



LUKOIL

OFFSHORE PROJECTS





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The start of LUKOIL's offshore operations dates back to 1999, when the Company started exploratory drilling with its in-house ASTRA self-elevating floating drilling rig in the northern part of the Caspian Sea.

Over the last decade, LUKOIL has successfully completed three unique large-scale projects in three different seas – the Baltic Sea, the Barents Sea, and the Caspian Sea. In each case it was the first ever project implemented by a Russian company on the coastal-shelf.

To facilitate its offshore operations, LUKOIL created a solid operational infrastructure that includes a metalwork construction plant, onshore facilities, a fleet of specialized vessels, a staff training system, and a reliable network of contractors and construction companies.

At the very beginning of its offshore operations LUKOIL announced environmental protection as a top priority. The Company has organized numerous comprehensive research expeditions and conducted ecological monitoring of the marine environment in every region of its operations. The research results demonstrated that LUKOIL's facilities were no source of pollution due to a rigid observance of the zero discharge principle.

This principle is based on a total ban on discharges of all kinds of wastes generated by the operations into the marine environment. All the waste is collected in sealed containers that are then taken onshore where the waste is neutralized and recycled.

The zero discharge principle is rigorously observed in the course of exploratory drilling, and is further used at the stage of the operation of the discovered fields.

In June 2004, LUKOIL launched satellite monitoring of the southeastern part of the Baltic Sea to detect oil slicks around the Kravtsovskoye field. So far, no spills of oil or petroleum products have been registered at the Company's facilities. A similar monitoring system will be set up around the area of LUKOIL's operations in the Caspian Sea.





THE BALTIC SEA

THE KRAVTSOVSKOYE (D-6) FIELD IN THE BALTIC SEA WAS DISCOVERED IN 1983 AND IS LOCATED 22.5 KM OFFSHORE FROM THE COAST OF THE KALININGRAD OBLAST. THE SEA DEPTH IN THE FIELD AREA IS 25-35 METERS.

Geological exploration by LUKOIL demonstrated that the geological C1+C2 oil reserves of the Kravtsovskoye field make up 21.5 mln tons with 9.1 mln. tons of extractable reserves. Investment into the field construction came to RUR 7.7 bln.

Commercial oil production at the Kravtsovskoye field started in 2004. By now 14 productive wells have been drilled at D-6. 13 of them with horizontal direction. The total oil production over the period of the platform's operation has reached around 3.6 mln tons.

Drilling and oil production operations are performed from an offshore ice-resistant stationary platform (IRSP) that was constructed at the metalwork construction plant of OOO LUKOIL-Kaliningradmorneft. This is the first ever producing platform on the Russian shelf designed and constructed by domestic engineering and production companies.

The IRSP consists of two modules. The technological module carries a drilling facility with a capacity of 320 tons to drill wells with a maximum measured depth of 4,500 m. There are 14 wells at the field. 13 of them are producers, and 1 is an observation well. There are two 20 tons cranes on the module. The length of the technological platform is 65 m, the width – 45 m, the height – 86 m, and the static weight on the ground – 6,557 tons.

The accommodation module is designed to accommodate 90 people. It also has a 12.5 tons crane and a helipad. The length of the module is 45.5 m, the width – 40.4 m, the height – 28 m, and the distance from the sea level to the first deck – 13.4 m.

The IRSP modules are connected by a 70 meter long bridge that is used for communication lines and personnel movement.

A 47 m long subsea pipeline connects the platform with onshore facilities and is made of seamless steel pipes. The diameter of the pipes is 273 mm, and their wall thickness – 18.3 mm. The formation product represented by the blend of crude and associated gas is transported to Romanovo oil gathering station where the crude is processed into stock-tank oil. The pipeline has two types of protection: active (protectors and anodes produced by the Norwegian JOTUN) and passive (three-layered external coating of extruded polypropylene). A part of the pipe runs in an underwater opening and is protected from wave effects by a special stone-made surcharge. The onshore part of the pipe has a protective casing through a 1 km long pipe with a diameter of 630 mm. The entire process flow sheet of the pipeline has a reliable control system. There is a valve between the offshore and the onshore part of the pipeline that can be used in the case of emergency to shut down the pipeline.

The onshore oil pipeline consists of two parts. The first part from the onshore valve to the Romanovo oil gathering station is 6.15 km long, and has an outside diameter of 273 mm, and 10 mm thick walls. The second, the underground part of the pipeline – from Romanovo station to the LUKOIL I integrated oil terminal (IOT) located in the Izhevskiy settlement – is 31.6 km long, and has an outside diameter of 219 mm and 8 mm thick walls. The onshore pipeline has a corrosion-preventive electrochemical protection system along its entire length.

The Romanovo oil gathering station is a production facility that includes twenty one technological tanks. It is designed to process the well product to the tank oil by separation, dehydration and desalting. The stripped gas is utilized to cover the own needs of the oil gathering station. The processed tank oil is pumped over to the Izhevskiy integrated oil terminal.

The oil storage tank capacity of the terminal is 124 ths cu. m. The depth of the IOT water area is sufficient for 20,000 tn deadweight tankers.





THE BARENTS SEA

IN ORDER TO SUPPORT THE YEAR-ROUND TRANSPORTATION OF OIL PRODUCED IN THE TIMANO-PECHORA OIL-AND-GAS PROVINCE, LUKOIL IMPLEMENTED A UNIQUE PROJECT FOR THE CONSTRUCTION OF A OFFLOADING TERMINAL IN THE VARANDEY SETTLEMENT ON THE COAST OF THE BARENTS SEA. THE CONSTRUCTION OF A TERMINAL WITH THE TRANSSHIPMENT CAPACITY OF UP TO 12 MLN TN OF OIL PER YEAR WAS COMPLETED IN 2007.

The project is considered as being unprecedented first of all due to the natural conditions – on average, the Barents Sea is covered with ice 247 days a year, with an ice thickness of up to 1.25-1.8 m. The shallow coastal area with constant alluvial currents does not allow for the construction of a shipping terminal onshore. Therefore, to load large capacity tankers with a deadweight of up to 70 ths tons, a fixed offshore ice-resistant offloading terminal (FOIRO) was constructed near 21 km offshore.

The FOIRO represents a more than 50 meter high structure with a total weight of over 11 ths tons. It includes two parts – a jacket with the accommodation module for 12 people, and the technological systems, and the rotating and mooring hoist (RMH) with a jib and a helipad. The octagonal shape of the jacket is specially designed to endure maximum high ice loads. The jacket is mounted on a sea bottom with the help of 24 piles. The crude is loaded from the RMH to the head of a tanker with the help of a flexible pipe.

The FOIRO was constructed at the metalwork construction plant of OOO LUKOIL-Kaliningradmorneft.

The FOIROt is connected to the onshore facilities by two lines of a subsea pipeline in a concrete casing with a diameter of 820 mm that is looped on the shore. Since the crude comes to the terminal in a heated state, over the periods between loading the tankers it circulates onshore-offshore to maintain the required temperature in the oil pipeline. This is done to prevent oil congealing during the planned downtimes of the oil pipeline for cleaning and preventive maintenance.

The onshore infrastructure of the terminal includes a tank farm with a capacity of 325 ths cu. m., a pumping station, energy supply facilities, a shift camp and a number of other facilities.

The terminal was constructed on the permafrost. Therefore, its basements for the 50 ths cu. m. tanks are equipped with forced soil freezing systems. All the tanks are double-walled according to the 'vessel in vessel' principle to prevent any leaks or oil spills.

The pumping station at the Varandey terminal has an advanced productivity of 8 ths cu. m. per hour. This ensures a possibility to load a 70 ths tons deadweight tanker in just 10-12 hours, which increases the integrity of the transshipment operations in the changeable climate conditions on the Barents Sea.

FOIROt operations are supported from offshore by an auxiliary icebreaker and an icebreaker tugboat. These vessels ensure the safety of the terminal and help the tankers in maneuvering and performing mooring and cargo operations in icy conditions. Both vessels have systems to extinguish fires on the terminal and tankers, as well as state-of-the-art oil spill response facilities.

The Varandey terminal has three protection levels against oil spills.





THE CASPIAN SEA

IN NOVEMBER 1995, WITHIN THE FRAMEWORK OF THE STATE PROGRAM FOR EXPLORATION ON THE CASPIAN SHELF, LUKOIL STARTED GEOLOGICAL AND GEOPHYSICAL OPERATIONS IN THE NORTHERN AND MIDDLE CASPIAN SEA.

In 1999, LUKOIL started exploratory drilling with its ASTRA self-elevating floating drilling rig (SEFDR), which was upgraded at the Krasnye Barrikady shipbuilding plant in Astrakhan. The SEFDR is a 3-support platform with 66-meter long pillars. The rig can be used in offshore drilling operations in up to 45 meters deep water conditions to drill wells with a measured depth of up to 5 thousand meters.

The efficiency of the geological exploration performed by the Company in the water area of the Caspian Sea has demonstrated up to a 100 percent success ratio of wildcat drilling.

At present, 8 large oil and gas fields have been discovered on LUKOIL's licensed areas in the Caspian Sea, and 16 exploration targets were identified. The most remarkable of them is Filanovsky oil and gas field – the largest field in terms of oil reserves discovered in Russia in the last 20 years. At this stage of knowledge the extractable reserves of these fields exceed 1 bln tons of conventional fuel. Thus, the Caspian Sea is one of LUKOIL's key growth regions for oil and gas production in the mid-term prospect.

The start of the commercial oil production at the first northern Caspian Y. Korchagin field (named after the former secretary of LUKOIL Board of Directors) is due in March, 2010. The field is located 180 km from Astrakhan and 240 km from Makhachkala. The sea depth in the field area is 11-13 meters. The field's 3P (possible, probably, proved) reserves are estimated at 570 mln. barrels of oil equivalent. The maximum level of oil and gas condensate production is 2.3 mln tn, and 1.2 bln cu. m. per year, respectively.

In order to ensure production and further transportation of hydrocarbons, the Y. Korchagin field construction project includes a number of large offshore facilities.

The field's key production facility is an offshore ice-resistant stationary platform (IRSP) consisting of two parts. One of the platforms carries a drilling facility with a capacity of 560 tons to drill wells with a maximum measured depth of 7,400 m. The total number of wells is 30. 26 out of them are producers. Also, there are 3 water injection wells, and 1 gas-injection well. The platform is also equipped with two 70 tons cranes. The length of the platform is 95.5 m, the width – 72.2 m. The platform's static weight on the ground with a liquid ballast is 25,655 tons.

The other part of the IRSP is designed to accommodate the personnel. It hosts living quarters, public, medical and service rooms, a cooking block, and storage for provisions. The accommodation block has 105 beds. There is a helipad on the fifth deck. The length of the second platform is 41.5 m, and the width – 40.2 m.

The two platforms are connected by a 74.2 meter long bridge to form a single production facility.

The crude from the Y. Korchagin field will be exported to an offshore transshipment facility (OTF) via a 58 km long subsea pipeline with the diameter of 300 mm and 16 mm thick walls.





The OTF includes a floater and a single point mooring (SPM). The facility is designed to load 10-12 ths tn deadweight shuttle tankers with crude to ensure the delivery of crude from the Yury Korchagin field.

The floater represents an oil carrier with a double bottom, double sides, an engine and boiler room, an accommodation superstructure, and a helipad. The floater's deadweight is 28,000 tons, the length – 132 m, the width – 32 m, the depth – 15.7 m, and the crew – 25 people. The floater is moored to the SPM, through which the crude that is received from the subsea pipeline is loaded onboard.

The entire LUKOIL flotilla consisting of 6 services vessels was involved in the construction and development of the Y. Korchagin field.

A number of managers representing the Company and its subsidiaries were recognized in the Russian Government's Award in the field of science and technology for the development and commercial implementation of efficient facilities for geological and geophysical research and high-performance technologies for offshore well construction that facilitated the discovery of a new large oil-and-gas sub-province in the Russian sector of the Caspian Sea thus accelerating preparation of the raw materials base for oil and gas production.

OFFSHORE TRAINING CENTER

IN ORDER TO TRAIN QUALIFIED STAFF FOR ITS OFFSHORE OIL AND GAS OPERATIONS, LUKOIL HAS DEVELOPED A PROJECT FOR THE CONSTRUCTION OF RUSSIA'S FIRST SPECIALIZED CORPORATE TRAINING CENTER.

The Center that can provide training to 2.5 thousand people per year will be located in the Ilyinka settlement of the Astrakhan Oblast, in the immediate proximity of the integrated transportation and production base that is used to provide materials and technical support to the offshore oil and gas operations in the Northern part of the Caspian Sea.

The key focus areas of the training center will be the technical and psychological training of staff for work at the offshore oil and gas facilities, practicing the skills of survival in unplanned situations, and training to managers, including those to be involved in international projects.

The training program will include the use of simulators that imitate actual working conditions on offshore oil and gas facilities in regular, unscheduled and emergency situations. Special equipment will be used to provide water rescue training. The equipment will be installed on the Volga river in appropriate deepwater locations or in a specially constructed pool. The water rescue training module can also be used to train divers.

After obtaining the appropriate licenses and accreditation the Corporate training center will issue the international certificates of the American Petroleum Institute, the International Well Control Forum, and the International Association of Drilling Contractors.





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