

# Aker Arctic assists Equinor with station keeping trials

Equinor and Viking Supply Ships executed a series of station keeping trials in ice in the Bay of Bothnia during March 2017 with a primary focus on measuring managed and unmanaged ice loads on a moored stationary vessel.

Viking Supply Ships provided two vessels for these trials: *Magne Viking* and *Tor Viking*. *Magne Viking* acted as the stationary vessel and *Tor Viking* as the support vessel, performing ice management as well as other duties.

Essential to the success of the trials was ensuring that station keeping operations occurred in the presence of realistically managed ice, while ensuring the overall safety of the operations. The ice risk management was the responsibility of the Lead Ice Advisor Erik Almkvist, along with the vessels' masters. Planning of the ice management operations was a group effort, with Aker Arctic assisting with ensuring that the ice management was conducted in a realistic manner, while meeting the demands of the station keeping trials. For this, Aker Arctic utilized its ice management prediction software (AIMS) to simulate the operation both prior to and during the trials.

## Verification of the prediction tool

Although the primary objective of the trials was to measure loads on the station keeping vessel, the trials provided an excellent opportunity to learn and collect data about ice management operations. A secondary objective was therefore to verify the performance of AIMS. This was achieved whilst performing ice management for the station keeping trials as well as during dedicated tests designed specifically to verify a variety of components within AIMS. Mike Neville, a Naval Architect from Aker Arctic Canada's office, accompanied Equinor representative Francesco Scibilia onboard the *Tor Viking* during the trials to assist with the planning, execution and documentation of the ice management operations. Daily duties consisted of developing a plan for the ice management operations, documenting the operations, collecting ice



*Francesco Scibilia (left) and Mike Neville (right) during Station Keeping Trials. Photo Courtesy of Viking Supply Ships*

management data, and comparing AIMS results to the observations. Having Neville onboard during the trials ensured that the ice management operation was documented in such a way that it could support the calibration of the ice management software AIMS after the trials were complete.

## Dynamic approach

Due to uncertainty in what conditions would be encountered during the trials upfront planning was very challenging. Preparations included ensuring adequate planning tools were available and performing simulations for a range of possible conditions that could be encountered. However, a dynamic approach was utilized for planning the trials, allowing the project team to adapt to the daily conditions. For each station keeping test performed in managed ice a target floe size was specified. An ice management strategy would then be

developed that would achieve the desired floe size while maximizing the value for the model calibration. Neville then simulated an ice management strategy using AIMS to define the required parameters required for the vessel's crew to generate the correct floe size distribution before the operation took place.

Several ice management techniques were utilized during the trials. The techniques were based on the effectiveness of managing the ice as well as the feedback from Viking Supply Ship's crew on the ease or difficulty in performing the desired maneuvers. As much as possible techniques were selected that simulated how a real ice management operation would be conducted. However, care had to be taken not to over-manage the ice, as it was desirable to perform the station keeping trials close to the limits of the *Magne Viking*.

## Overall the AIMS model turned out to be a useful tool for the station keeping trials.

The ability to run AIMS in the field provided a quick reference check of the validity of the model and allowed the ice management tactics to be adjusted to achieve the desired level of ice management efficiency. Some initial data analysis has been conducted which indicates that AIMS can reliably predict the floe size produced by ice management operations.

More information about the station keeping trials can be found in the proceedings of the 37th International Conference on Ocean Offshore & Arctic Engineering (OMA-E 2018). ■



*Tor Viking (foreground) performing physical ice management updrift of the stationary vessel Magne Viking (background). Photograph: Mike Neville*