MARTOB

On Board Treatment of Ballast Water (Technologies Development and Applications) and Application of Low-sulphur Marine Fuel

EDITION 2

THE MARTOB PROJECT

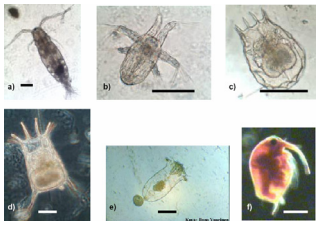
There is a growing concern about the damage to aquatic ecosystems caused by immigration of non-indigenous species. It is estimated that more than 10,000 million tonnes of ballast water is transported by shipping activities annually, and ballast water has been recognised as a major vector for the transplant of aquatic species across bio-geographical boundaries.

Another important environmental issue is fuel quality, to reduce sulphur emissions. Studies are underway, based on national incentives and environmental analyses of impact from shipping where choice and present status of quality of marine bunker fuel has become an important issue.

On Board Treatment of Ballast Water and Application of Low-sulphur Marine Fuel (MARTOB), is a three year project, €3.5 million initiative under the Competitive and Sustainable Growth (GROWTH) Programme, funded by the **European Commission, Directorate-General for Energy and Transport**. The project enjoys links with another EU project – SEAM (Assessing concepts, systems and tools for a **S**afer, **E**fficient and Environmentally **A**ware and Friendly **M**aritime Transport).

SEAM focuses on formulating safety and environmental measures and procedures to mitigate the impact of three elements of shipping operations. This focused approach is complementary to the MARTOB project.

The dissemination of the results will have a special focus on the promotion of ideas for positive exploitation of the project's findings, and will highlight the potential for further future research.



MARTOB OBJECTIVES:

- To investigate methodologies and technologies for preventing the introduction of nonindigenous species through ships' ballast water.
- To develop design tools and treatment equipment to be used in the further development of ballast water treatment techniques.
- To assess the effectiveness, safety, and environmental and economic aspects of current and newly developed methods.
- To develop cost-effective (capital and operating), safe, environmentally friendly on board ballast water treatment methods which have a minimum impact on ship operations.
- To produce guidelines for crew training and criteria for selecting an appropriate ballast water management method.
- To assess the financial, technical and operational effects of a sulphur cap on marine bunker fuel in European waters, and propose a verification scheme ensuring compliance with a sulphur cap from all players in the market.
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- To help to facilitate the introduction of an important sulphur emission abatement measure without unintentional distortion of competition in the shipping market.

MARTOB PARTNERS

The project involves 24 partners from eight European countries and started in April 2001. The project is coordinated by the School of Marine Science and Technology, University of Newcastle upon Tyne, UK. The following companies are partners in the project:

- Abo Akademi University
- Alfa Laval AB
- Association of Bulk Carriers (London)
- Berson Milieutechniek B.V.
- Bureau Veritas
- Environment, Energy and Process Innovation (TNO)
- Environmental Protection Engineering S.A.
- Fisheries Research Services
- French Research Institute for the Exploitation of the Sea
- Fueltech AS
- Institute for Applied Environmental Economics (TME)
- International Association of Independent Tanker Owners
- International Chamber of Shipping
- MAN B&W
- (MARINTEK) Norwegian Marine Technology Research Institute
- Norwegian Shipowners Association
- Shell Marine Products
- SINTEF Applied Chemistry
- SSPA Sweden AB
- Three Quays Marine Services
- Van den Heuvel Watertechnologie
- VTT Industrial Systems
- Wallenius Wilhelmsen Lines

BALLAST WATER TREATMENT – Full Scale Trials

One of the many objectives of the project is to assess the biological effectiveness of selected ballast water treatment technologies. Full scale Ship based test trials of these technologies were carried out in summer 2003. The treatment technologies included in the full scale trials are:

- High temperature thermal treatment
- De-oxygenation

Full scale shore based trails were undertaken during the same time period in Finland and the Netherlands for the following treatment technologies:

- Ultraviolet
- Ultrasound
- Ozone
- Oxicide

The overall aim of the trials was to compare the efficiency of the different technologies at removing or killing organisms i.e. the biological effectiveness of the treatment. The full scale test equipment was fitted to the car carrier Don Quijote, kindly supplied by Wallenius Wilhelmsen Lines.

PRELIMINARY RESULTS

The tests were carried out during two legs of the Don Quijote route. The High Temperature method was evaluated in the first leg, from Suez (Egypt) to Zeebrugge (Belgium) between the 27th May and the 5th June 2003. The Deoxygenation methodology was tested between the 20th to 30th June 2003 on the vessel's journey from Southampton (UK) to Manzanillo (Panama).

The shore based trials were undertaken at Tvärminne zoological station on the Finnish Coastline between August and September 2003. The station is part of the University of Helsinki, while the Oxicide trials were performed in August 2003 in Den Helder, Netherlands.

The sampling methodology was influenced by ongoing discussion at the International Maritime Organisation (IMO) regarding the ballast water management standard. The same sampling procedure was used for all systems. The systems' installations were validated by

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classification processes and their operational performance and biological effectiveness were examined using standard procedures and testing protocols developed within MARTOB.

During the trials, each system was assessed for it biological effectiveness, direct and indirect environmental impacts, and cost. Each system was then reviewed and recommendations made.

All systems have been found to achieve high biological effectiveness. Life cycle analysis has been undertaken, thus enabling the capital and associated running costs of the systems to be calculated. The hazards associated with each system have been identified and the potential environmental impacts assessed.

LOW SULPHUR MARINE FUEL

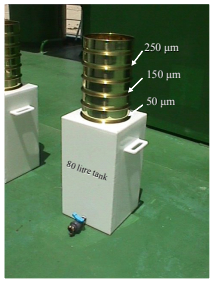
The availability of low sulphur marine fuels within the EU marine market has been investigated for both the present market and looking towards the future. It has been found that the future use of low sulphur marine fuels is likely to significantly increase and it can be concluded that extra supply capability will be required to meet the forecast demand.

The operational aspects of a low sulphur cap being implemented have been investigated and recommendations made to the EU for amendment of Dir 99/32. These being that sulphur limits are implemented for heavy fuel oil used in the marine market. Where a change between fuel types is carried out, this should be undertaken in open sea due to the potential of a loss of power for manoeuvring.

Methods to enable verification and compliance with sulphur cap regulations have been suggested and it has been recommended that automated systems are used for verification purposes.

CONCLUSIONS

The International Conference on Ballast Water Management for Ships, which was held in February 2004 at IMO in London, adopted the "International Convention for the Control and Management of Ships' Ballast Water and Sediments". This has now set out a clear target for technology vendors as well as research and development activities. Nevertheless, setting up standard procedure to confirm compliance still remains in the horizon.



MARTOB results clearly show that there are treatment technologies capable of reaching the "biological effectiveness" targets set by IMO but their cost effectiveness, market acceptability, operational requirements and reliability may require further development. Recommendations for direction and possibility of such investigation have been presented in various MARTOB technical reports.

MARTOB has recommended to the EU with regard to the IMO Diplomatic Conference (February 2004) that port facilities must be capable of receiving ballast water from those ships not able to undertake ballast water management procedures.

Attention was also drawn to the fact that a range of ballast water management techniques is required given the range of ships and their operating procedures.

Based on the outcome of the MARTOB project the establishment of verification and certification institutes for ballast water treatment and sulphur capping may be required for testing and certifying proposed new technologies.


Oxicide System

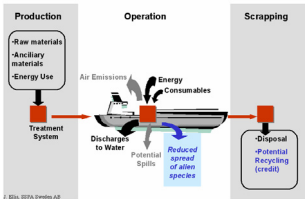
The majority of techniques developed within the project will be patented. The biological standards and test protocols could also be patented.

Throughout the project, good contacts have been established with tanker owners, bulk carrier operators, environmental institutes, and regulatory bodies.

DISSEMINATION

Martob Homepage:
www.marinetech.ncl.ac.uk/research/martob

- A one day conference held jointly with SEAM. Brussels, 26th March 2004.
- Presentation made at the ICES-SGBOV Ballast Water Conference, Italy, 22nd – 24th March 2004
- Recommendations have been made to the EU for the IMO Diplomatic Conference (February 2004)
- Presentation at INTERTANKO, London 20th Jan 2004.
- An article was published in the Finish "Navigator" magazine, titled "Onboard Ballast Water Treatment – a Tool for the Future?" January 2004.
- TNO has included an article about the MARTOB project in their e-magazine "Duurzaam Nieuws", January 2004.
- Presentation by MT at the workshop on Emissions reduction technologies and market-based instruments in Brussels. 4-5th September 2003
- SSPA have included a large article on the MARTOB project in the August edition of the "SSPA Highlights" newsletter. The MARTOB project and the problems of ballast water management were discussed in detail.
- A paper was presented at the Second International Ballast Water Treatment R&D Symposium organised by the IMO in London (21st-23rd July 2003). (Mesbahi, E.; Incecik, A., 2003)
- A MARTOB contribution paper on EU (Transport and Environment) and IMO Policies has been prepared and presented at the MEPC49 (IMO), London (14-18th July 2003).



- MARTOB – SEAM joint newsletter.
- Presentation by MT regarding the proposed sulphur regulations and involved challenges for ship operators and maritime authorities 20 May 2003
- A presentation about MARTOB project was at the International Workshop on Technical Aspects of Ballast Water Treatment Standards, Washington DC, USA, 12-14th February 2003.
- A joint workshop with SEAM was held 6th February 2003
- Article in TNO magazine, January 2003.
- MARTOB presentation was given in Dubai (Regional Tanker Ballast Water Management 17th of December 2002)
- Ensus 2002, Newcastle, UK. (16-18 December 2002)
- MARTOB Newsletter 1, December 2002.


UV+US System

FURTHER INFORMATION

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