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CVOC units are specified for new Aframax shuttle tankers



VOC release on a tanker loading from the Gullfaks field: GBA Marine's new system should reduce this substantially

Following a successful two year field trial, GBA Marine of Norway has received an order for four of its new compact on-voyage volatile organic compound (VOC) recovery systems from Teekay Shipping. They will be installed on shuttle tankers being built at Samsung Heavy Industries in Korea and due for delivery in 2010 and 2011 respectively.

The order follows development of a model system in 2005 and an initial contract in 2006 where GBA Marine retrofitted its first compact volatile organic compound (CVOC) recovery system on Teekay's Aframax shuttle tanker, *Navion Hispania*. System functionality and full-scale testing was conducted with Marintek which participated in several test voyages and verified that there was no vapour emissions from the cargo tanks to the atmosphere using GBA Marine's absorber.

"The system installed on *Navion Hispania* has been in full operation since May 2007," explains Dr Rune Gammelsæter, R&D manager at GBA Marine. "Now, nearly two years later, the results from the ship are that GBA's CVOC system has provided 100 per cent regularity and eliminated

A compact vapour recovery system (CVOC), which has proven effective in preventing cargo loss during voyages for Teekay, will now be installed on new shuttle tankers currently under construction at Samsung Heavy Industries in Korea

by Wendy Laursen

all VOCs released from the ship during transport of crude oil. These results are, to our knowledge, unique, and at the same time, a demonstration that hard work on the fundamental theory, laboratory testing and selection of only high quality components are very important for the end result.

"Absorption of VOC gases in crude oil depends directly on the contact area between oil and gas, and pressure," says Dr Gammelsæter. "The idea for this system is to reduce the size of

the absorption components, and by that, tailor the system into any crude oil tanker without interfering with existing systems on board."

The swirl absorber has a footprint of 1.8m x 0.5m, no moving parts and is virtually maintenance free, says GBA Marine. The control unit system consists of two cabinets, each measuring 0.6m x 1.2m x 0.3m, and comes with one or two touch screens for remote control, to be installed on the bridge, in the cargo control room or both, depending on an owner's requirements. All components containing oil are placed in the lower part of the pump room so gas detection systems, level switches and closed drain systems offer protection against leaks.

The CVOC system operates between two pressure settings. It starts at an upper level and then works the pressure down to a stop point through absorption of the VOC into the crude. When a ship approaches its discharge harbour, the set points can be changed and the system will reduce the pressure to a level acceptable for dipping the tanks.

Marintek had earlier determined that

vapour emissions control

emissions of approximately 11 tonnes a day can occur during a voyage carrying oil from the Norwegian Gullfaks field. This is less than those emissions generated during loading, but still economically and environmentally significant, says Dr Gammelsæter.

Typically, in the order of 100-300 tonnes of VOC are released during loading for an Aframax tanker, these figures being somewhat dependant on the type of oil loaded. "We have done a worldwide study in co-operation with Teekay Shipping, and some 44 tonnes released over a

four day transport of Gullfaks crude to Rotterdam is likely. Outside of the North Sea, around three tonnes is released each day, on average."

Dr Gammelsæter says a large number of theoretical calculations, using computational fluid dynamics software and thermodynamic calculations carried out by software package Hysys, indicate CVOC provides emission reductions between 30 and 70 per cent during loading, depending on the oil type. GBA Marine has developed theoretical models that can predict the reduction in emissions for crude

from any field based on assay results.

DNV approval of the system includes pressure integrity and operational safety. It is suitable for long and short voyages, as well as lightering operations, and GBA Marine is now in discussion with several other potential clients for both its patented CVOC system and the inline inert gas cleaner that offers reduced corrosion in inert gas piping. "Both systems represent the state-of-the-art. They are high performance, passive designs, which are compact and do not interfere with existing onboard equipment," he concludes.