



Photo courtesy of First Ore Mining Company

Innovative solutions for Pavlovskoe mining project

The Pavlovskoe lead-zinc project in the Novaya-Zemlya archipelago in the Arkhangelsk region is classified as one of the biggest mines in Russia. Aker Arctic has been involved in planning how to construct a processing plant in this northern location far from any infrastructure and characterised by severe arctic conditions.

First Ore Mining Company, a subsidiary of ARMZ Uranium Holding, represented by Executive Director Igor Semenov, is developing the Pavlovskoe project, which is estimated to have an output capacity of up to 2.6 Mt of ore per year. The deposit is expected to contribute resources sufficient for up to twenty years of production of mainly lead and zinc.

Barge-mounted plant

As the Novaya-Zemlya archipelago is far away from any infrastructure in harsh arctic conditions, it is not an easy place to build a processing plant. The barge-mounted process plant concept was proposed by First Ore Mining Company to

minimise the effect of the short shipping season and the high cost of labour.

Aker Arctic has subsequently been involved in developing outline solutions for the entire life-cycle from construction, transportation and installation to production and finally decommissioning. Environmental factors such as low ambient temperatures, ice loads and wind have been taken into consideration for all stages.

Equipment installed at shipyard

Aker Arctic has prepared an outline design of a special floating barge for this project. The processing plant, designed by Outotec, and power station, designed by Wärtsilä, as well as other equipment needed for production, are planned to be installed at a shipyard during the construction of the barge.

Once everything is ready and commissioned, the barge will be towed by sea to the area of production, and then fitted on land.



Igor Semenov, Executive Director of the First Ore Mining Company

“The area is remote with no infrastructure, so the idea is to build everything on the mainland and then transport it to the final production place,” says Pavlovskoe Project Manager Igor Semenov from the First Ore Mining Company. “Everything will already be assembled, connected, tested and ready to use.”

The barge needs to be large enough to accommodate everything needed for stand-alone production,

but at the same time as small as possible so that the fitting operation at the site will not become demanding or expensive. The dimensions of the barge designed by Aker Arctic is 176 metres long and 32 metres wide.

Towed to the site

The fully equipped barge will be towed to the region, where it will be floated into an excavated place, stabilised with gravel and be ready for immediate use.

According to Igor Semenov, on top of other targets, the First Ore Mining Company put a priority to avoid any impact on the environment of the Novaya-Zemlya archipelago.

“The ground in this area has permafrost, which is important not to disturb during the installation,” Alexey Dudal, Project Manager from Aker Arctic explains. “In order to mitigate the human impact on the fragile Arctic environment, heat from the barge should also not affect the permafrost. After twenty years, the barge will be removed in reverse procedure. The land area should then be restored to its original condition.”

Once the lead and zinc production is finished, there are two options: the barge may be either towed to a shipyard for complete decommissioning or it can be used in another project for ore processing.

Principal arrangement

The barge is divided into three parts, with the largest part used for the processing plant. Outotec has designed the processing plant including all equipment and its arrangement for efficient production of the lead and zinc concentrates from the ore.

The second part of the barge contains the power plant, which provides electricity to all facilities on the barge itself, the processing plant, the port constructed for transportation of the final products, and also the mine and accommodation complex. Wärtsilä has been responsible for designing the power plant.

The third part is the workshop block needed for maintenance and repair. In addition, there are offices, meeting rooms and lounge areas for the staff.

First step

Igor Semenov was satisfied with the results of the project carried out by the Aker Arctic team. He added that this was only the first step on the way of cooperation between the First Mining Company and Aker Arctic in the creation of innovative process concentrators for working in the Arctic.

The Aker Arctic team involved in the project comprised Project Manager Alexey Dudal, Development Manager Alexey Shtrek, Senior Naval Architect Lars Lönnberg and Naval Architect Aaron Tam. ■

Meet Alexey Dudal



Alexey Dudal, Deputy Head of Consultancy & Technology at Aker Arctic

In 2007, Alexey graduated from the State Marine Technical University of Saint Petersburg, Russia as a naval architect specialising in hull structures. Before moving to Finland and joining Aker Arctic, he spent eight years in Paris working at Bureau Veritas as a research engineer.

Alexey joined Aker Arctic in 2016 as a structural engineer. He is currently working as Deputy Head of the Consultancy & Technology team, providing assistance in tasks related to feasibility, pre-FEED studies, work during the FEED and consecutive stages of the project to match the needs of clients. This includes definition of the project requirements, design criteria, fleet composition studies, cargo loading and discharging in challenging conditions, port layout studies, transportation studies, ice management studies and risk control methodology. ■



Photo courtesy of First Ore Mining Company