

PROJECT SHEET

VARANDEY OIL TERMINAL PROJECT BARENTS SEA

BOSKALIS OFFSHORE: SKILLS, RESOURCES, EXPERIENCE

Boskalis Offshore brings together the offshore skills, resources and experience of Royal Boskalis Westminster. The group's offshore capabilities include seabed rectification works for pipeline/cable and platform installation, construction of pipeline shore approaches and landfalls, offshore mineral mining, offshore supply and support services and decommissioning services. Boskalis provides clients with tailored, project-specific solutions for above dredge related offshore services, as illustrated by the following project summary.

VARANDEY OIL TERMINAL PROJECT

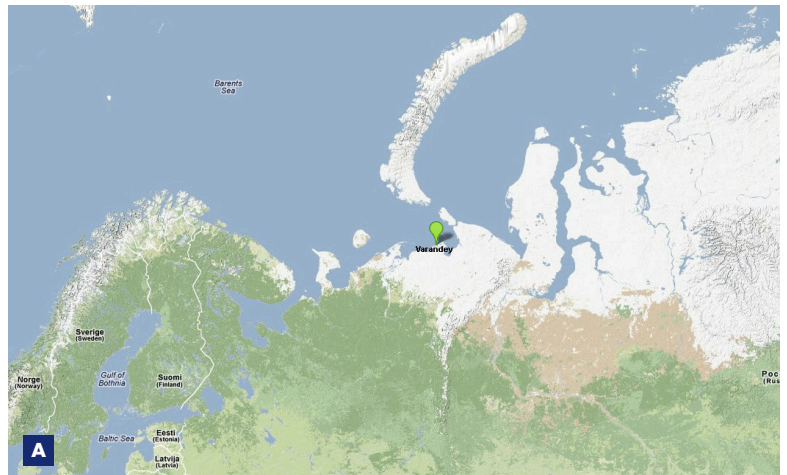
NaryanmarNeftegas JV, a joint venture between Lukoil (70%) and ConocoPhillips (30%), decided to construct a new offshore oil terminal in order to increase its oil export capacity. The new offshore oil terminal was constructed to export oil from the Timan-Pechora region located in Western Siberia, Russia.

The so-called Varandey facility consists of an onshore tank farm and a fixed offshore ice-resistant oil terminal (FOIROT). The oil terminal has a capacity for 12 million tons per year or 240,000 barrels per day.

To deliver oil from the onshore tank farm to the offshore oil terminal, the installation of two 22 km long 36" offshore pipelines was required. Russian

FEATURES

Client	NaryanmarNeftegas JV (LUKOIL / ConocoPhillips)
Location	Barents Sea
Period	2006 - 2008
Main contractor:	Mezhregiontruboprovodstroy
Contractor	Boskalis B.V. / Boskalis Offshore B.V.



- A Location map
- B Pipe lay barge Defender at work
- C TSHD 'Oranje' approaching Varandey Terminal
- D TSHD 'Oranje'

pipe lay company Mezhregiontruboprovodstroy (MRTS), operating the pipe lay barge Defender, was responsible for the installation of pipelines running from shore to the new Varandey terminal.

MRTS subcontracted Boskalis Offshore for the related offshore trenching and backfilling operations.

PROJECT LOCATION

The offshore oil terminal is located in the Barents Sea, nearby Varandey, Western Siberia. The very remote area leads to many logistical challenges;



fuel supply, crew changes and such require carefully planned transports to the work site in order not to cause any delays. Especially since working offshore is only possible in the months when the Barents Sea is not ice-bound which is generally from July to November.

Rapidly changing weather conditions, which include many short storms with wind velocities up to 10 Beaufort and outside temperatures dropping to -20°C, characterize the area.

As a result of the ice conditions in the area the seabed can be exposed to ice scour, a phenomenon where long, narrow ditches are formed in the seabed, due to the collision of fast ice and pack ice.

TRENCH DREDGING WORKS

To protect the two pipelines from the impacts of ice scour two separate, approx. 18 km long, 2.6 m deep trenches were required, providing a minimum cover of 1.5 m top of pipe. The trenches at a maximum dredging depth of 21 m required the excavation of approximately 1,300,000 m³ of soil consisting of silty sand, stiff to hard clay and boulders. The material dredged from the trenches had to be discharged at special designated disposal areas.



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BARENTS SEA

Boskalis deployed one of its bigger vessels, the 16,000 m³ capacity trailing suction hopper dredger (TSHD) 'Oranje', which was specially adjusted to work in arctic conditions. The TSHD 'Oranje' is a sea-going self-propelled vessel equipped with state of the art equipment, such as a dynamic positioning & dynamic tracking system and multi-beam echosounders. The vessel has two suction pipes; for this project the dragheads were equipped with in-house designed clay visors to optimize the production level.

TRENCH BACKFILLING WORKS

Upon installation of the pipelines by MTRS's Defender the pipeline trenches had to be backfilled to a cover of 1.5 m top of pipe, which required approximately 1,800,000 m³ of backfill material. After locating suitable backfill material in the area, TSHD 'Oranje' dredged this material and sailed back to the pipeline trench. Trench backfilling was carried out by pumping the material reversely through the suction pipe rather than dumping by means of opening the bottom doors. This controlled backfill process minimized material losses and turbidity in the area.

CONCLUSIONS

The conditions at the Varandey Oil Terminal Project were challenging due to the remote location, the limited available infrastructure, the harsh environment and difficult soil characteristics, such as stiff to hard clay and boulders. With the nearest port 1,200 km away, the TSHD 'Oranje' had to be completely self-sufficient.

After a thorough preparation, Boskalis Offshore's first project in the Russian Arctic was successfully executed and completed well in time.

The first oil was shipped to Canada in June 2008.



- E** TSHD 'Oranje' at Varandey in sea ice
- F** View on deck
- G** View on deck
- H** Oranje's draghead

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