

July 22, 2015

## M/V Harvest Leader Follow-Up Report

### Client

Ray Car Carriers Ltd.

Stamco Ship Management Ltd., Piraeus, Greece

### Purpose of installation

Investigation of HM technology's abilities to fully replace and take over the function and operation of the existing UV sterilizer.

Further to demonstrate that the HM system in addition to treating the fresh water against bacteria and any possible kind of bio growth also protects the calorifier and the internal piping system from settlement of lime scale, an ability that exceeds the capabilities of the existing UV sterilizer.

### Systems installed

The HydroPath Marine sterilizing system consisting of two HM45 units that were installed on the fresh water unit prior to launching the vessel at Busan, South Korea.

One HM45 system has the duty to treat the cold consumption water supplied to the entire accommodation. The second HM45 system treats the separate hot water circulation line leading to the calorifier.

### Date of installation

October 2014, Busan, South Korea

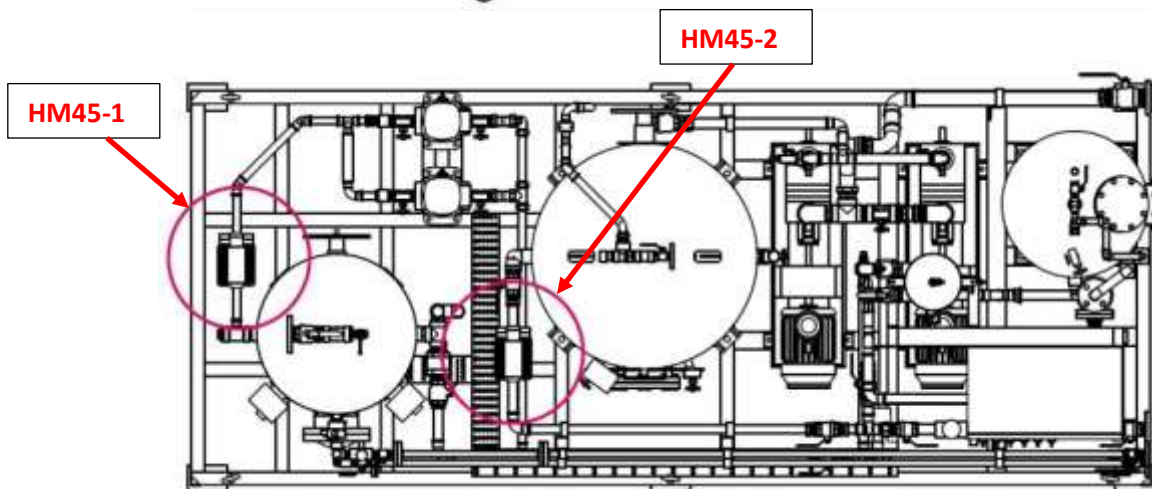
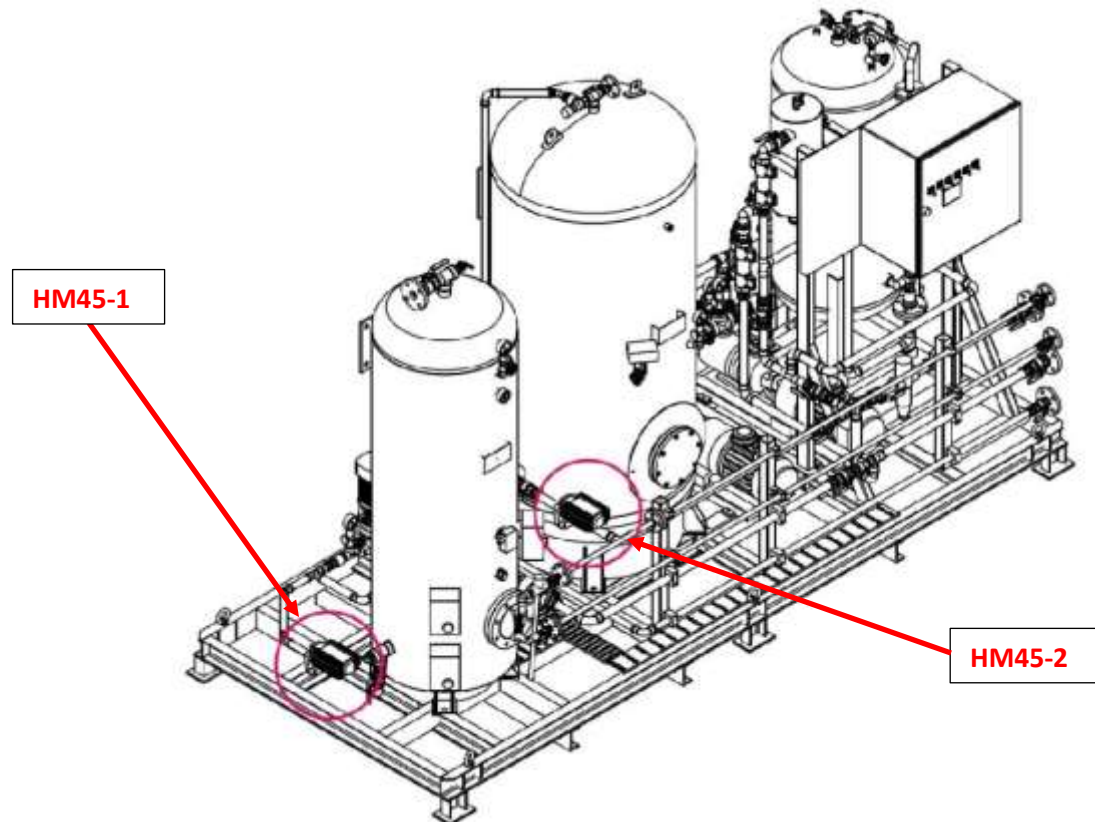


M/V Harvest Leader

### Installation Location

Two HM45 systems were installed on board the vessel:

First system was installed on the cold water outlet to the accommodation and before the split to the calorifier (see the exact positioning in the below scheme marked “HM45-1”). The second system was installed on the hot water return line to the calorifier (see the exact positioning in the below scheme marked “HM45-2”).



### **Findings**

In order to determine the actual quality of the freshwater that is consumed in all areas of the vessel's accommodation the water samples for the various tests were taken directly from a water tap in the vessel's galley leaving no doubt whatsoever that the water reaching the consumer is sterilized.

First water test was carried out on the day of launching the vessel back in October 2014 showing no traces of bacteria. After the samples for the above test were taken, the HM45 systems were put to work, without any additional treatment.

Following up on the performance of the HM45 system additional water tests were carried out in June 2015 with results showing no traces of any of the bacteria it was tested for and consequently attesting continuous non-hazardous drinking water quality.

### **In conclusion:**

Please see the below latest laboratory results that affirms the efficiency of the HM systems to treat bacteria in drinking water.



**CERTIFICATE OF ANALYSIS**

Report No. KR201-0005028

Date : Oct. 27, 2014

Receipt No. : EW14-10-008  
 Applicant : Hyundai Mipo Dockyard Co., Ltd.  
 Commodity : Drinking Water  
 Sample received from : Hyundai Mipo Dockyard Co., Ltd.  
 Hull no. : **H-8145**  
 Sampling point : GALLEY, MOTOR MAN1 CABIN, ACCOM LOBBY, ECR  
 Date of sampling : Oct. 22, 2014  
 Date of sample received : Oct. 22, 2014  
 Date of analysis : Oct. 22, 2014 - Oct. 27, 2014

The above sample was tested at the laboratory of Intertek Kimsco Co., Ltd. Ulsan Testing Center, with the results of which are as follows :

Test Item	Specification	Test Result	Test Method
Total Colony Counts in 35 °C, CFU/mL	≤ 100	0	Standard methods for the examination of environmental pollution (drinking water) 2013.
Total Coliforms, /100 mL	Not detected	Not detected	
E.coli/Fecal Coliforms, /100 mL	Not detected	Not detected	
Odor	Not detected	Not detected	
Taste	Not detected	Not detected	
Total Solids, mg/L	≤ 500	0	
pH (20 °C)	5.8 - 8.5	7.9	
Hardness, mg/L	≤ 1 000	58	
Consumption of KMnO <sub>4</sub> , mg/L	≤ 100	0.6	
Cu, mg/L	≤ 1	Not detected	
Color, degree	≤ 5	Less than 1	
Turbidity, NTU	≤ 1	Not detected	
Surfactants, mg/L	≤ 0.5	Not detected	
Cl <sup>-</sup> , mg/L	≤ 250	3.9	
Mn, mg/L	≤ 0.3	0.009	
SO <sub>4</sub> <sup>2-</sup> , mg/L	≤ 200	4.8	
Zn, mg/L	≤ 3	0.024	
Fe, mg/L	≤ 0.3	0.07	
Al, mg/L	≤ 0.2	Not detected	
NH <sub>3</sub> -N, mg/L	≤ 0.5	Not detected	
Hg, mg/L	≤ 0.001	Not detected	
CN, mg/L	≤ 0.01	Not detected	

\* Not Detected < Detection Limit  
 \* Judgment : Fit for drinking

- To Be Continued -

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**TEST REPORT NO: ASL-W026-15**

Company Name : Sinoda Shipping Agency Pte Ltd  
Company Address : 10, Anson Road, #15-01/02/023, International Plaza, Singapore 079903  
Date Received : 8 June 2015 Date Reported : 11 June 2015  
Date Tested : 8 June 2015 to 10 June 2015  
Sample Description : One (1) sample said to be drinking water was labelled as M.V. Harvest Leader

On analysis, the following results were obtained:

Test	Method	Result	WHO Guidelines for Drinking Water Quality
Appearance	APHA 2110	Clear	-
Odour	SOP-WAT-002	Unobjectionable	Unobjectionable
pH value	APHA 4500-H B	8.2	-
Colour, Hazen Unit	HI 83099	<5	-
Turbidity, NTU	APHA 2130 B	0.4	5
Total Dissolved Solids, mg/l	APHA 2540 C	34	1000
Residual Chlorine (Cl <sub>2</sub> ), mg/l	APHA 4500-Cl G	0.03	5
Total Alkalinity, mg CaCO <sub>3</sub> /L	APHA 2320 B	21.9	-
Total Hardness, mg CaCO <sub>3</sub> /L	APHA 3120 B	21.7	-
Fluoride (F), mg/L	HI 83099	<1	1.5
Chloride (Cl), mg/L	HI 83099	3.1	-
Nitrate (NO <sub>3</sub> ), mg/L	HI 83099	0.4	50
Phosphate (PO <sub>4</sub> ), mg/L	HI 83099	0.5	-
Sulphate (SO <sub>4</sub> ), mg/L	HI 83099	5	-
Iron (Fe), mg/l	APHA 3120 B	<0.01	-
Copper (Cu), mg/l	APHA 3120 B	<0.01	2
Silica (SiO <sub>2</sub> ), mg/l	APHA 3120 B	0.13	-
Manganese (Mn), mg/l	APHA 3120 B	<0.01	-
Aluminium (Al), mg/l	APHA 3120 B	<0.01	-
Total Coliform (m-endo, 35C, 24hrs), cfu/100ml	APHA 9222 B	<1	-
E Coli (EC-MUG, 44.5C, 24hrs), cfu/100ml	APHA 9222 D & 9225	<1	<1

**Remarks:** The above results were tested as per sample submitted with reference to WHO Guidelines for Drinking Water Quality (2011), the results are physically, chemically satisfactory and bacteriologically satisfactory

**Note:** < Less than

  
**Roselle Monteloyola**  
Laboratory Manager

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