Test Report

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Report No. :
KOMERI-0906-15T0954
http://www.komeri.re.kr

Korea
Marine Equipment
Research Institute

시점확인 진본 2016/03/11 11:50:13 KST 정부시점확인센터

1. Applicant

○ Company Name : KT MARINE CO., LTD.

○ Address : Rm.1808, 60 Centum buk-daero, Haeundae-gu, Busan, Korea

○ Date of Receipt : 2015. 03. 27

2. Equipment under Test

○ Name of Product : MARINOMATE

○ Model : MARINOMATE™ BWMS

○ Serial No. : -

3. Test Standards : Refer to "1.2 TEST STANDARD"

4. Use of Report : Government Type Approval (Ballast Water Management System)

5. Test Period : 2015. 06. 29 ~ 2016. 01. 12

6. Environment : Temperature (22.4 ± 6.0) ℃, Humidity (42 ± 16) % R.H.

7. Test Result : Conformity

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by	Technical Manager
	Name : Bo-Ram LEE (Signature)	Name : Young-Soo KIM (Signature)

· The test results are valid only for the test sample(s) provided by the applicant, and cannot be reproduced in full or in part without the prior written consent of the KOMERI.

Date of issue : 2016. 03. 11

The President of Korea Marine Equipment Research Institute (Signature)

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TABLE OF CONTENTS

■ GENERAL ····· 3

1. SHIPBOARD TEST ····· 4
1.1 TEST ENVIRONMENT ····· 4
1.2 TEST STANDARD ····· 5
1.3 TEST EQUIPMENT ····· 6
1.4 TEST SET-UP ····· 7
1.5 TEST PROCEDURE ····· 7
1.6 TEST SCHEDULE ····· 7
1.7 TEST RESULT ····· 8

ATTACHMENT Ⅰ. DRAWING ····· 14
ATTACHMENT Ⅱ. PROCEDURE FOR SHIPBOARD TEST ····· 15
ATTACHMENT Ⅲ. TEST RESULT DETAILS ····· 16

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GENERAL

■ MANUFACTURER

Company Name : KT MARINE CO., LTD.

Address : Rm.1808, 60 Centum buk-daero, Haeundae-gu, Busan, Korea

■ TEST SITE

. Kushiro port, Japan
. Sinsundae port, Korea
. Tianjin port, China
. Hachinohe port, Japan

■ ADDITIONAL TEST INFORMATION

Treatment Rated Capacity : 300 m^3/h

■ TEST SUMMARY

Test Item	Test Standard	Result
Shipboard test	Refer to "1.2 TEST STANDARD"	Conformity

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1. SHIPBOARD TEST

1.1 TEST ENVIRONMENT

- Ambient Temperature (22.4 ± 6.0) ℃
- Relative Humidity (42 ± 16) % R.H.
- Tested specification

Item	Description	
Flow rate range	(300 ± 30) m^3/h	
Treatments	Ballasting	Plankill pipe unit + Electrolyzer Unit
	de-Ballasting	Neutralization Unit
TRO concentration	10.0 ± 1 mg/L as Cl_2	

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1.2 TEST STANADARD

· The test standard is based on 'Standard for Ballast Water Management System' notified by Ministry of Oceans and Fisheries (Notification No. 2015-37, 2015, Annex 8) and IMO Guideline for Approval of Ballast Water Management System (Res. MEPC. 174(58), 2008, Annex, PART 2, 2.2, 2.4, & PART 4). Detail test methods are as below.

	Test Item	Test Standard
◆	Water temperature	APHA AWWA WEF[1] 2550 Temperature
◆	pH	APHA AWWA WEF[1] 4500-H+ pH value, B. Electrometric method
◆	ORP	APHA AWWA WEF[1] 2580 Oxidation-Reduction Potential (OPR)
◆	Salinity	APHA AWWA WEF[1] 2520 Salinity, B. Electrical conductivity method
◆	DO	ASTM Standard Method D888-09 Standard test methods for dissolved oxygen in water. Test method C. Instumental probe procedure-luminescene-based sensor
◆	Turbidity	APHA AWWA WEF[1] 2130 Turbidity, B. Nephelometric method
◆	TSS	APHA AWWA WEF[1] 2540 Solids, D. Total suspended solids dried
◆	DOC/POC[2]	ISO 8245, 1999, Guidelines for the determication of total organic carbon (TOC) and dissolved organic carbon (DOC)
◆	≥ 50 μm organisms	· Fleming, J.M., Coughlan, J. 1978, Preservation of vitally stained zooplankton for live/dead sorting. Estuaries (1) 135-137[3] · US EPA 600/R-10/146, 2010, Protocol for the Verification of Ballast Water Treatment Technologies, Section 5.4.6.4, p 45[4] · APHA AWWA WEF[1] 10200 Plankton C. Concentration techniques
◆	≥ 10 μm and < 50 μm organisms	· MERC Filp Template 9.0, 2012, SOP 8 - Live organisms 10 - 50 μm, p. 45[5] · Mia K. Steinberg, Edward J. Lemieux, Lisa A. Drake, 2011, Determining the viability of marine protists using a combination of vital, fluorescent stains[5] · UNESCO Manual on Harmful Marine Microalgae 2nd Edition 2004 4. Estimating cell numbers
◆	Heterotrophic bacteria	Dry rehydratable film method (3M Petrifilm™ Aerobic Count Plate)
◆	Coliform	APHA AWWA WEF[1] 9222 Membrane filter technique for members of the coliform group, B. Standard total coliform membrane filter procedure
◆	*Escherichia coli*	US EPA, 2009, Method 1603, *Escherichia coli* (*E. coli*) in water by membrane filtration using modified membrane-thermotolerant *Escherichia coli* agar (Modified mTEC)
◆	Intestinal Enterococci	US EPA, 2009, Method 1600, Enterococci in water by membrane filtration using membrane-Enterococcus indoxyl-β -D-glucoside agar (mEI)
◆	Toxicogenic *Vibrio cholerae* (O1, O139)	APHA AWWA WEF[1] 9260 Detection of pathogenic bacteria, H. Vibrio and/or API 20E Identification system for Enterobacteriaceae and other non-fastidious Gram-negative rods (BioMerieux, Inc.)

[1] APHA AWWA WEF, Standard Methods For the Examination of Water and Wastewater 22nd Edition 2012.
[2] The sample analysis is conducted by Korea Testing & Research Institute (KTR).
[3] Staining with Neutral Red.
[4] Touch with the point of a fine dissecting needle.
[5] Fluorescence staining with FDA/CMFDA.

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1.3 TEST EQUIPMENT

Description	Model Number	Serial Number	Calibration Due
◆ Auto pipette	BP-10000	044090060	~ 2016. 11. 24
◆ Auto pipette	BP-1000	744061707	~ 2016. 12. 16
◆ Auto pipette	One touch-200	943850361	~ 2016. 11. 24
◆ Autoclave	WAC-60	DH.WAC01060	~ 2016. 12. 08
◆ Bogorov counting chamber	-	-	-
◆ Clean bench	SH-150S	-	-
◆ Colony counter	570	071203875	-
◆ Digital imaging	JUJAK 5.5	5A17185	-
◆ Drying and heating oven	WON-105	4007270901018	~ 2016. 12. 03
◆ Electronic balance	Pioneer™ Balances	8330420867	~ 2016. 12. 07
◆ Filtration system	350 mL	-	-
◆ Fluorescent microscope	CFX41-33FL	1C39498	-
◆ Humidity Recorder	313	130305885	~ 2016. 12. 21
◆ Incubators	WIG-155	WIG155090514006	~ 2016. 12. 03
◆ Mass cylinder	100 mL	-	~ 2020. 07. 17
◆ Micro (Pasteur) pipette	31 501 02	-	-
◆ Multiprobe (Hydrolab)	Hydrolab MS5	041000049050	-
◆ Plankton net	conical (30 μm)	-	-
◆ Sedgewick-Rafter chamber	-	-	-
◆ Standard sieve	30 μm	-	~ 2016. 11. 15
◆ Stereo-microscope	SZ51	-	-
◆ Turbidity meter	2100 P	10010C039174	-
◆ Vacuum pump	1617-353 series	08060001268	~ 2016. 12. 07

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1.4 TEST SET-UP

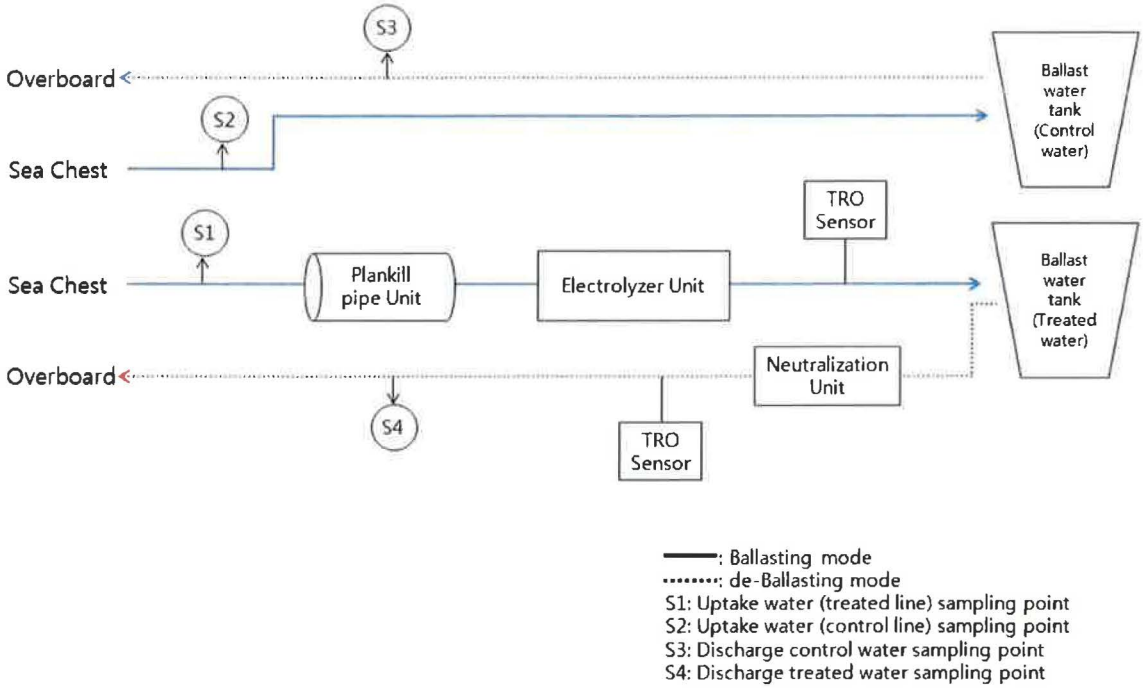

Figure 1-1 Diagram of the MARINOMATE™ for shipboard test

1.5 TEST PROCEDURE

· See ATTACHMENT Ⅱ. PROCEDURE FOR SHIPBOARD TEST.

1.6 TEST SCHEDULE

Test cycle	Test mode and date		Test site	
	Ballasting	de-Ballasting	Ballasting	de-Ballasting
1	2015. 06. 29	2015. 07. 05	Kushiro, Japan	Busan, Korea
2	2015. 10. 19	2015. 10. 23	Busan, Korea	Tianjin, China
3	2016. 01. 07	2016. 01. 11	Hachinohe, Japan	Busan, Korea

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1.7 TEST RESULT

1.7.1 Basic water parameter of source water

(1) Source water (treated line)

Test cycle	Water temp. (℃)	pH	ORP (mV)	Salinity (PSU)	DO (mg/L)	Turbidity (NTU)	TSS (mg/L)	DOC (mg/L)	POC (mg/L)
1	11.11 ± 0.14	8.13 ± 0.02	273 ± 1	31.67 ± 0.05	9.31 ± 0.01	4.10 ± 0.14	32.67 ± 2.31	1.01	0.21
2	20.75 ± 0.04	7.38 ± 0.19	460 ± 14	32.41 ± 0.01	8.11 ± 0.01	2.13 ± 0.12	15.83 ± 0.76	1.31	0.13
3	8.64 ± 0.02	7.69 ± 0.01	278 ± 5	32.78 ± 0.02	8.73 ± 0.03	1.50 ± 0.13	19.33 ± 2.57	0.92	0.06

(2) Source water (control line)

Test cycle	Water temp. (℃)	pH	ORP (mV)	Salinity (PSU)	DO (mg/L)	Turbidity (NTU)	TSS (mg/L)	DOC (mg/L)	POC (mg/L)
1	11.18 ± 0.06	8.14 ± 0.03	208 ± 2	31.41 ± 0.04	9.32 ± 0.02	4.47 ± 0.19	36.67 ± 4.73	1.03	0.26
2	20.19 ± 0.05	8.31 ± 0.15	506 ± 3	32.45 ± 0.07	7.46 ± 0.03	3.16 ± 0.09	19.67 ± 0.29	1.24	0.11
3	8.48 ± 0.05	7.94 ± 0.01	285 ± 3	32.80 ± 0.03	8.84 ± 0.04	1.53 ± 0.04	18.67 ± 1.04	0.93	Not Detected*

** Less than detection limit (0.03 mg/L)*

G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

1.7.2 Assessment of valid test

(1) Viable organisms in the uptake water (treated line)

Test cycle	≥ 50 μm organisms (inds./m^3)	≥ 10 μm and < 50 μm organisms (inds./mL)	Remarks
1	14 912 ± 1 361	314 ± 28	Valid
2	11 067 ± 3 569	110 ± 9	Valid
3	2 345 ± 483	117 ± 11	Valid
Valid requirement	> 90	> 90	-

(2) Viable organisms in the uptake water (control line)

Test cycle	≥ 50 μm organisms (inds./m^3)	≥ 10 μm and < 50 μm organisms (inds./mL)	Remarks
1	12 400 ± 1 288	259 ± 15	Valid
2	25 867 ± 2 881	106 ± 9	Valid
3	4 000 ± 180	144 ± 15	Valid
Valid requirement	> 90	> 90	-

(3) Viable organisms in the discharge control water

Test cycle	≥ 50 μm organisms (inds./m^3)	≥ 10 μm and < 50 μm organisms (inds./mL)	Remarks
1	609 ± 122	21 ± 6	Valid
2	1 700 ± 236	15 ± 5	Valid
3	2 198 ± 330	16 ± 6	Valid
Valid requirement	≥ 10	≥ 10	-

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1.7.3 Assessment of discharge treated water

Test cycle	≥ 50 μm organisms (inds./m^3)	≥ 10 μm and < 50 μm organisms (inds./mL)	Bacteria (CFU/100 mL)			Remarks
			Escherichia coli	Intestinal Enterococci	Toxicogenic *Vibrio cholerae* (O1, O139)	
1	4 ± 1.7	0.0 ± 0.0	0 ± 0.0	0 ± 0.0	0 ± 0.0	Conformity
2	1 ± 1.6	0.0 ± 0.0	0 ± 0.0	0 ± 0.0	0 ± 0.0	Conformity
3	1 ± 0.9	0.0 ± 0.0	0 ± 0.0	0 ± 0.0	0 ± 0.0	Conformity
Discharge standard	< 10	< 10	< 250	< 100	< 1	-

1.7.4 Recording data of operation parameters

Test cycle	Ballasting		de-Ballasting	
	TRC (m^3/h)	TRO (mg/L as Cl_2)	TRC (m^3/h)	TRO (mg/L as Cl_2)*
1	305 ± 6	9.87 ± 0.24	303 ± 9	0.00 ± 0.01
2	299 ± 5	10.10 ± 0.39	287 ± 8	0.11 ± 0.04
3	306 ± 6	10.02 ± 0.30	294 ± 7	0.03 ± 0.01

** Measured values of TRO #3*

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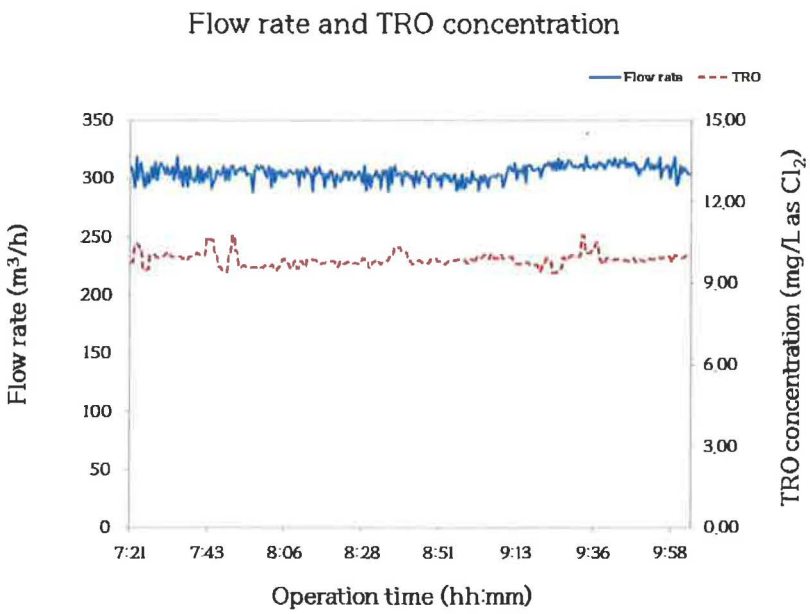
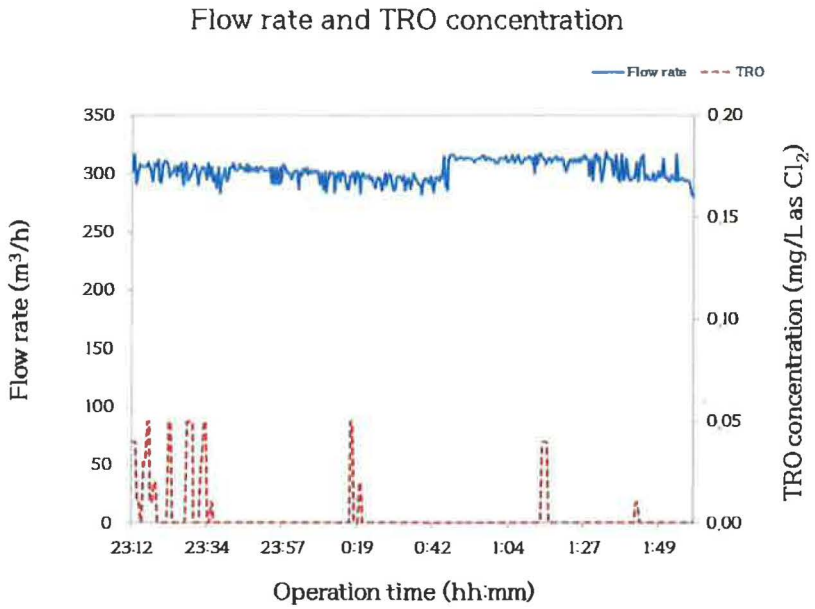
· All times to be written on the graph are UTC (Universal Time Coordinated).

(1) 1st. cycle ballasting (2015. 06. 29)



(2) 1st. cycle de-ballasting (2015. 07. 05)



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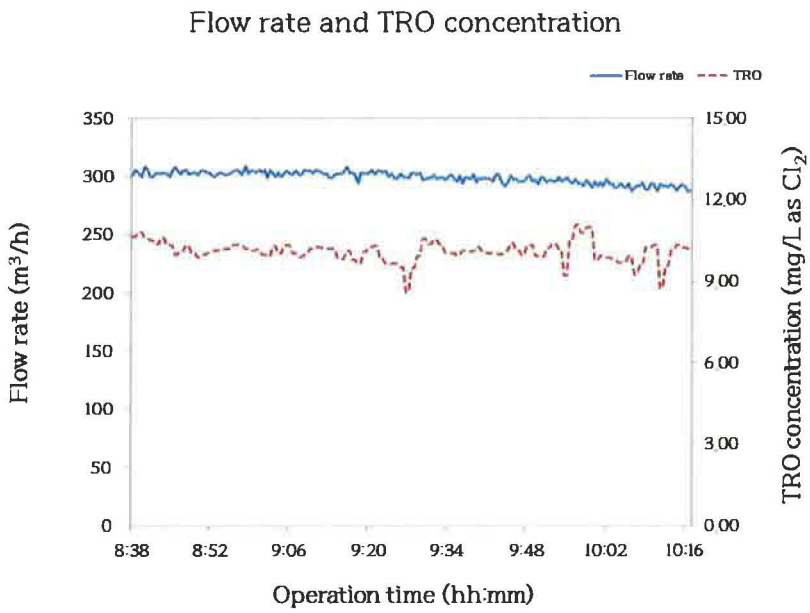
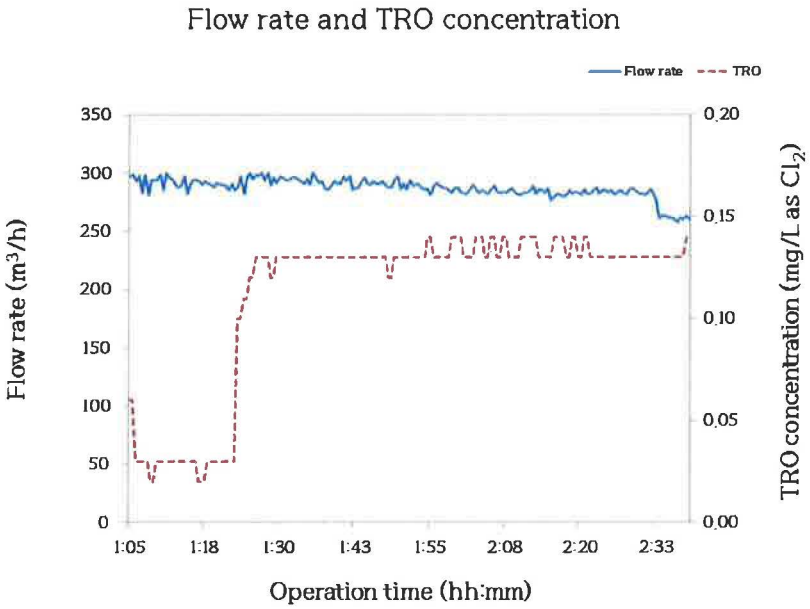
(3) 2nd. cycle ballasting (2015. 10. 19)



(4) 2nd. cycle de-ballasting (2015. 10. 23)



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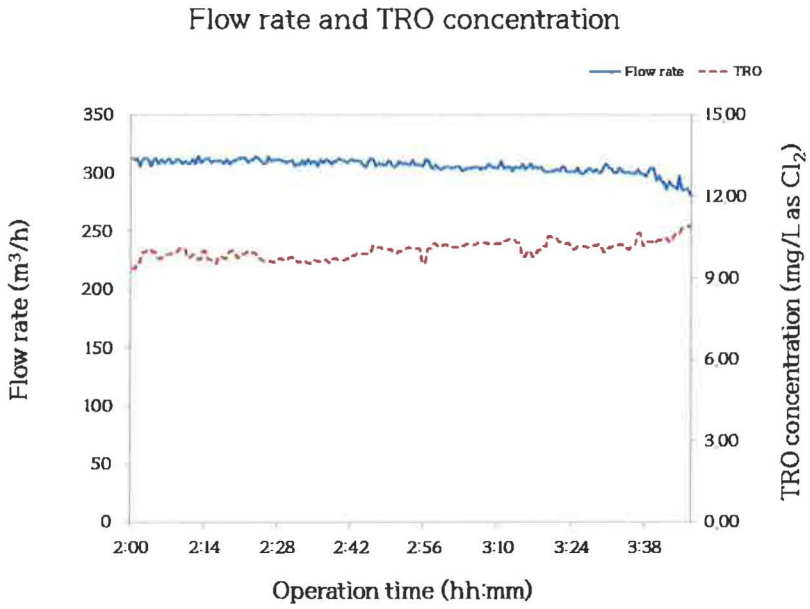
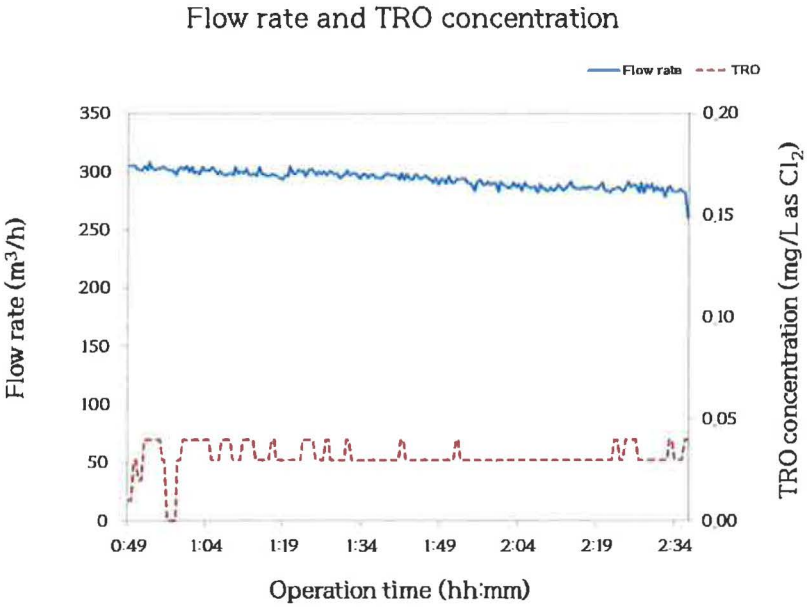
(5) 3rd. cycle ballasting (2016. 01. 07)



(6) 3rd. cycle de-ballasting (2016. 01. 11)

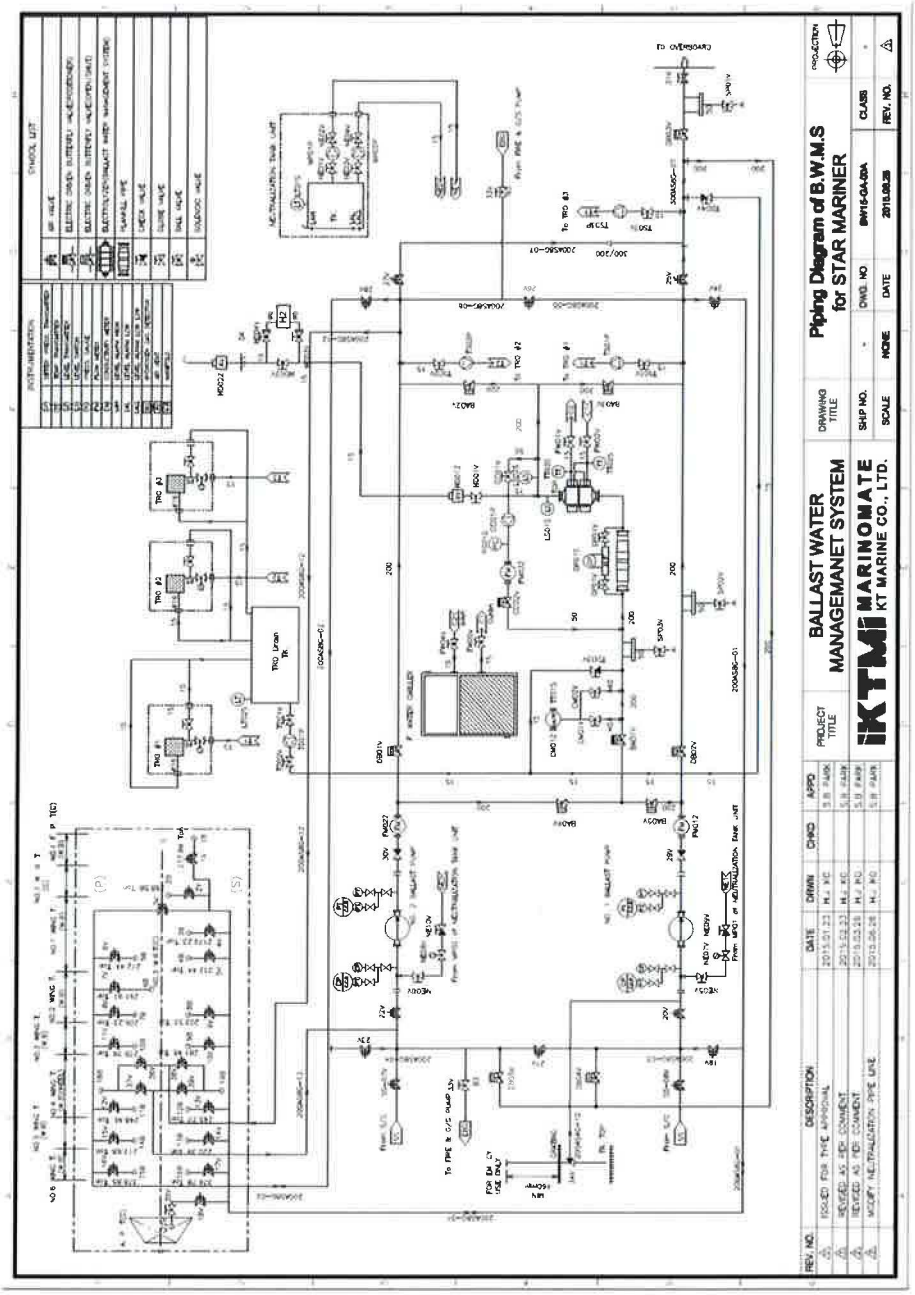


-The end-

G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

ATTACHMENT

I. DRAWING



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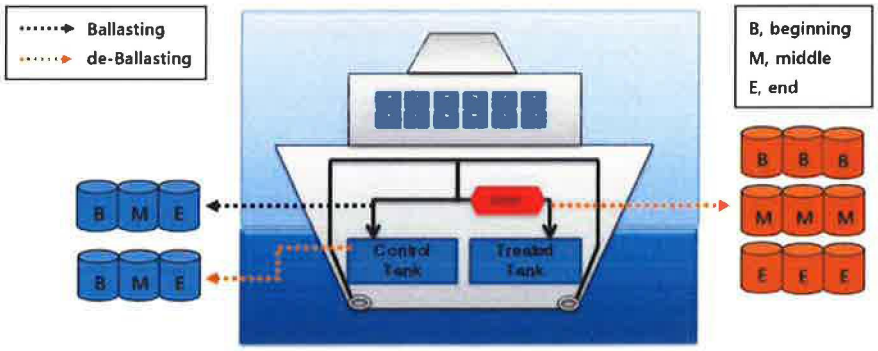
II. RAW DATA

KOMERI SOP BWMS 02
Rev. 5.0 February, 2015

BWMS Test Procedure for Shipboard Test

The test cycles including invalid and unsuccessful test cycles are to span a trial period of not less than six months.

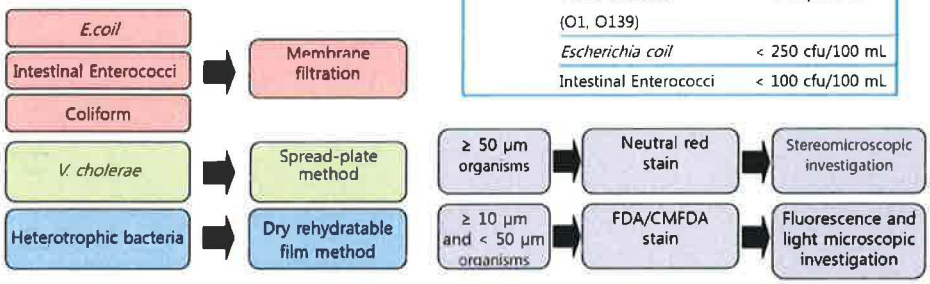


Sample volume			
Ballasting	Uptake water	≥ 50 μm organisms	1 m³ × 3
		≥ 10 μm and < 50 μm organisms	1 L × 3
		Bacteria	1 L × 3
de-Ballasting	Discharge control water	≥ 50 μm organisms	1 m³ × 3
		≥ 10 μm and < 50 μm organisms	1 L × 3
	Discharge Treated water	≥ 50 μm organisms	1 m³ × 9
		≥ 10 μm and < 50 μm organisms	1 L × 9
		Bacteria	1 L × 9

<Standard for valid test>

Ballasting		
Uptake water	≥ 50 μm organisms	> 90 inds./m³
	≥ 10 μm and < 50 μm organisms	> 90 inds./mL

de-Ballasting		
Discharge Control water	≥ 50 μm organisms	≥ 10 inds./m³
	≥ 10 μm and < 50 μm organisms	≥ 10 inds./mL
Discharge Treated water	≥ 50 μm organisms	< 10 inds./m³
	≥ 10 μm and < 50 μm organisms	< 10 inds./mL
	Toxicogenic *Vibrio cholerae* (O1, O139)	< 1 cfu/100 mL
	Escherichia coil	< 250 cfu/100 mL
	Intestinal Enterococci	< 100 cfu/100 mL



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Ⅲ. TEST RESULT DETAILS

- 1st test cycle ballasting (2015. 06. 29) - Basic water parameter

Test item	Source water (treated line)	Uptake water (treated line)			Source water (control line)	Uptake water (control line)		
		B	M	E		B	M	E
Water temperature (℃)	11.26	11.01	11.29	11.43	11.22	11.28	10.78	10.95
	11.08	11.08	11.13	11.11	11.22	10.99	10.95	10.95
	10.98	10.91	11.25	11.03	11.11	10.97	10.84	11.03
Average	11.11	11.00	11.22	11.19	11.18	11.08	10.86	10.98
Standard deviation	0.14	0.09	0.08	0.21	0.06	0.17	0.09	0.05
pH	8.12	8.10	8.14	8.17	8.17	8.14	8.17	8.18
	8.16	8.13	8.09	8.13	8.11	8.14	8.15	8.16
	8.12	8.12	8.13	8.08	8.15	8.20	8.26	8.16
Average	8.13	8.12	8.12	8.13	8.14	8.16	8.19	8.17
Standard deviation	0.02	0.02	0.03	0.05	0.03	0.03	0.06	0.01
ORP (mV)	273	262	250	253	206	212	211	224
	273	261	249	257	208	213	213	225
	272	260	248	261	209	213	212	226
Average	273	261	249	257	208	213	212	225
Standard deviation	1	1	1	4	2	1	1	1
Salinity (PSU)	31.61	31.62	31.51	31.57	31.45	31.44	31.74	31.74
	31.70	31.59	31.45	31.58	31.39	31.50	31.72	31.70
	31.70	31.59	31.48	31.55	31.38	31.50	31.66	31.67
Average	31.67	31.60	31.48	31.57	31.41	31.48	31.71	31.70
Standard deviation	0.05	0.02	0.03	0.02	0.04	0.03	0.04	0.04
DO (mg/L)	9.31	9.35	9.26	9.21	9.31	9.28	9.26	9.31
	9.31	9.35	9.31	9.29	9.34	9.30	9.29	9.29
	9.32	9.34	9.30	9.32	9.30	9.31	9.29	9.26
Average	9.31	9.35	9.29	9.27	9.32	9.30	9.28	9.29
Standard deviation	0.01	0.01	0.03	0.06	0.02	0.02	0.02	0.03
Turbidity (NTU)	4.15	3.62	4.05	3.82	4.50	4.35	3.93	4.41
	3.94	4.06	4.32	4.05	4.64	4.42	3.86	4.69
	4.21	3.75	3.59	3.89	4.27	4.39	3.95	4.34
Average	4.10	3.81	3.99	3.92	4.47	4.39	3.91	4.48
Standard deviation	0.14	0.23	0.37	0.12	0.19	0.04	0.05	0.19
TSS (mg/L)	30.0				42.0			
	34.0				35.0			
	34.0				33.0			
Average	32.7				36.7			
Standard deviation	2.3				4.7			
DOC (mg/L)	1.01				1.03			
POC (mg/L)	0.21				0.26			

B: Beginning, M: Middle, E: End

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Ⅲ. TO BE CONTINUED

· 1st test cycle ballasting (2015. 06. 29) - Viable orgamism and bacteria

Test item	Source water (treated line)	Uptake water (treated line)			Source water (control line)	Uptake water (control line)		
		B	M	E		B	M	E
≥ 50 μm organisms (inds./m³)		13 000	15 600	16 600		12 200	11 400	13 600
		14 400	14 000	15 800		12 000	10 800	13 800
		14 600	13 400	16 800		11 600	11 600	14 600
Average		14 000	14 334	16 400		11 934	11 267	14 000
Standard deviation		872	1 137	529		306	416	529
≥ 10 μm and < 50 μm organisms (inds./mL)		367	328	291		287	277	253
		318	300	308		257	250	251
		341	290	278		262	255	238
Average		342	306	293		269	261	248
Standard deviation		25	20	15		16	14	8
Heterotrophic bacteria (CFU/mL)		63	59	32		36	36	28
		64	65	35		35	38	32
		60	54	34		38	40	32
Average		63	60	34		37	38	31
Standard deviation		2	6	2		2	2	2
Coliform (CFU/100 mL)		20	26	6		8	6	20
		30	36	6		26	10	16
		18	24	14		18	12	14
Average		23	29	9		18	10	17
Standard deviation		6	6	5		9	3	3
Escherichia coli (CFU/100 mL)		0	0	0		0	4	2
		2	0	0		2	0	2
		2	0	4		2	0	0
Average		2	0	2		2	2	2
Standard deviation		1	0	2		1	2	1
Intestinal Enterococci (CFU/100 mL)		0	0	0		0	0	0
		0	0	0		0	0	0
		0	0	0		0	0	0
Average		0	0	0		0	0	0
Standard deviation		0	0	0		0	0	0
Toxicogenic *Vibrio cholerae* (O1, O139) (CFU/100 mL)		0	0	0		0	0	0
		0	0	0		0	0	0
		0	0	0		0	0	0
Average		0	0	0		0	0	0
Standard deviation		0	0	0		0	0	0

B. Beginning; M. Middle; E. End
CFU. Colony Forming Unit.

G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 1st test cycle de-ballasting (2015. 07. 05) - Basic water parameter

Test item	Discharge control water			Discharge treated water								
	B	M	E	B1	B2	B3	M1	M2	M3	E1	E2	E3
Water temperature (℃)	20.26	20.34	20.20	21.25	21.47	21.87	21.62	21.70	21.72	21.70	21.68	22.19
	20.32	20.32	20.24	21.36	21.61	21.66	21.60	21.69	21.65	21.79	21.73	22.22
	20.33	20.24	20.21	21.28	21.68	21.64	21.80	21.66	21.77	21.72	21.78	22.18
Average	20.30	20.30	20.22	21.30	21.59	21.72	21.67	21.68	21.71	21.74	21.73	22.20
Standard deviation	0.04	0.05	0.02	0.06	0.11	0.13	0.11	0.02	0.06	0.05	0.05	0.02
pH	8.05	8.05	8.05	6.82	6.78	6.78	6.77	6.79	6.78	6.79	6.78	6.79
	8.05	8.06	8.06	6.79	6.79	6.77	6.77	6.78	6.78	6.79	6.79	6.80
	8.06	8.06	8.06	6.80	6.79	6.77	6.78	6.79	6.78	6.79	6.77	6.81
Average	8.05	8.06	8.06	6.80	6.79	6.77	6.77	6.79	6.78	6.79	6.78	6.80
Standard deviation	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01
ORP (mV)	189	207	217	149	-42	-70	-105	-88	-84	-60	-83	-61
	190	207	216	122	-44	-86	-118	-75	-98	-66	-78	-56
	191	207	215	102	-58	-85	-107	-76	-94	-63	-77	-51
Average	190	207	216	124	-48	-80	-110	-80	-92	-63	-79	-56
Standard deviation	1	0	1	24	9	9	7	7	7	3	3	5
Salinity (PSU)	31.91	31.93	31.88	31.29	31.85	31.80	31.84	31.84	31.84	31.86	31.85	31.87
	31.90	31.91	31.91	31.90	31.87	31.86	31.86	31.87	31.86	31.87	31.87	31.88
	31.91	31.91	31.90	31.90	31.87	31.85	31.92	31.87	31.86	31.87	31.88	31.87
Average	31.91	31.92	31.90	31.70	31.86	31.84	31.87	31.86	31.85	31.87	31.87	31.87
Standard deviation	0.01	0.01	0.02	0.35	0.01	0.03	0.04	0.02	0.01	0.01	0.02	0.01
DO (mg/L)	7.42	7.44	7.48	2.62	2.05	1.98	1.12	1.71	1.75	2.14	1.53	1.83
	7.46	7.46	7.51	1.94	2.18	1.61	1.07	1.83	1.47	2.00	1.80	2.20
	7.49	7.45	7.53	2.15	2.01	1.55	1.28	1.93	1.57	1.90	1.90	2.08
Average	7.46	7.45	7.51	2.24	2.08	1.71	1.16	1.82	1.60	2.01	1.74	2.04
Standard deviation	0.04	0.01	0.03	0.35	0.09	0.23	0.11	0.11	0.14	0.12	0.19	0.19
Turbidity (NTU)	1.06	0.97	2.16	5.35	3.39	3.44	3.05	3.10	3.44	4.55	4.39	4.86
	1.07	1.08	2.21	4.65	3.38	3.15	3.55	3.11	3.51	4.34	4.27	4.65
	1.03	0.99	2.35	4.51	3.33	3.47	3.15	3.27	3.79	4.56	4.31	4.60
Average	1.05	1.01	2.24	4.84	3.37	3.35	3.25	3.16	3.58	4.48	4.32	4.70
Standard deviation	0.02	0.06	0.10	0.45	0.03	0.18	0.26	0.10	0.19	0.12	0.06	0.14

B. Beginning; M. Middle; E. End.

G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 1st test cycle de-ballasting (2015. 07. 05) - Viable organism and bacteria

Test item	Discharge control water			Discharge treated water								
	B	M	E	B1	B2	B3	M1	M2	M3	E1	E2	E3
≥ 50 μm organisms (inds./m³)	460	680	520	4*	0*	3*	2*	3*	4*	4*	4*	6*
	620	740	540									
	480	820	620									
Average	520	747	560	-	-	-	-	-	-	-	-	-
Standard deviation	87	70	53	-	-	-	-	-	-	-	-	-
≥ 10 μm and < 50 μm organisms (inds./mL)	24	12	30	0	0	0	0	0	0	0	0	0
	18	16	24	0	0	0	0	0	0	0	0	0
	18	18	25	0	0	0	0	0	0	0	0	0
Average	20	16	27	0	0	0	0	0	0	0	0	0
Standard deviation	3	3	3	0	0	0	0	0	0	0	0	0
Heterotrophic bacteria (CFU/mL)				1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**
				1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**
				1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**	1×10^{6}**
Average				-	-	-	-	-	-	-	-	-
Standard deviation				-	-	-	-	-	-	-	-	-
Coliform (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Escherichia coli (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Intestinal Enterococci (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Toxicogenic *Vibrio cholerae* (O1, O139) (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0

* Entire sample volume is analysed.
** Estimated count.
B. Beginning; M. Middle; E. End.
CFU. Colony Forming Unit.

KOMERI 2020 LEADING
G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

- 2nd test cycle ballasting (2015. 10. 19) - Basic water parameter

Test item	Source water (treated line)	Uptake water (treated line)			Source water (control line)	Uptake water (control line)		
		B	M	E		B	M	E
Water temperature (℃)	20.77	20.64	20.91	21.59	20.25	20.35	20.68	20.62
	20.78	20.72	20.87	21.72	20.16	20.24	20.41	20.50
	20.70	20.63	20.78	21.79	20.16	20.28	20.48	20.37
Average	20.75	20.66	20.85	21.70	20.19	20.29	20.52	20.50
Standard deviation	0.04	0.05	0.07	0.10	0.05	0.06	0.14	0.13
pH	7.16	7.53	7.38	7.44	8.36	7.74	8.05	7.98
	7.46	7.59	7.54	7.60	8.43	7.73	8.03	7.99
	7.52	7.62	7.62	7.58	8.14	7.79	8.01	7.97
Average	7.38	7.58	7.51	7.54	8.31	7.75	8.03	7.98
Standard deviation	0.19	0.05	0.12	0.09	0.15	0.03	0.02	0.01
ORP (mV)	476	310	198	146	509	366	185	147
	448	312	181	156	503	368	189	154
	456	309	188	157	507	370	182	161
Average	460	310	189	153	506	368	185	154
Standard deviation	14	2	9	6	3	2	4	7
Salinity (PSU)	32.41	32.40	32.23	32.44	32.37	32.40	32.31	32.50
	32.40	32.37	32.41	32.43	32.50	32.45	32.51	32.44
	32.42	32.45	32.44	32.41	32.49	32.49	32.50	32.47
Average	32.41	32.41	32.36	32.43	32.45	32.45	32.44	32.47
Standard deviation	0.01	0.04	0.11	0.02	0.07	0.05	0.11	0.03
DO (mg/L)	8.11	8.00	7.99	7.86	7.43	7.55	7.71	7.67
	8.10	7.96	7.99	7.96	7.47	7.58	7.74	7.82
	8.11	7.98	8.01	7.95	7.48	7.57	7.76	7.84
Average	8.11	7.98	8.00	7.92	7.46	7.57	7.74	7.78
Standard deviation	0.01	0.02	0.01	0.06	0.03	0.02	0.03	0.09
Turbidity (NTU)	2.26	1.79	1.37	1.98	3.16	2.99	2.61	2.59
	2.07	1.72	1.29	1.80	3.25	2.97	2.79	2.42
	2.05	1.68	1.31	1.90	3.07	3.08	2.56	2.68
Average	2.13	1.73	1.32	1.89	3.16	3.01	2.65	2.56
Standard deviation	0.12	0.06	0.04	0.09	0.09	0.06	0.12	0.13
TSS (mg/L)	15.0				19.5			
	16.0				19.5			
	16.5				20.0			
Average	15.8				19.7			
Standard deviation	0.8				0.3			
DOC (mg/L)	1.31				1.24			
POC (mg/L)	0.13				0.11			

B. Beginning; M. Middle; E. End.

KOMERI 2020 LEADING
G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 2nd test cycle ballasting (2015. 10. 19) - Viable organism and bacteria

Test item	Source water (treated line)	Uptake water (treated line)			Source water (control line)	Uptake water (control line)		
		B	M	E		B	M	E
≥ 50 μm organisms (inds./m³)		17 000	8 200	10 000		25 000	24 800	30 000
		14 800	7 200	10 800		21 600	25 200	29 400
		14 400	7 000	10 200		24 600	23 400	28 800
Average		15 400	7 467	10 334		23 734	24 467	29 400
Standard deviation		1 400	643	416		1 858	945	600
≥ 10 μm and < 50 μm organisms (inds./mL)		109	113	126		105	101	117
		101	101	108		106	94	111
		106	123	100		94	117	105
Average		106	113	112		102	104	111
Standard deviation		4	11	13		7	12	6
Heterotrophic bacteria (CFU/mL)		1	0	0		128	130	119
		0	0	0		140	144	120
		2	1	0		138	139	125
Average		1	1	0		136	138	122
Standard deviation		1	1	0		6	7	3
Coliform (CFU/100 mL)		0	0	0		78	50	48
		0	0	0		80	46	52
		0	0	0		64	56	50
Average		0	0	0		74	51	50
Standard deviation		0	0	0		9	5	2
Escherichia coli (CFU/100 mL)		0	0	0		18	14	2
		0	0	0		14	12	4
		0	0	0		18	12	6
Average		0	0	0		17	13	4
Standard deviation		0	0	0		2	1	2
Intestinal Enterococci (CFU/100 mL)		0	0	0		2	4	0
		0	0	0		0	4	0
		0	0	0		4	0	2
Average		0	0	0		2	3	1
Standard deviation		0	0	0		2	2	1
Toxicogenic *Vibrio cholerae* (O1, O139) (CFU/100 mL)		0	0	0		0	0	0
		0	0	0		0	0	0
		0	0	0		0	0	0
Average		0	0	0		0	0	0
Standard deviation		0	0	0		0	0	0

B. Beginning; M. Middle; E. End
CFU. Colony Forming Unit

G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 2nd test cycle de-ballasting (2015. 10. 23) - Basic water parameter

Test item	Discharge control water			Discharge treated water								
	B	M	E	B1	B2	B3	M1	M2	M3	E1	E2	E3
Water temperature (℃)	19.58	19.52	19.52	19.14	19.12	19.08	19.09	19.09	19.08	19.32	19.23	19.15
	19.50	19.51	19.53	19.09	19.08	19.10	19.07	19.12	19.11	19.22	19.23	19.17
	19.52	19.52	19.47	19.12	19.05	19.03	19.08	19.08	19.08	19.25	19.19	19.11
Average	19.53	19.52	19.51	19.12	19.08	19.07	19.08	19.10	19.09	19.26	19.22	19.14
Standard deviation	0.04	0.01	0.03	0.03	0.04	0.04	0.01	0.02	0.02	0.05	0.02	0.03
pH	8.01	8.06	8.11	7.76	7.74	7.59	6.89	7.02	7.01	7.09	6.95	6.90
	8.01	8.03	8.05	7.76	7.76	7.56	6.88	6.99	6.91	7.08	6.97	6.89
	8.03	8.02	8.00	7.73	7.60	7.56	6.91	7.00	6.95	7.10	6.95	6.89
Average	8.02	8.04	8.05	7.75	7.70	7.57	6.89	7.00	6.96	7.09	6.96	6.89
Standard deviation	0.01	0.02	0.06	0.02	0.09	0.02	0.02	0.02	0.05	0.01	0.01	0.01
ORP (mV)	166	175	191	355	357	227	231	102	64	53	35	22
	169	178	192	355	330	202	234	91	61	48	31	23
	172	179	192	357	327	208	231	86	60	48	26	21
Average	169	177	192	356	338	212	232	93	62	50	31	22
Standard deviation	3	2	1	1	17	13	2	8	2	3	5	1
Salinity (PSU)	32.50	32.50	32.51	32.11	32.45	32.47	32.46	32.42	32.44	32.40	32.40	32.41
	32.49	32.48	32.49	32.14	32.45	32.50	32.45	32.44	32.44	32.39	32.43	32.42
	32.48	32.48	32.47	32.19	32.47	32.42	32.44	32.44	32.44	32.43	30.43	32.41
Average	32.49	32.49	32.49	32.15	32.46	32.46	32.45	32.43	32.44	32.41	31.75	32.41
Standard deviation	0.01	0.01	0.02	0.04	0.01	0.04	0.01	0.01	0.00	0.02	1.15	0.01
DO (mg/L)	7.22	7.30	7.21	7.72	7.76	7.76	7.78	7.79	7.79	7.77	7.72	7.76
	7.25	7.27	7.19	7.75	7.76	7.79	7.76	7.77	7.78	7.77	7.78	7.76
	7.20	7.28	7.20	7.75	7.76	7.79	7.78	7.77	7.78	7.76	7.77	7.76
Average	7.22	7.28	7.20	7.74	7.76	7.78	7.77	7.78	7.78	7.77	7.76	7.76
Standard deviation	0.03	0.02	0.01	0.02	0.00	0.02	0.01	0.01	0.01	0.01	0.03	0.00
Turbidity (NTU)	0.85	1.10	1.30	2.46	1.30	1.06	0.82	0.57	0.68	0.74	1.01	0.93
	0.91	1.06	1.30	2.71	1.52	1.03	0.77	0.71	0.62	0.99	0.97	0.76
	0.86	1.13	1.26	2.21	1.32	0.77	0.71	0.91	0.58	0.65	1.00	0.88
Average	0.87	1.10	1.29	2.46	1.38	0.95	0.77	0.73	0.63	0.79	0.99	0.86
Standard deviation	0.03	0.04	0.02	0.25	0.12	0.16	0.06	0.17	0.05	0.18	0.02	0.09

B. Beginning: M. Middle: E. End.

KOMERI 2020 LEADING
G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 2nd test cycle de-ballasting (2015. 10. 23) - Viable organism and bacteria

Test item	Discharge control water			Discharge treated water								
	B	M	E	B1	B2	B3	M1	M2	M3	E1	E2	E3
≥ 50 μm organisms (inds./m^3)	1 260	1 760	1 920	5*	1*	1*	0*	1*	0*	0*	0*	0*
	1 520	1 820	1 920									
	1 540	1 600	1 960									
Average	1 440	1 727	1 934	-	-	-	-	-	-	-	-	-
Standard deviation	156	114	23	-	-	-	-	-	-	-	-	-
≥ 10 μm and < 50 μm organisms (inds./mL)	9	19	16	0	0	0	0	0	0	0	0	0
	15	9	16	0	0	0	0	0	0	0	0	0
	16	8	25	0	0	0	0	0	0	0	0	0
Average	14	12	19	0	0	0	0	0	0	0	0	0
Standard deviation	4	6	5	0	0	0	0	0	0	0	0	0
Heterotrophic bacteria (CFU/mL)				25	17	10	21	10	15	5	25	10
				20	11	12	18	12	18	7	26	10
				20	16	11	15	13	18	4	25	15
Average				22	15	11	18	12	17	6	26	12
Standard deviation				3	3	1	3	2	2	2	1	3
Coliform (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Escherichia coli (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Intestinal Enterococci (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Toxicogenic *Vibrio cholerae* (O1, O139) (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0

* Entire sample volume is analysed.
B, Beginning; M, Middle; E, End.
CFU, Colony Forming Unit.

KOMERI 2020 LEADING
G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 3rd test cycle ballasting (2016. 01. 07) - Basic water parameter

Test item	Source water (treated line)	Uptake water (treated line)			Source water (control line)	Uptake water (control line)		
		B	M	E		B	M	E
Water temperature (℃)	8.65	8.53	8.50	8.54	8.53	8.40	8.69	8.42
	8.62	8.48	8.53	8.53	8.44	8.39	8.67	8.37
	8.66	8.47	8.51	8.51	8.47	8.38	8.49	8.28
Average	8.64	8.49	8.51	8.53	8.48	8.39	8.62	8.36
Standard deviation	0.02	0.03	0.02	0.02	0.05	0.01	0.11	0.07
pH	7.69	7.99	7.91	7.93	7.94	7.94	8.00	8.01
	7.69	8.00	7.91	7.94	7.93	7.98	7.99	8.00
	7.70	8.01	7.91	7.93	7.94	7.97	8.00	7.99
Average	7.69	8.00	7.91	7.93	7.94	7.96	8.00	8.00
Standard deviation	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.01
ORP (mV)	283	378	372	554	286	350	300	282
	277	389	390	550	281	349	298	254
	274	390	404	500	287	348	299	255
Average	278	386	389	535	285	349	299	264
Standard deviation	5	7	16	30	3	1	1	16
Salinity (PSU)	32.78	32.77	32.66	32.75	32.81	32.80	32.85	32.80
	32.79	32.79	32.66	32.76	32.82	32.83	32.85	32.77
	32.76	32.80	32.66	32.80	32.77	32.82	32.80	32.79
Average	32.78	32.79	32.66	32.77	32.80	32.82	32.83	32.79
Standard deviation	0.02	0.02	0.00	0.03	0.03	0.02	0.03	0.02
DO (mg/L)	8.76	8.77	8.76	8.72	8.88	9.00	8.76	8.80
	8.70	8.75	8.79	8.71	8.83	8.98	8.77	8.85
	8.74	8.70	8.80	8.73	8.80	8.99	8.74	8.84
Average	8.73	8.74	8.78	8.72	8.84	8.99	8.76	8.83
Standard deviation	0.03	0.04	0.02	0.01	0.04	0.01	0.02	0.03
Turbidity (NTU)	1.63	1.31	1.99	1.41	1.57	1.62	1.39	1.14
	1.49	1.39	1.65	1.46	1.52	1.16	1.26	1.20
	1.37	1.40	1.47	1.51	1.50	1.25	1.30	1.20
Average	1.50	1.37	1.70	1.46	1.53	1.34	1.32	1.18
Standard deviation	0.13	0.05	0.26	0.05	0.04	0.24	0.07	0.03
TSS (mg/L)	21.5				19.0			
	16.5				17.5			
	20.0				19.5			
Average	19.3				18.7			
Standard deviation	2.6				1.0			
DOC (mg/L)	0.92				0.93			
POC (mg/L)	0.06				Not detected*			

*Less than detection limit (0.03 mg/L)
B. Beginning; M. Middle; E. End.

KOMERI 2020 LEADING
G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 3rd test cycle ballasting (2016. 01. 07) - Viable organism and bacteria

Test item	Source water (treated line)	Uptake water (treated line)			Source water (control line)	Uptake water (control line)		
		B	M	E		B	M	E
≥ 50 μm organisms (inds./m³)		3 150	2 000	2 300		3 750	4 200	4 000
		2 950	1 850	2 150		3 950	4 000	4 350
		2 750	1 900	2 050		4 000	3 850	3 900
Average		2 950	1 917	2 167		3 900	4 017	4 084
Standard deviation		200	76	126		132	176	236
≥ 10 μm and < 50 μm organisms (inds./mL)		111	101	110		167	147	122
		115	106	125		145	156	157
		129	120	134		137	133	127
Average		119	109	123		150	146	136
Standard deviation		9	10	12		16	12	19
Heterotrophic bacteria (CFU/mL)		3	5	3		7	5	2
		1	3	1		11	7	2
		3	3	1		8	4	4
Average		3	4	2		9	6	3
Standard deviation		1	1	1		2	2	1
Coliform (CFU/100 mL)		0	0	0		32	52	48
		0	0	0		22	48	54
		0	0	0		30	56	60
Average		0	0	0		28	52	54
Standard deviation		0	0	0		5	4	6
Escherichia coli (CFU/100 mL)		0	0	0		2	4	8
		0	0	0		2	4	6
		0	0	0		0	10	2
Average		0	0	0		2	6	6
Standard deviation		0	0	0		1	3	3
Intestinal Enterococci (CFU/100 mL)		0	0	0		2	4	4
		0	0	0		0	2	2
		0	0	0		2	2	6
Average		0	0	0		2	3	4
Standard deviation		0	0	0		1	1	2
Toxicogenic *Vibrio cholerae* (O1, O139) (CFU/100 mL)		0	0	0		0	0	0
		0	0	0		0	0	0
		0	0	0		0	0	0
Average		0	0	0		0	0	0
Standard deviation		0	0	0		0	0	0

B. Beginning; M. Middle; E. End.
CFU. Colony Forming Unit.

KOMERI 2020 LEADING
G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 3rd test cycle de-ballasting (2016. 01. 11) - Basic water paremeter

Test item	Discharge control water			Discharge treated water								
	B	M	E	B1	B2	B3	M1	M2	M3	E1	E2	E3
Water temperature (℃)	16.05	16.12	16.20	15.79	15.79	15.77	15.78	15.84	15.92	15.85	15.85	15.82
	16.03	16.10	16.23	15.76	15.79	15.78	15.79	15.84	15.90	15.84	15.83	15.82
	16.03	16.10	16.24	15.80	15.79	15.79	15.77	15.83	15.90	15.84	15.83	15.80
Average	16.04	16.11	16.22	15.78	15.79	15.78	15.78	15.84	15.91	15.84	15.84	15.81
Standard deviation	0.01	0.01	0.02	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
pH	7.88	7.90	7.90	7.71	7.75	7.69	7.72	7.74	7.71	7.67	7.73	7.64
	7.89	7.90	7.88	7.75	7.79	7.70	7.72	7.73	7.70	7.69	7.72	7.69
	7.89	7.90	7.92	7.75	7.76	7.69	7.70	7.72	7.70	7.68	7.70	7.67
Average	7.89	7.90	7.90	7.74	7.77	7.69	7.71	7.73	7.70	7.68	7.72	7.67
Standard deviation	0.01	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03
ORP (mV)	291	276	265	-32	-69	-35	-70	-43	-74	-36	-83	-65
	288	275	263	-50	-66	-56	-60	-45	-75	-59	-102	-71
	285	274	261	-41	-63	-56	-54	-48	-70	-75	-98	-71
Average	288	275	263	-41	-66	-49	-61	-45	-73	-57	-94	-69
Standard deviation	3	1	2	9	3	12	8	3	3	20	10	3
Salinity (PSU)	32.84	32.94	32.95	32.86	32.89	32.90	32.90	32.91	32.90	32.93	32.92	32.89
	32.88	32.95	32.95	32.87	32.89	32.90	32.91	32.90	32.90	32.91	32.90	32.90
	32.91	32.96	32.97	32.85	32.89	32.90	32.91	32.90	32.91	32.90	32.90	32.90
Average	32.88	32.95	32.96	32.86	32.89	32.90	32.91	32.90	32.90	32.91	32.91	32.90
Standard deviation	0.04	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01
DO (mg/L)	8.39	8.38	8.37	8.53	8.49	8.42	8.33	8.36	8.38	8.25	8.30	8.31
	8.36	8.38	8.38	8.43	8.43	8.40	8.40	8.33	8.39	8.25	8.29	8.32
	8.43	8.40	8.39	8.44	8.43	8.41	8.41	8.32	8.35	8.25	8.30	8.33
Average	8.39	8.39	8.38	8.47	8.45	8.41	8.38	8.34	8.37	8.25	8.30	8.32
Standard deviation	0.04	0.01	0.01	0.06	0.03	0.01	0.04	0.02	0.02	0.00	0.01	0.01
Turbidity (NTU)	2.05	1.92	2.11	1.37	0.98	1.04	0.71	0.89	1.62	2.04	2.37	2.74
	1.98	1.96	2.18	1.24	1.06	0.75	0.83	0.91	1.49	1.82	2.22	2.83
	1.91	2.01	2.31	1.19	0.73	0.85	0.75	0.93	1.49	2.15	2.22	2.96
Average	1.98	1.96	2.20	1.27	0.92	0.88	0.76	0.91	1.53	2.00	2.27	2.84
Standard deviation	0.07	0.05	0.10	0.09	0.17	0.15	0.06	0.02	0.08	0.17	0.09	0.11

B. Beginning: M. Middle: E. End.

G4B(www.g4b.go.kr)진위확인코드 : 2YKJEI0GjAI=

Ⅲ. TO BE CONTINUED

· 3rd test cycle de-ballasting (2016. 01. 11) - Viable organism and bacteria

Test item	Discharge control water			Discharge treated water								
	B	M	E	B1	B2	B3	M1	M2	M3	E1	E2	E3
≥ 50 μm organisms (inds./m^3)	1 700	2 280	2 560	0*	0*	0*	2*	2*	0*	0*	0*	0*
	1 760	2 360	2 440									
	1 920	2 200	2 560									
Average	1 794	2 280	2 520	-	-	-	-	-	-	-	-	-
Standard deviation	114	80	69	-	-	-	-	-	-	-	-	-
≥ 10 μm and < 50 μm organisms (inds./mL)	21	9	13	0	0	0	0	0	0	0	0	0
	9	23	13	0	0	0	0	0	0	0	0	0
	20	10	19	0	0	0	0	0	0	0	0	0
Average	17	14	15	0	0	0	0	0	0	0	0	0
Standard deviation	7	8	3	0	0	0	0	0	0	0	0	0
Heterotrophic bacteria (CFU/mL)				8	5	5	5	4	6	2	3	2
				8	7	6	3	5	3	2	2	1
				6	5	3	2	4	5	1	4	4
Average				8	6	5	4	5	5	2	3	3
Standard deviation				1	1	2	2	1	2	1	1	2
Coliform (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Escherichia coli (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Intestinal Enterococci (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0
Toxicogenic *Vibrio cholerae* (O1, O139) (CFU/100 mL)				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0
Average				0	0	0	0	0	0	0	0	0
Standard deviation				0	0	0	0	0	0	0	0	0

* Entire sample volume is analysed.
B, Beginning; M, Middle; E, End.
CFU, Colony Forming Unit.

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