participate in the high sea fisheries
(mainly mackerel).

Aquaculture
Aquaculture is an important industry
along the Norwegian coast. Along the
North Sea coast, the highest number of
aquaculture sites is found in Hordaland
with 383 localities. Sogn og Fjordane and
Møre og Romsdal have 201 and 239
sites respectively. The highest densities
are for salmon and trout plants for all
regions (Directorate of Fisheries, 2011).