

PROJECT SHEET

BAYDARATSKAYA BAY, RUSSIA
PIPELINE CROSSING

INTRODUCTION

The Baydaratskaya Bay Project is located in the Kara Sea in the North of Russia. The Kara Sea is bordered on its western side by Novaya Zemlya and on the east by the North Siberian Coast. Baydaratskaya Bay is located in the south of the Kara Sea between the Ural Coast and the Yamal Peninsula. Yamalgasinvest (Gazprom) is planning the construction of four pipelines and two cable crossings at Baydaratskaya Bay for the exploitation of the Bovanenkova and Harasawejskoje gas field on the Yamal Peninsula. The pipeline trajectory continues to Uktha an important industrial city in the Komi Republic of North Western Russia. The gas mainline system Bovanenkova-Uktha is part of the Yamal-Europe gas mainline projected for natural gas supply to the gas-transport network of Central Russia and further on to Western Europe.

Mezhregiontruboprovodstroy (MRTS) was awarded the works as the main contractor for the installation of 2 pipelines (main and reserve) with an outside diameter of 1,219 mm. The design capacity of these two subsea pipelines is 68.5 billion m³ per year. The overall scope covered the dredging of a 40 km long trench from 7 km offshore from the Yamal Coast to 21 km offshore from the Ural Coast.

ABOUT BOSKALIS OFFSHORE

Boskalis Offshore (BO) was subcontracted by MRTS to execute the trenching works for the first pipeline crossing. 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

FEATURES

Client	Yamalgas invest (Gazprom)
Period	July - November 2008
Location	Baydaratskaya Bay, Kara Sea, Russian Federation
Main Contractor	Mezhregiontruboprovostroy (MRTS)



A Location map

B Work in progress

C Due to its northern location the area is characterized by a severe arctic climate allowing operations only to take place from July until October

mining, offshore supply and support services and decommissioning services. Boskalis provides clients with tailored, project-specific solutions for above dredge related offshore services.

ARCTIC CLIMATE

Due to its northern location the area is characterized by a severe arctic climate allowing operations only to take place from July until October. During the remaining part of the year the temperatures drop drastically and sea ice covers the Kara Sea. In addition the remoteness of the area demands an



extensive preparation since infra-structure is lacking and no facilities are available.

TRENCH DESIGN

The trench was designed to have a bottom width between the toe lines of 8 m, 1:2 slopes and a depth varying between 3 and 3.5 m. Primary objective of burying the pipeline under the seabed was to protect the pipeline from the sea ice. Surveys performed of the pipeline trajectory showed scars in the seabed caused by sea ice varying in depth between 0.2 and 1.0 m. The pipeline which had a diameter of approximately 1.5 m (including coatings) had to be buried sufficiently deep under the seabed to avoid any possible danger. The water depth along the pipeline trajectory varied between 9 and 23 m at its deepest point.

TRENCHING OPERATIONS

The large trailing suction hopper dredger 'Oranje' was mobilized for the dredging operations. Because of previous operations in the arctic this dredger has been adapted for operating under extremely cold conditions .

Dynamic position / dynamic tracking enabled the vessel to perform the trenching operations at great

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accuracy . Hydrographic surveys were performed by the trailing suction hopper dredger herself. For that purpose multi-beam transducers were installed on the vessel. Soil conditions varied between medium to hard clay and in order to achieve the most optimal production in these soil conditions the vessel was equipped with dragheads with clay visors .

BACKFILLING OPERATIONS

Upon completion of the trenching operations backfilling was performed of the sections where pipe laying had been completed by MRTS. Suitable material for backfilling was obtained by dredging at a designated borrow area near the Ural Coast. Prior to backfilling an entire section specific locations were backfilled every 200 or 500 m to ensure that the position of the laid pipeline was fixed. Once a complete section was fixed backfilling was commenced.

Backfilling was realized by discharging the dredged material through the suction pipe. The suction pipe was kept at a certain height above the top of the laid pipeline ensuring a safe distance between the draghead and the pipeline. During the first stage of backfilling (fixing the position of the pipeline) the vessel remained stationary above the required location and discharged the sand-water mixture until a heap was created up to the original sea bed level. Backfilling of an entire section was realized in layers of 0.5 m up to a level of 0.5 m above the top of the pipeline. The remaining part up to the origin al seabed level was backfilled in one layer . These layers were created whilst navigating over the pipeline trench at slow speed while discharging the load.

The work in the season of 2008 was successfully completed early November 2008 as per the requirements of the Client.



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- D** The remoteness of the area demands an extensive preparation since infrastructure is lacking and no facilities are available
- E** Work in progress. Dynamic position and dynamic tracking enabled the vessel to perform the trenching operations at great accuracy
- F** Working in sea ice

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