

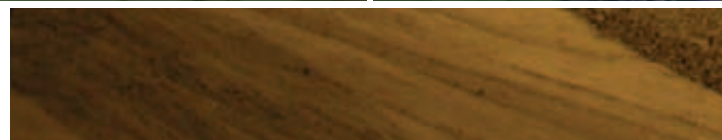
Sakhalin is a large island in the Northern Pacific, almost 950 kilometres long and up to 170 kilometres wide. It belongs to Russia, but is over 10,000 kilometres away from Moscow. A cold and bleak region to which the Czars used to banish only its convicts. A region which is often beset by earthquakes, like the one on 28 May 1995, when a quake with a strength of 7.5 on the Richter scale devastated the city of Neftegorsk. However, some of Russia's most significant oil and gas reserves are to be found on and around Sakhalin: a coastal area of 20,000 square kilometres is believed to hold reserves of 700 million tonnes of oil and 2500 billion cubic metres of natural gas. In view of the rising oil prices, developing this field is becoming more and more attractive. And, above all, it is now becoming feasible in the first place – as a result of the latest technologies, which are also safe and reliable, thanks to the know-how provided by Germanischer Lloyd Oil and Gas GmbH (GLO). There are now diverse oil projects underway around the island; the technologically most complex of these, Sakhalin II, is being pushed forward by the Sakhalin Energy Investment Company Ltd. (SEIC): over 20 billion US dollars will be invested here by this consortium, which consists of the companies Shell, Mitsui and Mitsubishi. Since last year, the Russian gas corporation Gazprom has been negotiating an entry into this attractive project; for the first time, liquefied natural gas (LNG) is to be delivered by Russia to the booming economies in Asia and the US West Coast.

The region is so inhospitable that the oil deposits at sea must, in part, be accessed from the coast with the aid of horizontal drilling, as is the case for the Sakhalin I project, for example. Molikpaq, the first Sakhalin II platform, has no pipeline connection with the island so far: since 1999, oil has been produced on Molikpaq (Phase 1) and then bunkered until it can be transferred to tankers. However, the tankers are unable to dock at the platform for about five months a year, owing to the heavy ice cover. At some places on the island, there are annual average temperatures of 0.5 degrees Celsius, dropping as low as minus 45 degrees in January, and the sea is frozen over for several months of the year. Oil loading and hence oil production is then impossible.

But now a new era in technological innovation is dawning: Sakhalin II has entered its Phase 2, where the aim is to erect two new platforms connected to a pipeline network, with which it will be possible to produce oil continuously on 365 days a year. GLO will class both of these offshore platforms, which is an indispensable prerequisite to ensure that SEIC can receive flag state registration combined with internationally secured ownership rights to its installations.



Two platforms are being installed far north in the polar ice: LUN-A produces gas, PA-B mainly oil



Producing Oil in Gruelling Conditions



Two New Platforms under Construction

The Lunskeye platform (LUN-A) some 15 kilometres off the northeast coast of Sakhalin – with a water depth of 48 metres – mainly produces gas with low levels of condensate. This gas is conveyed via a large onshore pipeline to an LNG installation in the southern part of the island. The processed and liquefied gas will then be transported to Japan and the US West Coast by LNG tankers docking at an export terminal in Aniva Bay, which is generally ice-free throughout the year. Even farther north than LUN-A, the Piltun-Astokhskeye-B platform (PA-B) will be installed in water 30 metres deep to produce chiefly oil. For this field too, pipelines will be built to transport the oil and gas to the south of the island. Both pipelines will be 800 kilometres long, with 126 kilometres crossing inaccessible marshland. In addition to classification of the two offshore platforms, the tanker loading unit for the oil in Aniva Bay, an offshore tower in 30 metres of water with a swivelling loading arm, was also certified by GLO.

“The unusual feature for these gigantic offshore platforms,” explains GLO project manager Jan Zschommler, “is that they each consist of a concrete substructure and a superstructure which is the actual platform, known as the topside. The first topside will be mounted onto the substructure in June, as part of an extraordinary manoeuvre.” The substructure itself consists of four concrete legs with a diameter of 25 metres anchored in a concrete base 100 metres square and 13 metres thick. These units (LUN-A 103,000 tonnes, PA-B 90,000 tonnes!) have already been brought to their destinations by tugs from the Russian manufacturing facilities in Nahodka and successfully sunk in the sea by ballasting; all they are waiting for now is to receive their topsides. These are currently still under construction in the yard at Samsung Heavy Industries (SHI) in South Korea.

“Such substructures are normally made of steel mounted on piles,” explains Ulrich Hachmann, Head of the Department for Offshore Structures and Installations at GLO. However, owing to a number of factors – like the seismic activities, the ice loads and the local production capacities – SEIC decided in favour of a heavy concrete structure. In view of these facts, even the topsides are designed to be particularly massive: “Because of the extremely rough environmental conditions in this region, large parts of the platform had to be clad for their own protection. In general, all accommodation and processing areas must be concentrated in one unit. All this leads to



An international inspection team checks the plants. Only when this difficult manoeuvre has been completed and both platforms are able to commence production successfully will GLO issue the class certificate for the Sakhalin II platforms LUN-A and PA-B

truly gigantic dimensions and enormous masses for the steel construction and equipment. The larger of the two topsides will weigh over 28,000 tonnes.”

For months on end, the GLO experts in Hamburg were busy with the assessments of the ice and seismic loads. The structures designed by the reputed Norwegian engineering office Aker Kvaerner were checked independently by a GLO team; all technical aspects of the two platforms that were relevant to safety were examined thoroughly. The result: no excessive loads were detected, and the design by Aker Kvaerner and AMEC was approved.

Topsides on the Way to Sakhalin

At present, the GLO experts are concentrating their efforts on the construction phase of the topsides: just as for the construction of the concrete substructure, GLO surveyors are currently monitoring the work at the Korean yard to ensure that the previously approved drawings are executed correctly. By the beginning of the year, about 15,000 of the total of 113,427 prefabricated pipe sections – known as piping spools – together with 100,000 cable termination points had been processed for the LUN-A platform. The highlight of the surveying work is expected to come at the end of June: the first of the two 30,000 tonne topsides (for LUN-A) will be floated to Sakhalin and deposited on the concrete legs. During this operation, care must be taken to ensure that neither substructure nor topside is damaged. Special transport barges have been built, with immense flooding valves to permit rapid and precise lowering of the structure. The seismic mount (a “friction pendulum bearing”) to be installed between topside and substructure also deserves mention. Its purpose is to make sure that the seismic movements of the earth, and hence also the concrete base, are not transmitted directly to the topside. This seismic mount is intended to protect and decouple the platform from the substructure during an earthquake. Such quake absorbers have already been successfully used for the construction of buildings and bridges in the USA; they will be given their offshore premiere in Sakhalin II. No wonder that the offshore trade will be watching Sakhalin with great interest in June, says Jan Zschommler. And only when this difficult manoeuvre has been completed and both platforms are able to commence production successfully will GLO will issue the class certificate for the Sakhalin II platforms LUN-A and PA-B. ■ CG



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