



Environmental report 2002
Wilh. Wilhelmsen

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ENVIRONMENTAL REPORT

Finding solutions to global pollution problems represents some of the biggest challenges facing the world in coming years. The WW group's area of operation — maritime transport and related services — presents several key environmental challenges. We are concerned to prevent and reduce possible unfortunate environmental consequences of our business operations.

Modern society is wholly dependent on maritime transport, which provides incomparably the most energy-effective option when measured in megajoules per tonne of cargo per kilometre transported (MJ/t-km). A comparison shows that one of our modern ro-ro ships at present uses substantially less energy than road transport to carry a specified volume of cargo. The challenges are nevertheless real enough, and we will accept our share of responsibility by ensuring that our transport services take these seriously in coming years.

Shipping is an international business, and we will participate actively in efforts to establish a common international regulatory regime and environmental policy.

GOAL

Within the constraints set by technological development and economic realities, we will constantly organise our business to eliminate or minimise damage to or problems for health and the environment.

ENVIRONMENTAL STRATEGIES

One consequence of the world-wide significance of the environmental issue is that it will also represent an important competitive and commercial factor. Damage to the environment is best combated through preventive measures. We will continuously evaluate our environmental risks, and analyse how the level of safety can be raised or the environmental burden reduced.

Research and technological development are essential for identifying the most appropriate and cost-effective solutions. Our ambition is to maintain a network of contacts with national and international research institutes and technical communities which can secure our access to existing expertise in the environmental field. Our contingency planning for possible environment-related incidents covers both preventive measures and crisis management. We also stage realistic exercises at regular intervals. Openness and an acceptance of the public's need for information about our attitudes and actions in the environmental field will also characterise our relations with the media in this area.

Ingar Skaug



INGAR SKAUG

ENVIRONMENTAL CHALLENGES

The WW group takes environmental challenges seriously, and aims for a process which leads not only to increased understanding of the way it actually affects the environment but also to continuous improvements towards a cleaner environment.

Two areas of the business have great environmental significance. One concerns the vessels owned directly by the group through its shipowning companies, and the other relates to the vessels owned by others but managed by Barber International. The group's opportunities to influence design and new investment for the latter vessels are limited.

Barber International Ltd's operational offices and the ships controlled by Wilh. Wilhelmsen are certified in accordance with the ISO 14001 environmental standard. The group is thereby committed to continuous monitoring and improvement of the most significant environmental aspects it has defined.

Another goal is to encourage as many as possible of Barber's clients to opt for an environment-friendly operational profile, and to be in a position to offer environmental certification of their vessels if desired.

This report will focus primarily on the vessels controlled by Wilh. Wilhelmsen ASA. An environmental accounting has been drawn up for these vessels which critically evaluates the processes that influence emissions to the air and discharges to the sea, together with volumes delivered to land. The most important emission figures are once again compared with results in earlier years, and these comparisons will be used to evaluate environmental targets for future work.

REGULATORY REGIME

WW's efforts to limit emissions to the air and discharges to the sea are based on the international regulations in the IMO's Marpol 73/78 convention. With annexes, this regulates discharges to the sea and emissions to the air. In addition, a number of special national requirements must be taken into account.

THE MOST IMPORTANT ENVIRONMENTAL IMPACTS OF WW'S OPERATIONS

A ship comprises a number of sub-processes which add up to the factor in WW's operations with the biggest impact on the environment. The diagram shows the most significant of these discharges and emissions.

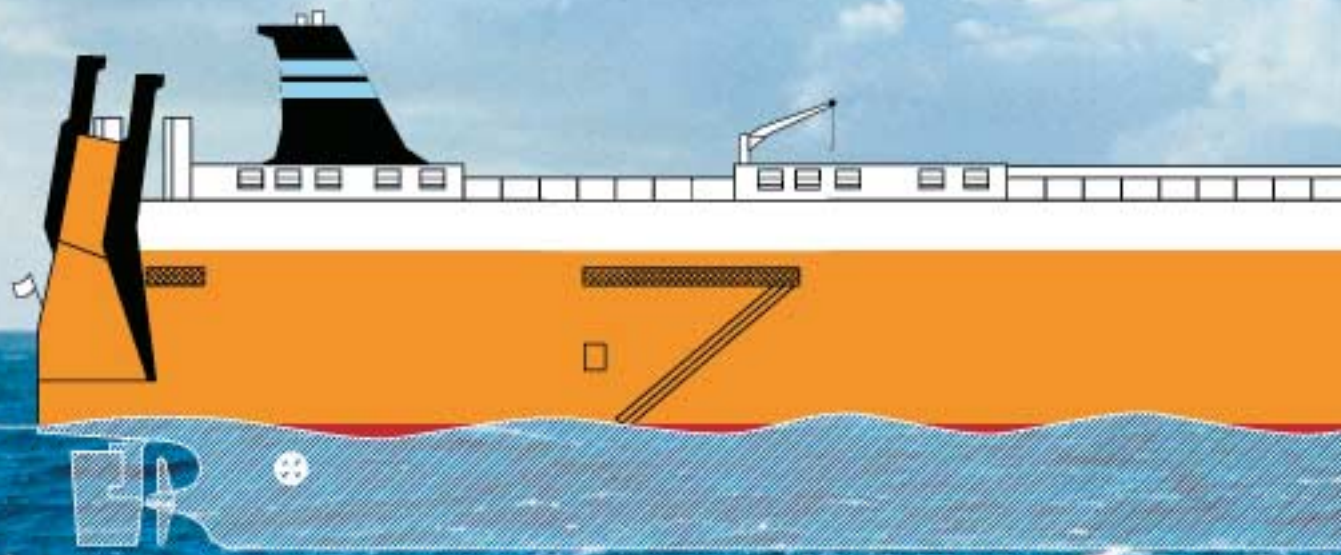
EMISSIONS TO THE AIR

These consist primarily of exhaust fumes, but also include volatile organic compounds (VOC) given off from the cargo as well as freon and halon gases. Exhaust emissions are measured in grams per tonne cargo transported per kilometre (g/t-km).

EXHAUST FUMES INCLUDE SUCH COMPONENTS AS:

Carbon dioxide This gas is regarded as an important contributor to the greenhouse effect, and is a direct product of combustion. High combustion efficiency will reduce bunkers consumption and thereby carbon emissions. The diesel engines installed in most of WW's ocean-going vessels are among the most efficient internal combustion devices available today. Maritime transport is also regarded as the most efficient existing means of moving cargo. Some of WW's ships mix additives with the bunkers to reduce pollution and enhance engine efficiency.

Nitrogen oxides Nitrogen oxides contribute to acid precipitation and ground-level smog, as well as influencing the greenhouse effect, contributing to ozone depletion and posing a health risk. According to published research reports, international shipping is estimated to account for about seven per cent of total nitrogen oxide emissions. New IMO requirements to limit such emissions apply to vessels whose keel was laid after 2000.



OPERATIONAL DISCHARGES TO THE SEA

This category embraces discharges of treated sewage, waste, bilge water, ballast water and toxic antifoulings, as well as a small risk of oil spills in the event of accidents.

BALLAST WATER

This area has come into focus after the discovery that alien types of algae and plants/animals are flourishing in certain areas. They appear to have been introduced in ballast water shipped from one port region to another. Their expansion could displace existing species, or cause heavy pollution and fouling of seawater intakes and filters, for instance, where new species become established.

ANTIFOULINGS

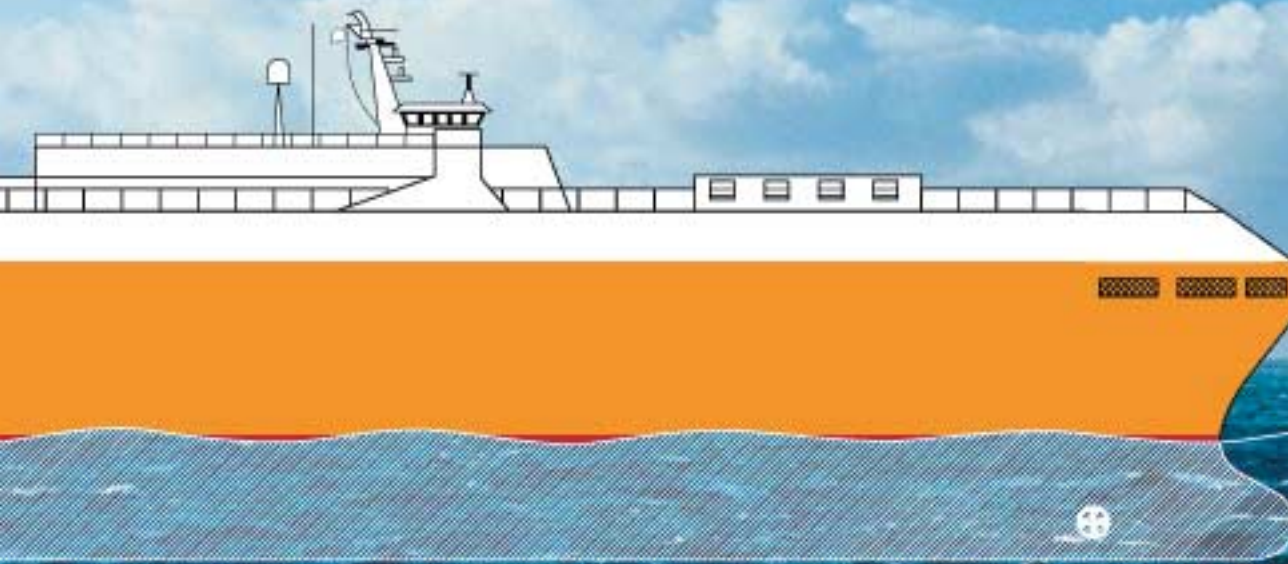
Antifouling coatings are intended to keep the hull smooth and thereby reduce fuel consumption and exhaust fumes. The drawback with traditional antifoulings is that they not only kill weeds and other foulings but also add toxins to the sea. That applies particularly to the tin-based TBT coatings.

Sulphur oxides Sulphur oxides contribute to acid precipitation and pose a health hazard. Estimates indicate that shipping accounts for roughly four per cent of global sulphur oxide emissions. This contribution derives directly from the sulphur content in bunkers, so that the best method of reducing it is to use fuel oil with a low sulphur content. The IMO specifies that this content should not exceed five per cent.

Particulate matter Particulate matter (PM) in exhaust fumes comprises both organic and inorganic components. These contribute to pollution and pose a risk of cancer and other health hazards.

VOC Vaporisation from oil cargoes is particularly heavy during the loading process, when petroleum gases in the tanks are displaced by cargo being pumped aboard. In addition, the most volatile components vaporise from the cargo throughout the voyage.

Freon and halon gases These contribute to depleting the ozone layer in the atmosphere. Freon is used in refrigeration processes on board, while halon is used for fire-fighting.



SCRAPPING

Scrapping is part of a vessel's life cycle. Growing attention is now being paid to this process. Efforts are being made, for instance, to find ways of identifying the scrapping methods used and how these help to pollute the environment.

OTHER DISCHARGES

Other discharges, such as sewage, bilge water, oily sludge and waste, are all treated to the standard of cleanliness defined in international regulations before being discharged.

ACCIDENTAL DISCHARGES TO THE SEA

Accidental discharges unfortunately represent an unavoidable risk. However, WW is duty-bound to do what it can to minimise such discharges by instituting good operational procedures and actively training its personnel. Good emergency response routines must be put in place to limit the scope of any damage should an accident occur. Continuous efforts are pursued in this area with regard to both regulations and emergency response plans.

ENVIRONMENTAL WORK IN THE BUSINESS

Environmental work in the WW organisation is stratified. The management of each company bases its environmental policy on the company's quality assurance system. Environmental targets for vessel operation have been developed jointly by Wilhelmsen Lines Shipowning AS and Barber Ship Management AS. The management organisation for each ship is responsible for technical monitoring and for recommending environmental measures which should be implemented on board. The captain and crew are responsible for day-to-day monitoring, and the captain's instructions also confer the authority to take such steps as are considered



necessary to protect the marine environment. Barber Ship Management AS has established an environmental management system and is ISO 14001-certified. This certification covers ships controlled by Wilhelmsen Lines Shipowning AS. Its requirements include the establishment of an environmental programme and a special environmental committee. Meeting at least three times a year, the latter is respon-

sible for setting environmental targets and for monitoring progress towards these as specified in the environmental programme. Personnel responsible for externally-owned vessels managed by Barber work actively in cooperation with their owners to make these ships more environment-friendly.

ENVIRONMENTAL ASPECTS

ISO-14001 certification commits WW to continuous monitoring and improvement of the most significant environmental aspects defined by the company in its business area. The table below presents a selection of the most important environmental aspects defined for the vessels in 2002. Weighting of the factors "degree of pollution", "probability of occurrence", "international regulations", "owner requirements" and "financial consequences" determines the ranking of each environmental aspect.

ENVIRONMENTAL PROGRAMME

Ship operation is constantly developing, and many of the measures currently being tried out on some of the group's vessels aim to reduce emissions of polluting substances. If these efforts yield successful results, the relevant measures will be extended to other vessels in coming years.

Procedures and long-term targets have been established for the most significant environmental aspects, with measures and status

Environmental aspects	Degree of pollution	Probability	International regulations	Owner requirements	Financial consequences	Level of significance
Nitrogen oxide emissions	3	5	2	5	2	300
Sulphur oxide emissions	3	5	2	5	2	300
Carbon dioxide emissions	3	5	1	4	4	240
Environmentally-harmful glassware/cans, etc, not recycled to land	4	4	4	4	3	768
Non-environment-friendly cleaning media/chemicals used on board	4	4	4	4	3	768
Oily sludge directly to the sea	3	5	5	3	3	675
Bilge water directly to the sea	3	2	5	5	5	750
Batteries not sorted and sent ashore	3	3	5	5	3	675
Tin-free antifouling not applied	3	3	5	5	3	675
Oil spills when bunkering	5	2	5	5	5	1250
Oil spills from hydraulic system	2	4	5	5	4	800
Motivation and training	2	4	4	5	3	480

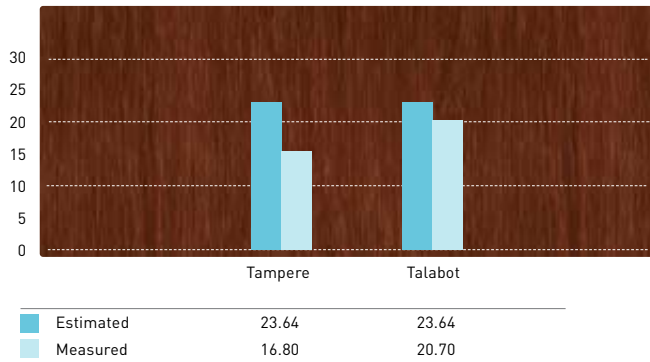
PRINCIPAL ACTIVITIES IN THE 2002 ENVIRONMENTAL PROGRAMME

Aspect	Other	Sea	Air	Objective	Target	Measures	Status
NO _x engine operations	x	•	•	Reduce NO _x emissions	Reduce NO _x emissions per unit transported by 25% over eight years (2000-2008).	a) Study the effect of NO _x -reducing nozzles on the newbuildings, and ask Wärtsilä and engine manufacturers about their experience in this area. b) Talabot and Takara will continue to run their auxiliary engines on diesel oil in 2002.	a) On-going. b) Preliminary analysis shows an NO _x decline of about 50% – reduced use of spare parts and cleaner engines.
SO ₂ engine operations	x	•	•	Reduce sulphur emissions	a) Continue to evaluate the environmental benefits of diesel oil. b) Emissions to be reduced by using bunkers with a lower sulphur content.	a) Continue to operate Talabot and Takara on diesel oil in 2002. b) Performance on low-sulphur operation to be evaluated for the auxiliary engines.	2) See item b above [NO _x]. 3) All bunkering pursued in accordance with the EU directive, marine diesel oil with a maximum sulphur content of 0.2% used on board.
Bunkers	x	•	•	Reduce sludge content	3) Reducing water content in sludge.	3) Install water separator on eight vessels in 2002.	3) Five vessels completed: Taiko, Tampa, Texas, Tapiola and Tampere.
Antifouling	•	x	•	Reduce bunkers consumption per unit transported Only tin-free antifouling will be used on WWL vessels	1) Reduce hull fouling on existing vessels when docking. 2) Reduce fouling on propellers. 2) Evaluate new alternative antifoulings 3) Evaluate extended docking intervals.	1) All vessels docking in 2002 to be sandblasted and given a new coat of paint. 2) Propellers cleaned every 9-12 months. 2) The following vessels due to receive TBT-free antifouling in 2002: Taiko, Talabot and Takayama 3) Takasago and Takamine planned for five-year docking intervals.	1) 11 vessels completed - Takayama remains. 2) Programme for 2002 under preparation. 2) Two vessels completed, one to go. 3) Completed, Tarouga also completed.
Halon	x	•	•	Reduce pollution of the environment	1) Halon to be swapped for a less environmentally-harmful substance when replacement necessary.	1) Halon not replaced on Texas, Tampa, Taiko, Tagus and Tasco.	1) Taiko and Tagus empty – will not be refilled. Tasco, Tampa and Texas maintained until refilling required.
HCFC and Freon	x	•	•	Reduce pollution of the environment	1) Register the quantity used on board from 1999. 2) Start a campaign to reduce leaks.	1) Monitor consumption in 2002. 2) Motivate crew. 3) Start evaluation programme.	1) Freon consumption: 1999 = 9 549 kg, 2000 = 10 419 kg, 2001 = 9 300 kg. 2) Under development.
Chemicals and solvents	•	x	x	Reduce pollution from chemicals and solvents	1) Environment-friendly chemicals to be assessed and tested. 4) Produce statistics on chemical purchases.	1) Draw up and implement a list. 4) Statistical material to be evaluated.	1) List complete, implementation not completed. 4) Completed – to be continued.
Bilge water	•	x	•	Reduce polluting oil discharges to the sea	1) Reduce the oil content in bilge water from 15 to 5 ppm by 2008. 2) Evaluate results from the newbuildings.	1) Install separators in newbuildings 4423, 4424, 4425 and 4430. 2) Evaluation report to be prepared.	1) Installed on all newbuildings. 2) Postponed because of start-up problems. Cost-benefit analysis completed.
Batteries/ fluorescent tubes	•	•	x	Reduce environmental impact	1) Assess better products, 2) Improve waste handling on board. 3) Evaluate receiving stations on land.	1) Buy environment-friendly products, 2) Recycle environmentally-harmful waste to land.	1) Completed, continuous process. 2) Under preparation.
Consumption of cylinder oil	•	x	x	Reduce consumption of cylinder oil	1) New lubrication system for cylinder oil to be evaluated.	1) New lubrication system for cylinder oil to be installed on a selected vessel.	1) Tarouga chosen, system tested – consumption reduced from 1.3 to 0.8 g/hp.

being reviewed at each of the three meetings of the environmental committee during the year. The table below illustrates some of the activities being pursued to achieve WW's objectives in accepting its share of responsibility for reducing the environmental impact of its operations.

The environmental programme has been applied on all Wilhelmsen-controlled vessels in connection with ISO 14001 certification. The most important targets being pursued are:

NO_x EMISSION G/T-KM – MEASURED VERSUS ESTIMATED VALUES



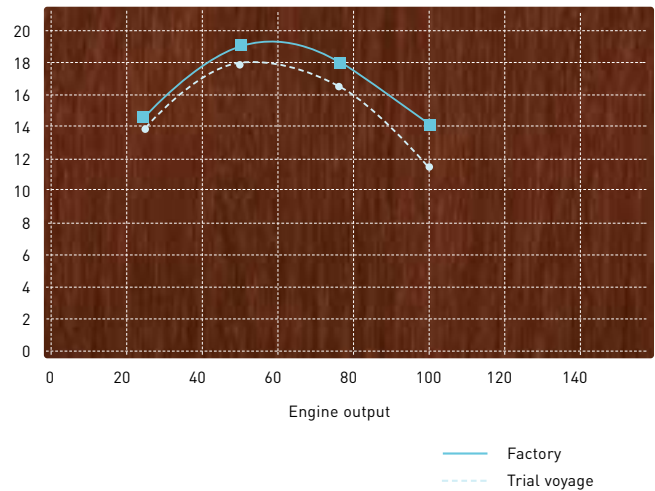
NITROGEN OXIDE EMISSIONS

The goal is to reduce such emissions by 25 per cent from 2000 to 2008. All emissions from the main engines on newbuildings delivered since 2001 are below the upper limit of 17 g/kWh. The engines are delivered with a certificate which documents the nitrogen oxide results obtained.

These gases have also been measured on two older ships to clarify emission levels from the various engines. Technical and operational solutions which could help to meet the target will then be assessed.

WW's most recent Mark IV series of ro-ro carriers goes beyond existing standards in a number of areas. All the bunkers tanks are protected so that minor damage to the vessel's sides will not cause polluting leaks. The bridge is equipped with electronic charts for safer navigation. Nitrogen oxide emissions from the ship's engi-

NO_x MEASUREMENTS MARK IV



nes are below the new Marpol requirements. The vessels feature the newest sewage treatment and waste incineration equipment, with capacities exceeding the Marpol standard. Advanced bilge water separators also ensure an oil content well below the Marpol requirement.

SULPHUR OXIDE EMISSIONS

The 2002 target was to use no fuel containing more than 2.5 per cent sulphur in the first six months and 2.2 per cent in the second half. In line with the group's long-term strategy, a further reduction will be sought in 2003. The sulphur content of bunkers is recorded continuously. Some of the auxiliary engines are also being run on diesel oil, which contains little sulphur.

FUEL CONSUMPTION

The volume of oily sludge from fuel oil is to be reduced. Homogenisers are installed in the latest vessels and in Takara. A preliminary evaluation shows more efficient and complete combustion, with a consequent reduction in the volume of sludge which must be handled on board. Results will continue to be assessed in 2003.

TIN-FREE ANTIFOULING

Only tin-free antifouling have been applied in dockings since 2000. WW is also testing new alternative antifouling.

ACCIDENTAL OIL SPILLS

The group aims to minimise oil pollution caused by accidents. Spills in 2002 totalled only 20 litres, and the trend in recent years shows a constant improvement.

FREON AND HALON GASES

The volume of freon used is registered, and a campaign has been launched to reduce possible leaks from refrigeration plant on the vessels. Remaining halon-based systems will be replaced with more environment-friendly products when refilling is required.

USE OF CHEMICALS

Use of environment-friendly chemicals will be stepped up this year. The group's procurement staff prepares lists of more environment-friendly alternatives to be used on the ships.

BILGE WATER

The aim is to work continuously on reducing the oil content in bilge water. Separators which reduce discharges will be assessed for both newbuildings and when replacing existing systems.

WASTE HANDLING

All the vessels have a plan for waste sorting. Some feature a separate recycling station. Experience with such units will be assessed for possible retrofitting of similar installations on all the ships.

BALLAST WATER

The aim is to reduce the volume of micro-organisms in ballast water, and to limit the intake and discharge of such water where possible. A ballast management system has been implemented in the fleet, along with a plan for internal transfers of ballast between the tanks. A special training programme has been established for ship's officers in the group to enhance understanding of the problem and ensure optimum ballast water operations. Continuous training and education will help to ensure the most environment-friendly approach in this area.

INSPECTIONS

Barber International has its own inspection programme to monitor the standards set by the group. Under this, every ship is visited once a year by the company's safety inspectors. A special safety, health and environmental (SHE) group has been established to follow up this work. The SHE inspectors check the vessel's condition, interview the crew, organise emergency response exercises and discuss how further improvements in safety and environmental protection could be achieved.

TRAINING

A well-founded training programme represents an important element in all safety and environmental work. Barber International Ltd has its own maritime training and educational centre at Mumbai in India. Specially-tailored training programmes are also run in cooperation with the company's manning offices in Norway, Poland and the Philippines. In addition, Barber cooperates closely with the Vestfold Regional College in Norway to hold regular seminars on safety training in critical conditions. This programme has been specially developed for WW officers, and feedback from participants is very positive. All Barber International Ltd's management offices are now certified and hold a document of compliance, and all the ships have received a safety management certificate (SMC) in accordance with the ISM code. Emergency response exercises for handling oil spills are staged regularly both at sea and on land. Environmental work is also a topic at the conferences organised regularly for ship's officers.

Computer-based training (CBT) modules are supplied to Barber's manning offices and vessels under management through a collaboration with Seagull. WW's Mark IV newbuildings also feature a dedicated CBT room for such training.

REGISTRATION AND ANALYSIS

Barber has adopted a computer system developed in-house to register and analyse operational data as well as undesirable incidents and non-conformances. This information is compared with pre-defined quality parameters to check that levels are not unacceptably high.

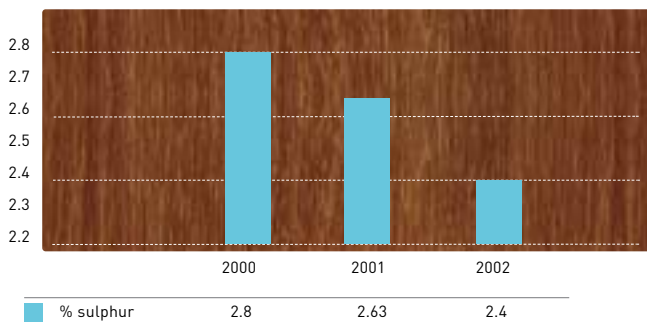
CONSUMPTION

All purchases of bunkers oil are tested for such characteristics as sulphur content. This information is then registered and stored. The table below illustrates a selection of the data logged at each bunkering.

	Quantity	Unit
Year 2002		
Order no.	2252	
Supplier	Xxxx	
Delivery date	05.06.02	
Port	Zeebrugge	
Ship	Talisman	
Owner	WW	
Quantity	3 500	tonnes
Price	Xxxx	USD
Quality	380	cst/mt
Sulphur content	2.31	%
Test result	ok/not ok	

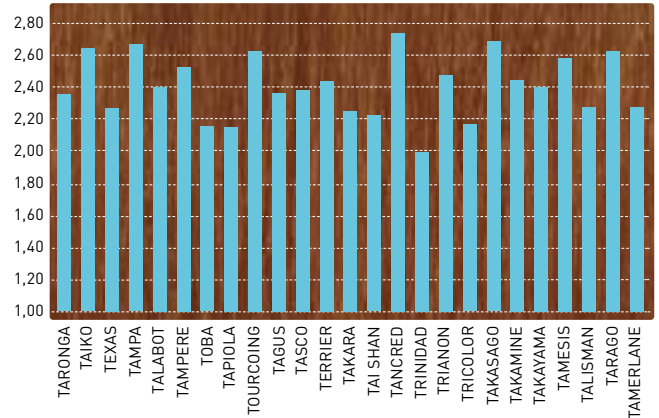
WW purchased a total of 395 908 tonnes of bunkers in 2002 with an average sulphur content of about 2.4 per cent. This means that the group reduced the sulphur content in its bunkers for the third year in a row. The table below illustrates this development.

FLEET TOTAL - % SULPHUR IN BUNKERS



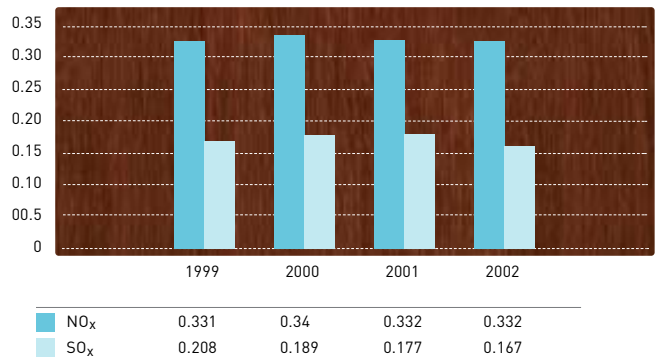
The following table shows the percentage sulphur content in all bunkers purchased in 2002 for each of the vessels.

AVERAGE SULPHUR CONTENT IN BUNKERS 2002



However, the group's total energy consumption is a misleading parameter for measuring how well its ships are being operated. The most interesting comparison is between consumption and emissions per gram of cargo transported per tonne-kilometre (g/t-km). These data are now calculated for all WW ships and presented in the environmental accounting. Emissions of nitrogen oxides, sulphur oxides and carbon dioxide are calculated on the basis of each ship's service speed, cargo hold volume and estimated gases released. The table shows the average for all vessels in 2002.

NO_x & SO_x EMISSIONS (G/T-KM)

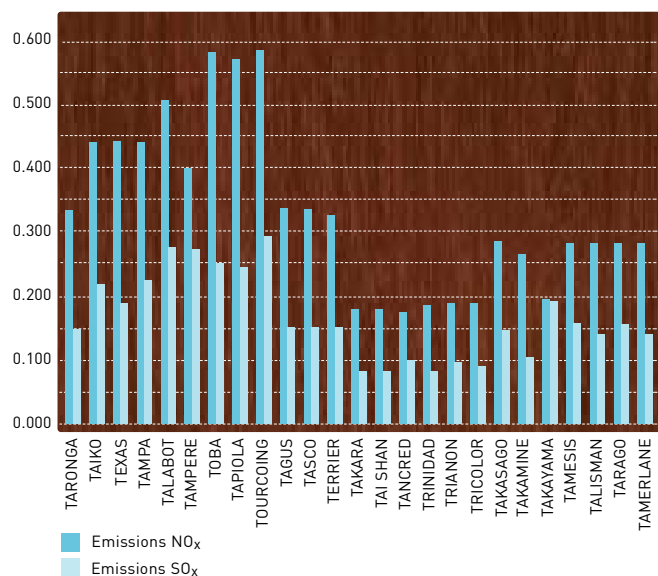


Because the fleet composition was unchanged, total nitrogen oxide emissions in 2002 were the same as for the previous year. Sulphur oxide emissions declined somewhat owing to the increased focus on purchasing low-sulphur bunkers. In line with the

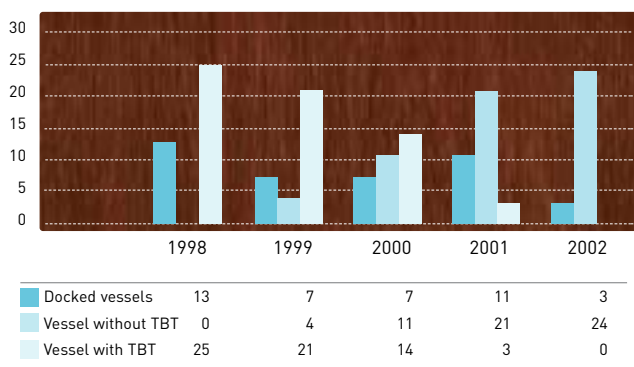
goal of steadily reducing the sulphur content in bunkers, WW is hoping for a further reduction in 2003.

The following graph shows emissions of nitrogen and sulphur oxides for each of the group's vessels. The variations largely reflect differences in engine performance, cargo hold volume and sailing speed.

VESSEL EMISSIONS IN 2002



At 31 December 2001, only three ships were in service with tin-based (TBT) antifouling. These were docked during 2002, and tin-free antifouling applied. The whole fleet has accordingly been converted to such coatings. The graph below shows the historical development.

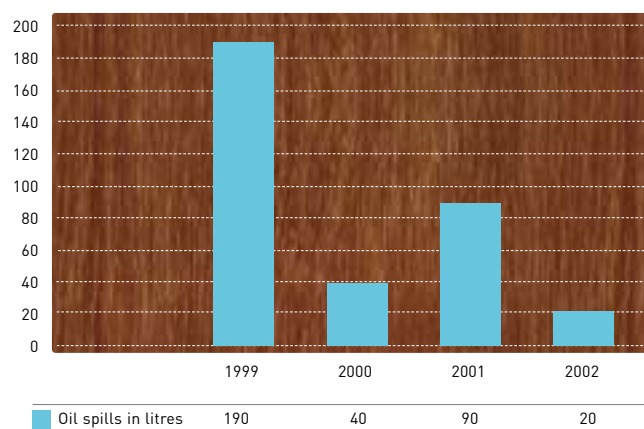


Five-year tin-free systems have been applied on Taronga, Takasago and Takamine. This means that the antifouling system

will function for twice as long as traditional coatings. The aim is to try to reduce consumption and extend the interval between each hull treatment.

Three oil spills were recorded on the ships in 2002. Two of these incidents involved leaks of oil to the sea, with the larger coming to 15 litres. The total amount spilt was 20 litres. In operational terms, WW can be well satisfied that its motivational efforts and the training initiated in connection with work on ISO 14000 are making a positive contribution through reduced oil spills. All the incidents will nevertheless be analysed and necessary measures initiated to avoid repetitions.

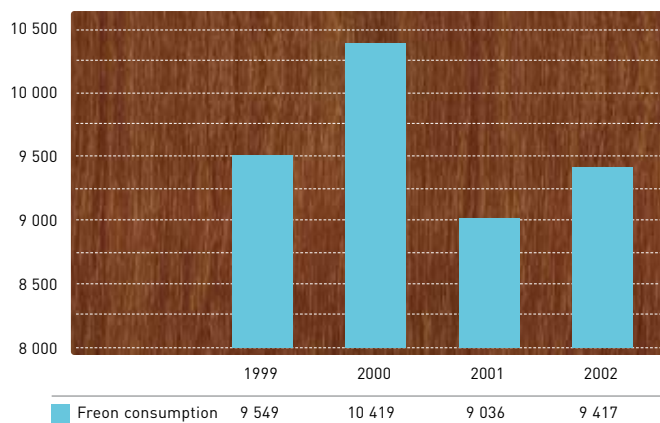
OILSPILL IN LITRE



HCFC AND FREON

Consumption of freon in the fleet is stable. WW's long-term goal is to reduce this consumption, and measures to achieve that objective are under continuous assessment.

FLEET FREON CONSUMPTION (KG)



PRESENTATION – M/V TALABOT

The ConRo (container and ro-ro) carrier m/v Talabot is the fifth of five sister ships. It was delivered from Mitsubishi Heavy Industries Ltd in Japan during June 1979. This vessel is particularly suited to carrying heavy cargo and containers, but also has the flexibility for high-efficiency transport of cars and lorries.



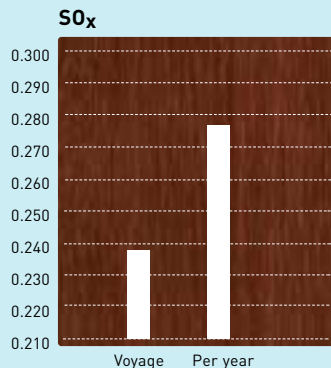
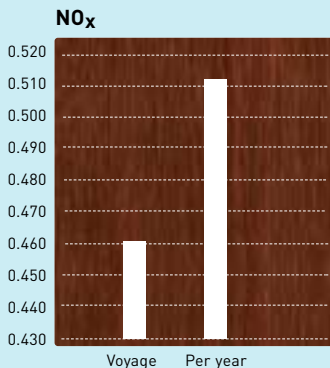
MAIN DIMENSIONS

Length overall 228.41 m
 Length between perpendiculars: 211.50 m
 Breadth: 32.26 m
 Draft: 11.17 m
 Deadweight at max draft: 34 605 tonnes
 Gross tonnage: 39 535 tons
 Net tonnage: 13 678 tonnes
 Main engine (Sulzer 9RND90M): 22 190 kW
 No of decks: 6 (1 hoistable)
 Design speed: 21 knots

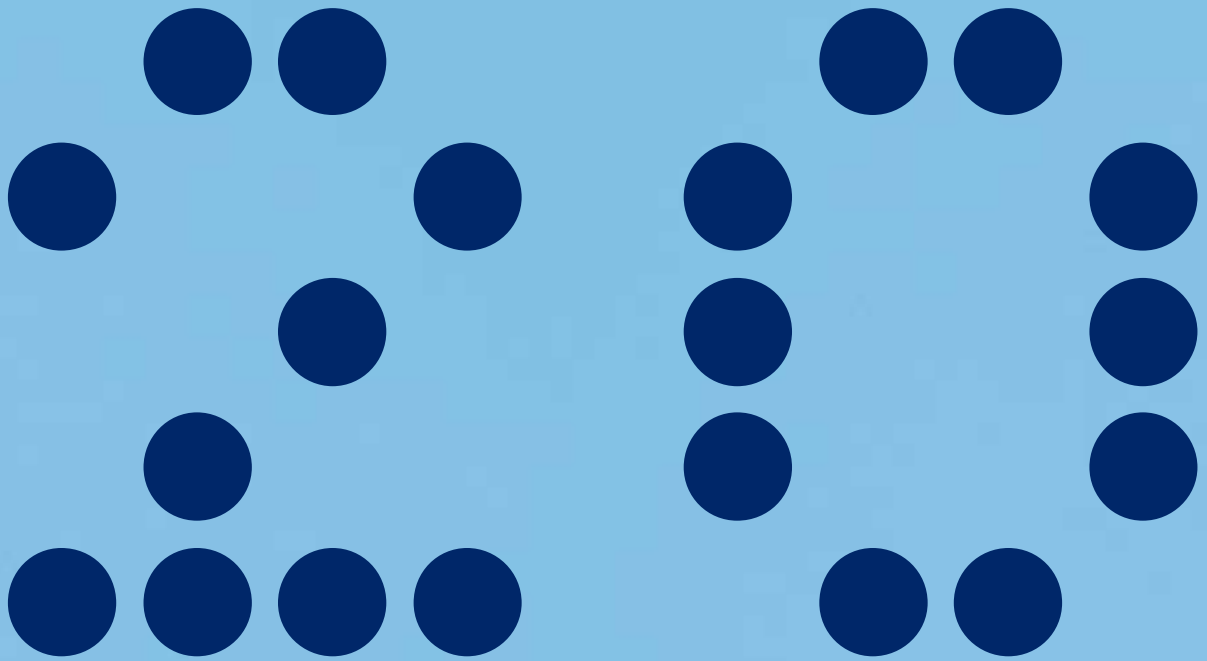
ENVIRONMENTAL CALCULATION – VOYAGE FROM BALBOA, PANAMA – AUCKLAND, NEW ZEALAND , 2-15 JULY 2002

Total bunkers burnt	1 136 tonnes
Sulphur content in bunkers	2.37 per cent
Distance sailed	6 593 nautical miles
Average speed	19.1 knots
Engine output	80 per cent

REAL EMISSIONS ON THIS VOYAGE COMPARED WITH THE ESTIMATED ANNUAL AVERAGE



For this voyage, the estimated values are in the order of 10-15 per cent higher than actual emissions. This primarily reflects the fact that annual emissions are calculated with the aid of constant coefficients relating to the cargo carried, sailing speed and engine output. On the other hand, nitrogen oxide emissions from TALABOT'S engine were measured and are included in this calculation.



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