Document No.c-6

Study Report

Land-based test

of

ECOMARINE Ballast Water Treatment System

January 31, 2012

Laboratory of Aquatic Science Consultant Co., LTD.

Document No.c-6

STATEMENT

Title of study: Land-based test of the laboratory scale ECOMARINE ballast water treatment system

Study number: T-02-200

The land-based test of the laboratory scale ECOMARINE ballast water treatment system was conducted by the Laboratory of Aquatic Science Consultant Co., LTD. based on the standards for the type approval evaluation test of ballast water treatment systems (established by the Inspection and Measurement Division of the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, Japan), the quality assurance project plan (GAPP) that additionally takes the technical requirements of ISO/IEC17025 in accordance with the JIS Q 9001:2000 (appropriate to ISO 9001:2000) and the study protocol.

Responsible personnel (study director)
Laboratory of Aquatic Science Consultant Co., LTD.

(Signature) 久城 圭 (Kei Kushiro) (Date) January 31, 2012

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QUALITY ASUURANCE STATEMENT

Title of study: Land-based test of the laboratory scale ECOMARINE ballast water treatment system

Study number: T-02-200

The land-based test of the laboratory scale ECOMARINE ballast water treatment system was conducted by the Laboratory of Aquatic Science Consultant Co., LTD. according to the below schedule and the inspection result was reported to the study director.

Date of inspection	Type of inspection / Study phase inspected	Date of report
Mar. 22, 2011 (First revision: Oct. 24, 2011)	Study-based inspection / Study protocol	Mar. 26, 2011 (First revision: Oct. 26, 2011)
Apr. 18, 2011	Facility-based inspection / SOPs	Apr. 20, 2011
Oct. 26 and Nov. 2, 2011	Study-based inspection / Experimental phase	Nov. 4, 2011
Jan. 27, 2013	Study report (draft)	Jan. 27, 2013
Jan. 30, 2013	Study report (final)	Jan. 31, 2013

It is guaranteed the land-based test was conducted in accordance with the study protocol and the inspection result was accurately reflected in the description provided in this report.

Responsible personnel (quality assurance management)
Laboratory of Aquatic Science Consultant Co., LTD.

(Signature) 大木康弘 (Yasuhiro Oki) (Date) January 31,

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1. Test conditions

The land-based test of the laboratory scale ECOMARINE ballast water treatment system was conducted by the Laboratory of Aquatic Science Consultant Co., LTD. based on the standards for the type approval evaluation test of ballast water treatment systems (established by the Inspection and Measurement Division of the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, Japan), the quality assurance project plan (GAPP) that additionally takes the technical requirements of ISO/IEC17025 in accordance with the JIS Q 9001:2000 (appropriate to ISO 9001:2000) and the study protocol.

2. Summary of test result

The test was conducted in a total of 11 test cycles including 6 test cycles in accordance with the seawater test requirement (salinity: over 32 psu) and 5 test cycles in accordance with the brackish water requirement (salinity: 3 to 32 psu) using test water prepared to meet the standards for the type approval evaluation test of ballast water treatment systems (herein after referred to as land-based test standards).

Any organism densities including L and S size groups and bacteria in treated water discharged after having been stored in the ballast tank for 5 days were below the ballast water discharge standards defined as criteria for determination of the land-based test standards.

Note that in the seawater test cycle 3, the number of S size group in the untreated water and the control water during de-ballasting was less than 10^2 individuals/ml, which caused due to the reason unrelated to the treatment performance of the system, the seawater test was therefore conducted in 6 test cycles.

3. Test schedule

Table 1 Test schedule

Test cycle	Date of ballasting	Date of de-ballasting
Seawater 1	Oct. 28, 2011	Nov. 2, 2011
Seawater 2	Nov. 4, 2011	Nov. 9, 2011
Seawater 3*	Nov. 14, 2011	Nov. 19, 2011
Seawater 4	Nov. 21, 2011	Nov. 26, 2011
Seawater 5	Nov. 23, 2011	Nov. 28, 2011
Seawater 6	Dec. 2, 2011	Dec. 7, 2011
Brackish water 1	Dec. 9, 2011	Dec. 14, 2011
Brackish water 2	Dec. 11, 2011	Dec. 16, 2011
Brackish water 3	Dec. 18, 2011	Dec. 23, 2011
Brackish water 4	Dec. 21, 2011	Dec. 26, 2011
Brackish water 5	Jan. 21, 2012	Jan. 26, 2012

*Invalidated test.

4. Test result

4.1 L size group

All the test cycles with L size group in accordance with the seawater requirement and the brackish water requirement met the test water requirement at the time of water intake (over 10^5 individuals/m^3) and the control water requirement at the time of discharge (over 10^2 individuals/m^3).

All the organism densities in the treated water at the time of discharge were below the ballast water discharge standard (less than 10^1 individuals/m^3).

Table 2-1 Test result with L size group in accordance with the seawater requirement (test cycle 1)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	2.6	x 10^5	6	23
	Mid	2.6	x 10^5	7	18
	End	2.6	x 10^5	8	18
Before treatment	Beginning	3.2	x 10^5	10	24
	Mid	3.1	x 10^5	8	25
	End	3.2	x 10^5	6	14
Immediately after treatment	Beginning	1	x 10^0	1	1
	Mid	N.D.	N.D.	N.D.	N.D.
	End	2	x 10^0	2	2
Control water after 5 days	Beginning	874.5	x 10^2	6	14
	Mid	698.0	x 10^2	6	14
	End	559.6	x 10^2	7	17
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	1	x 10^0	1	1
	End	3	x 10^0	1	1

N.D. = Not Detected.

Table 2-2 Test result with L size group in accordance with the seawater requirement (test cycle 2)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	1.1	x 10^5	8	20
	Mid	1.0	x 10^5	9	21
	End	1.0	x 10^5	9	20
Before treatment	Beginning	1.3	x 10^5	7	17
	Mid	0.9	x 10^5	8	16
	End	0.8	x 10^5	8	19
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	113.3	x 10^2	7	18
	Mid	111.0	x 10^2	6	19
	End	126.2	x 10^2	7	21
5 days after treatment	Beginning	1	x 10^0	1	1
	Mid	1	x 10^0	2	1
	End	1	x 10^0	2	1

N.D. = Not Detected.

Table 2-3 Test result with L size group in accordance with the seawater requirement (test cycle 3)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	6.9	x 10^5	7	20
	Mid	5.3	x 10^5	6	20
	End	4.6	x 10^5	6	19
Before treatment	Beginning	4.1	x 10^5	5	18
	Mid	3.5	x 10^5	7	23
	End	4.3	x 10^5	6	22
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	2	x 10^0	2	2
Control water after 5 days	Beginning	258.1	x 10^2	7	30
	Mid	228.5	x 10^2	8	29
	End	276.4	x 10^2	7	21
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 2-4 Test result with L size group in accordance with the seawater requirement (test cycle 4)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	4.8	x 10^5	8	15
	Mid	4.8	x 10^5	7	20
	End	3.4	x 10^5	6	12
Before treatment	Beginning	2.8	x 10^5	7	21
	Mid	4.5	x 10^5	6	12
	End	2.5	x 10^5	7	17
Immediately after treatment	Beginning	1	x 10^0	1	1
	Mid	1	x 10^0	1	N.D.
	End	N.D.	N.D.	N.D.	1
Control water after 5 days	Beginning	375.2	x 10^2	7	26
	Mid	428.1	x 10^2	7	22
	End	850.4	x 10^2	6	13
5 days after treatment	Beginning	2	x 10^0	1	2
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 2-5 Test result with L size group in accordance with the seawater requirement (test cycle 5)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	3.5	x 10^5	7	13
	Mid	3.8	x 10^5	5	13
	End	3.2	x 10^5	8	18
Before treatment	Beginning	5.4	x 10^5	8	20
	Mid	5.0	x 10^5	8	18
	End	4.7	x 10^5	7	14
Immediately after treatment	Beginning	1	x 10^5	1	1
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	425.9	x 10^2	8	15
	Mid	591.2	x 10^2	7	11
	End	380.0	x 10^2	7	10
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 2-6 Test result with L size group in accordance with the seawater requirement (test cycle 6)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	3.8	x 10^5	8	20
	Mid	3.7	x 10^5	8	22
	End	3.3	x 10^5	7	18
Before treatment	Beginning	3.8	x 10^5	7	15
	Mid	5.1	x 10^5	7	15
	End	4.0	x 10^5	6	13
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	6	x 10^0	1	1
	End	1	x 10^0	1	1
Control water after 5 days	Beginning	1152.9	x 10^2	6	20
	Mid	823.7	x 10^2	6	14
	End	1013.6	x 10^2	6	19
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	1	x 10^0	1	1
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 3-1 Test result with L size group in accordance with the brackish water requirement (test cycle 1)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	2.9	x 10^5	4	14
	Mid	3.2	x 10^5	5	14
	End	3.3	x 10^5	5	14
Before treatment	Beginning	2.8	x 10^5	6	11
	Mid	2.6	x 10^5	5	9
	End	3.1	x 10^5	6	10
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	135.9	x 10^2	4	17
	Mid	227.4	x 10^2	6	12
	End	197.1	x 10^2	3	14
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 3-2 Test result with L size group in accordance with the brackish water requirement (test cycle 2)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	2.2	x 10^5	6	12
	Mid	2.1	x 10^5	5	9
	End	1.7	x 10^5	6	13
Before treatment	Beginning	2.4	x 10^5	6	11
	Mid	2.9	x 10^5	5	10
	End	2.2	x 10^5	6	9
Immediately after treatment	Beginning	1	x 10^5	1	1
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	225.0	x 10^2	7	13
	Mid	375.0	x 10^2	5	19
	End	402.9	x 10^2	7	13
5 days after treatment	Beginning	1	x 10^0	1	2
	Mid	3	x 10^0	2	2
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 3-3 Test result with L size group in accordance with the brackish water requirement (test cycle 3)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	2.6	x 10^5	5	12
	Mid	2.7	x 10^5	6	12
	End	3.2	x 10^5	6	11
Before treatment	Beginning	3.0	x 10^5	6	11
	Mid	3.4	x 10^5	6	13
	End	3.2	x 10^5	4	9
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	36.5	x 10^2	7	18
	Mid	39.7	x 10^2	6	14
	End	37.7	x 10^2	6	16
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	1	x 10^0	1	1
	End	1	x 10^0	1	1

N.D. = Not Detected.

Table 3-4 Test result with L size group in accordance with the brackish water requirement (test cycle 4)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	3.9	x 10^5	6	16
	Mid	4.1	x 10^5	6	15
	End	4.2	x 10^5	5	11
Before treatment	Beginning	2.6	x 10^5	6	14
	Mid	4.1	x 10^5	4	8
	End	2.8	x 10^5	6	12
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	58.2	x 10^2	5	19
	Mid	14.1	x 10^2	6	21
	End	85.1	x 10^2	7	16
5 days after treatment	Beginning	4	x 10^0	1	2
	Mid	2	x 10^0	1	2
	End	1	x 10^0	1	2

N.D. = Not Detected.

Table 3-5 Test result with L size group in accordance with the brackish water requirement (test cycle 5)

Unit: inds./m^3

		Total		Number of taxon	Number of species
Control water	Beginning	2.1	x 10^5	4	9
	Mid	2.6	x 10^5	4	11
	End	2.6	x 10^5	3	10
Before treatment	Beginning	2.3	x 10^5	3	8
	Mid	2.7	x 10^5	3	8
	End	3.0	x 10^5	4	8
Immediately after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.
Control water after 5 days	Beginning	31.7	x 10^2	5	17
	Mid	47.0	x 10^2	5	14
	End	66.0	x 10^2	4	10
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

4.2 S size group

The test cycle 3 in accordance with the seawater requirement did not meet the control water requirement at the time of discharge (over 10^2 individuals/m^3) because the natural decrease in the control water was faster than anticipated. However the treatment performance degradation and the malfunction of the system did not occurred, the test cycle 3 was therefore determined as an invalidated test cycle.

All the test cycles except for that test cycle with S size group in accordance with the seawater requirement and the brackish water requirement met the test water requirements at the time of water intake (over 10^3 individuals/ml) and at the time of discharge (over 10^2 individuals/ml).

All the organism densities in the treated water at the time of discharge were below the ballast water discharge standard (less than 10^1 individuals/m^3).

Table 4-1 Test result with S size group in accordance with the seawater requirement (test cycle 1)

Unit: inds./ml

		Total		**Number of taxon**	**Number of species**
Control water	Beginning	1.99	x 10^3	4	23
	Mid	2.06	x 10^3	3	20
	End	2.92	x 10^3	4	21
Before treatment	Beginning	1.74	x 10^3	4	20
	Mid	1.58	x 10^3	4	25
	End	1.73	x 10^3	4	21
Immediately after treatment	Beginning	1.97	x 10^2	2	5
	Mid	1.50	x 10^2	2	5
	End	1.73	x 10^2	2	6
Control water after 5 days	Beginning	1.64	x 10^2	4	11
	Mid	1.60	x 10^2	3	8
	End	1.54	x 10^2	3	7
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	0.01	x 10^0	1	1

N.D. = Not Detected.

Table 4-2 Test result with S size group in accordance with the seawater requirement (test cycle 2)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	2.73	x 10^3	4	21
	Mid	2.32	x 10^3	3	20
	End	3.06	x 10^3	4	24
Before treatment	Beginning	1.83	x 10^3	4	25
	Mid	2.09	x 10^3	4	19
	End	2.67	x 10^3	4	22
Immediately after treatment	Beginning	2.57	x 10^2	2	6
	Mid	2.30	x 10^2	2	6
	End	1.50	x 10^2	2	4
Control water after 5 days	Beginning	1.03	x 10^2	3	6
	Mid	1.20	x 10^2	2	3
	End	1.07	x 10^2	4	6
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 4-3 Test result with S size group in accordance with the seawater requirement (test cycle 3)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	2.36	x 10^3	4	24
	Mid	2.63	x 10^3	4	15
	End	1.73	x 10^3	4	27
Before treatment	Beginning	1.91	x 10^3	4	24
	Mid	2.11	x 10^3	4	21
	End	2.13	x 10^3	4	20
Immediately after treatment	Beginning	2.43	x 10^2	1	1
	Mid	3.13	x 10^2	1	1
	End	4.57	x 10^2	1	1
Control water after 5 days*	Beginning	0.47	x 10^2	3	9
	Mid	0.84	x 10^2	3	5
	End	0.44	x 10^2	3	7
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	0.01	x 10^0	1	1
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected. *Since the organism densities were less than 100 inds./ml and did not met the requirement, this test cycle was determined as an invalidated test.

Table 4-4 Test result with S size group in accordance with the seawater requirement (test cycle 4)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	3.03	x 10^3	4	17
	Mid	3.01	x 10^3	4	17
	End	3.12	x 10^3	4	18
Before treatment	Beginning	2.36	x 10^3	3	13
	Mid	2.82	x 10^3	4	12
	End	2.08	x 10^3	3	12
Immediately after treatment	Beginning	1.90	x 10^2	2	2
	Mid	3.77	x 10^2	1	1
	End	2.37	x 10^2	2	2
Control water after 5 days	Beginning	4.30	x 10^2	4	6
	Mid	3.47	x 10^2	4	5
	End	5.63	x 10^2	4	6
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 4-5 Test result with S size group in accordance with the seawater requirement (test cycle 5)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	2.11	x 10^3	4	12
	Mid	2.41	x 10^3	4	10
	End	2.07	x 10^3	4	9
Before treatment	Beginning	2.49	x 10^3	4	15
	Mid	2.10	x 10^3	4	13
	End	2.22	x 10^3	4	10
Immediately after treatment	Beginning	4.53	x 10^2	2	2
	Mid	3.47	x 10^2	2	2
	End	5.17	x 10^2	2	2
Control water after 5 days	Beginning	1.37	x 10^2	4	5
	Mid	1.20	x 10^2	3	3
	End	1.30	x 10^2	4	5
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 4-6 Test result with S size group in accordance with the seawater requirement (test cycle 6)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	1.80	x 10^3	4	15
	Mid	2.13	x 10^3	4	15
	End	2.18	x 10^3	4	18
Before treatment	Beginning	2.10	x 10^3	4	19
	Mid	2.48	x 10^3	4	19
	End	2.22	x 10^3	4	20
Immediately after treatment	Beginning	1.47	x 10^2	2	5
	Mid	1.37	x 10^2	3	4
	End	1.47	x 10^2	2	4
Control water after 5 days	Beginning	1.57	x 10^2	3	5
	Mid	1.30	x 10^2	4	6
	End	1.33	x 10^2	3	5
5 days after treatment	Beginning	0.02	x 10^0	1	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	0.05	x 10^0	3	N.D.

N.D. = Not Detected.

Table 5-1 Test result with S size group in accordance with the brackish water requirement (test cycle 1)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	2.63	x 10^3	4	8
	Mid	4.04	x 10^3	4	8
	End	3.65	x 10^3	4	7
Before treatment	Beginning	2.28	x 10^3	3	5
	Mid	2.44	x 10^3	3	5
	End	2.30	x 10^3	4	12
Immediately after treatment	Beginning	5.33	x 10^1	1	1
	Mid	6.00	x 10^1	1	1
	End	8.67	x 10^1	2	2
Control water after 5 days	Beginning	9.07	x 10^2	3	4
	Mid	8.73	x 10^2	3	4
	End	9.50	x 10^2	4	4
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 5-2 Test result with S size group in accordance with the brackish water requirement (test cycle 2)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	2.21	x 10^3	4	8
	Mid	2.21	x 10^3	4	9
	End	2.27	x 10^3	4	9
Before treatment	Beginning	2.13	x 10^3	4	11
	Mid	2.29	x 10^3	4	6
	End	2.17	x 10^3	4	9
Immediately after treatment	Beginning	2.00	x 10^1	1	1
	Mid	1.33	x 10^1	1	1
	End	0.67	x 10^1	2	2
Control water after 5 days	Beginning	14.73	x 10^2	4	5
	Mid	12.66	x 10^2	4	4
	End	13.86	x 10^2	3	4
5 days after treatment	Beginning	0.01	x 10^0	1	1
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 5-3 Test result with S size group in accordance with the brackish water requirement (test cycle 3)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	1.86	x 10^3	4	9
	Mid	1.97	x 10^3	4	9
	End	2.10	x 10^3	4	4
Before treatment	Beginning	1.84	x 10^3	4	13
	Mid	1.54	x 10^3	4	6
	End	1.45	x 10^3	4	10
Immediately after treatment	Beginning	0.33	x 10^1	1	1
	Mid	1.67	x 10^1	1	1
	End	2.67	x 10^1	1	1
Control water after 5 days	Beginning	10.96	x 10^2	3	3
	Mid	11.56	x 10^2	4	4
	End	10.10	x 10^2	4	4
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 5-4 Test result with S size group in accordance with the brackish water requirement (test cycle 4)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	2.22	x 10^3	4	7
	Mid	2.26	x 10^3	4	5
	End	2.28	x 10^3	4	7
Before treatment	Beginning	2.15	x 10^3	4	6
	Mid	2.35	x 10^3	4	6
	End	2.44	x 10^3	4	7
Immediately after treatment	Beginning	3.67	x 10^1	1	1
	Mid	3.67	x 10^1	1	1
	End	3.67	x 10^1	2	2
Control water after 5 days	Beginning	10.00	x 10^2	4	6
	Mid	9.23	x 10^2	4	6
	End	9.73	x 10^2	4	6
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

Table 5-5 Test result with S size group in accordance with the brackish water requirement (test cycle 5)

Unit: inds./ml

		Total		Number of taxon	Number of species
Control water	Beginning	1.13	x 10^3	3	4
	Mid	1.13	x 10^3	4	7
	End	1.06	x 10^3	4	5
Before treatment	Beginning	1.32	x 10^3	4	4
	Mid	1.20	x 10^3	3	4
	End	1.47	x 10^3	4	6
Immediately after treatment	Beginning	7.67	x 10^1	1	1
	Mid	5.33	x 10^1	1	1
	End	9.34	x 10^1	2	2
Control water after 5 days	Beginning	4.01	x 10^2	4	4
	Mid	3.78	x 10^2	3	3
	End	4.44	x 10^2	3	3
5 days after treatment	Beginning	N.D.	N.D.	N.D.	N.D.
	Mid	N.D.	N.D.	N.D.	N.D.
	End	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected.

4.3 Bacteria

All the test cycles using test water including heterotrophic bacteria over at least 10^4 cfu/ml in accordance with the seawater requirement and the brackish water requirement met the test water standard.

4.3.1 Escherichia coli

All the organism densities in the treated water after having been stored in the ballast tank for 5 days at the time of discharge in accordance with the seawater requirement and the brackish water requirement were below the ballast water discharge standard (less than 250 cfu/100 ml).

4.3.2 Enterococci

All the organism densities in the treated water after having been stored in the ballast tank for 5 days at the time of discharge in accordance with the seawater requirement and the brackish water requirement were below the ballast water discharge standard (less than 100 cfu/100 ml).

4.3.3 Vibrio cholera (O1 and O139)

All the organism densities in the treated water after having been stored in the ballast tank for 5 days at the time of discharge in accordance with the seawater requirement and the brackish water requirement were below the ballast water discharge standard (less than 1 cfu/100 ml).

Table 6-1 Test result with bacteria in accordance with the seawater requirement (test cycle 1)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	2,480	3,040	2,680	35,800	46,800	34,000	6,000	3,060	3,120	18	19	11	48	38	34
Vibrio cholera: second phase, alkaline peptone water	104	101	161	5,012	7,956	11,220	N.D.	61	60	N.D.	2	N.D.	23	17	10
Vibrio cholera: O1 and O139	N.D.	34	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	720	760	340	48,200	37,000	35,200	1,460	960	340	3.0	0.6	2.0	88	48	42
Escherichia coli	540	420	80	2,400	200	400	1,200	800	240	0.6	0.4	0.6	12	4	4
Enterococci group	59	49	47	2,264	2,112	2,352	36	35	27	N.D.	N.D.	N.D.	8	4	7
Enterococci	17.2	18.1	8.9	N.D.	N.D.	94	25	17	N.D.	N.D.	N.D.	N.D.	N.D.	1	N.D.
Heterotrophic bacteria	34,200	35,000	67,800	932,000	962,000	994,000	39,800	37,600	36,800	166	128	178	722	562	336

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 6-2 Test result with bacteria in accordance with the seawater requirement (test cycle 2)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	28,800	9,600	24,200	9,240	1,058	10,080	5,220	5,940	3,920	20	10	8	94	74	56
Vibrio cholera: second phase, alkaline peptone water	16,678	4,285	10,117	1,294	2,539	3,326	2,767	1,544	1,333	6	11	5	29	26	26
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	55	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	3,240	2,020	900	4,960	4,660	1,920	1,460	1,820	1,640	24	12	10	46	31	22
Escherichia coli	2,620	920	60	1,140	820	380	320	620	40	5.4	2.6	1.4	24	15	10
Enterococci group	8	12	10	2	N.D.	2	19	12	10	0.2	N.D.	N.D.	N.D.	N.D.	N.D.
Enterococci	2.0	2.0	1.4	N.D.	N.D.	N.D.	12	9.1	3.8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heterotrophic bacteria	128,400	144,800	138,400	692,000	674,000	274,000	84,800	75,400	82,800	164	212	188	376	186	122

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 6-3 Test result with bacteria in accordance with the seawater requirement (test cycle 3)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	940	108	82	34,200	24,000	14,000	1,900	620	720	3	2	3	31	9	6
Vibrio cholera: second phase, alkaline peptone water	105	23	9	N.D.	N.D.	N.D.	149	200	79	N.D.	N.D.	0.1	N.D.	N.D.	N.D.
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	2,000	2,000	200	48,400	31,400	38,200	3,600	3,000	3,400	7	7	4	44	22	10
Escherichia coli	800	1,800	N.D.	11,200	4,000	6,400	600	400	400	2.0	0.8	N.D.	39	20	8.4
Enterococci group	4	6	11	0.6	9	3	0.4	1.0	0.4	N.D.	N.D.	N.D.	0.2	N.D.	N.D.
Enterococci	2.0	2.0	1.4	N.D.	N.D.	N.D.	N.D.	0.6	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heterotrophic bacteria	23,200	9,760	22,400	326,000	330,000	328,000	13,580	12,840	20,600	16	16	26	328	216	122

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 6-4 Test result with bacteria in accordance with the seawater requirement (test cycle 4)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	1,000	980	680	2,720	2,100	2,020	980	880	1,000	5	2	2	14	7	3
Vibrio cholera: second phase, alkaline peptone water	56	133	39	82	225	124	224	153	70	0.7	0.1	0.4	5	2	0.5
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	1,740	1,720	880	5,380	3,980	2,100	1,140	760	1,540	8.0	0.8	0.8	12	5	3
Escherichia coli	1,340	1,220	400	180	320	180	560	120	960	5.8	0.2	0.2	7.0	2.2	1.4
Enterococci group	91	103	92	3	2	0.8	138	120	174	N.D.	0.4	1.0	N.D.	0.2	0.2
Enterococci	21	44	29	1.3	2.0	N.D.	5.5	1.8	1.9	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heterotrophic bacteria	23,200	19,200	21,600	356,000	330,000	318,000	10,200	16,600	15,400	50	50	38	268	98	124

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 6-5 Test result with bacteria in accordance with the seawater requirement (test cycle 5)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	520	700	560	860,000	560,000	920,000	540	480	640	3	1.0	0.6	33	16	9
Vibrio cholera: second phase, alkaline peptone water	112	118	196,844	40,444	110,400	110,400	103	66	58	N.D.	0.5	0.2	0.3	2.0	0.5
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	300	300	160	100,000	80,000	60,000	340	160	120	0.6	0.6	0.2	5	5	3
Escherichia coli	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20	N.D.	N.D.	N.D.	0.4	1.4	0.2
Enterococci group	101	77	100	8	8	13	67	45	43	N.D.	N.D.	0.2	0.6	0.2	0.4
Enterococci	74	55	43	3.8	2.3	5.0	33	15	12	N.D.	N.D.	N.D.	0.4	N.D.	0.2
Heterotrophic bacteria	23,600	14,400	16,400	586,000	624,000	618,000	14,600	11,000	14,400	58	24	12	212	190	188

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 6-6 Test result with bacteria in accordance with the seawater requirement (test cycle 6)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	620	580	220	12,200	9,620	16,960	320	240	240	3	0.4	N.D.	1.2	1.0	0.6
Vibrio cholera: second phase, alkaline peptone water	285	357	132	3,854	289	509	77	24	24	N.D.	N.D.	N.D.	0.8	N.D.	N.D.
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	462	540	504	14,700	14,560	19,020	674	278	290	0.8	0.8	0.8	0.2	0.4	0.6
Escherichia coli	12	128	28	280	480	2,800	296	28	60	0.4	0.2	0.2	N.D.	N.D.	0.2
Enterococci group	206	170	121	0.2	0.2	0.6	11	8	7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Enterococci	4.1	2.6	1.2	N.D.	N.D.	0.5	2.1	0.6	1.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heterotrophic bacteria	10,520	13,660	11,860	420,000	450,000	390,000	11,320	11,820	10,740	46	64	74	120	82	26

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 7-1 Test result with bacteria in accordance with the brackish water requirement (test cycle 1)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	160	580	440	200	220	200	980	260	820	0.4	2.8	1.0	0.4	N.D.	N.D.
Vibrio cholera: second phase, alkaline peptone water	112	203	210	47	N.D.	13	603	225	340	N.D.	0.8	N.D.	47	N.D.	13
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	920	520	420	39,600	41,600	45,800	860	100	640	2.4	3.2	3.8	1.2	0.8	0.2
Escherichia coli	N.D.	100	N.D.	N.D.	200	2,200	40	N.D.	20	0.8	2.4	3.0	0.2	0.2	N.D.
Enterococci group	16	18	17	138	114	164	12	15	12	N.D.	N.D.	N.D.	0.8	N.D.	N.D.
Enterococci	2.7	6.2	6.5	122	107	84	4.3	5.9	2.5	N.D.	N.D.	N.D.	0.8	N.D.	N.D.
Heterotrophic bacteria	13,700	14,620	16,140	206,000	254,000	226,000	25,000	25,200	25,200	18	10	6.0	126	88	86

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 7-2 Test result with bacteria in accordance with the brackish water requirement (test cycle 2)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	320	320	240	1,820	1,020	1,280	120	120	120	0.2	N.D.	N.D.	1.2	1.8	0.8
Vibrio cholera: second phase, alkaline peptone water	275	171	156	1,050	731	967	40	24	30	N.D.	N.D.	N.D.	N.D.	0.5	N.D.
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	840	900	1,120	2,700	960	340	560	940	560	1.2	0.2	1.0	12	8.6	6.4
Escherichia coli	40	40	80	N.D.	N.D.	N.D.	20	160	120	0.2	N.D.	0.2	N.D.	N.D.	N.D.
Enterococci group	28	28	28	1.8	1.4	2.2	29	27	34	N.D.	N.D.	0.2	N.D.	N.D.	N.D.
Enterococci	14	5.9	3.4	0.7	0.5	1.6	7.4	6.0	6.2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heterotrophic bacteria	20,000	24,200	29,000	161,800	106,400	163,200	10,920	25,200	25,200	16	28	20	180	128	96

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 7-3 Test result with bacteria in accordance with the brackish water requirement (test cycle 3)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	350	356	390	1,240	640	1,280	262	284	1,160	0.2	N.D.	0.2	N.D.	0.2	N.D.
Vibrio cholera: second phase, alkaline peptone water	53	73	56	142	N.D.	29	8.2	31	244	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	1,160	740	880	11,400	5,300	6,080	1,160	1,000	1,760	1.2	0.6	0.8	0.2	1.0	0.2
Escherichia coli	20	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20	N.D.	N.D.	N.D.	N.D.	N.D.	0.2
Enterococci group	17	19	15	10	N.D.	4.0	25	25	26	N.D.	N.D.	N.D.	N.D.	N.D.	4.0
Enterococci	7.3	10	6.6	5.0	N.D.	2.0	9.3	16	11	N.D.	N.D.	N.D.	N.D.	N.D.	4.0
Heterotrophic bacteria	18,800	16,860	17,400	154,000	252,000	224,000	16,360	10,840	11,760	38	26	14	90	44	46

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 7-4 Test result with bacteria in accordance with the brackish water requirement (test cycle 4)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	780	280	200	1,840	1,160	1,540	80	660	200	N.D.	N.D.	N.D.	3.8	0.8	N.D.
Vibrio cholera: second phase, alkaline peptone water	97	N.D.	13	834	N.D.	589	N.D.	134	N.D.	N.D.	N.D.	N.D.	0.3	N.D.	N.D.
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	0.5	N.D.	0.4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.1	N.D.	N.D.
Escherichia coli group	740	680	780	6,880	6,340	6,160	760	760	880	0.4	0.8	0.6	4.2	3.2	2.4
Escherichia coli	180	20	80	N.D.	20	20	40	40	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.2
Enterococci group	5.4	5.4	6.8	0.8	0.8	2.0	12	13	15	N.D.	N.D.	N.D.	N.D.	0.2	N.D.
Enterococci	2.2	0.7	0.6	N.D.	0.7	0.2	4.6	1.5	4.0	N.D.	N.D.	N.D.	N.D.	0.2	N.D.
Heterotrophic bacteria	29,400	27,600	22,600	90,800	89,000	88,200	31,400	25,600	22,200	46	26	12	92	62	28

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

Table 7-5 Test result with bacteria in accordance with the brackish water requirement (test cycle 5)

	Control water						Treated water								
	During ballasting			After 5 days			Before treatment			Immediately after treatment			After 5 days		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Vibrio cholera: first phase, TCBS agar	240	200	140	380	260	320	200	140	240	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Vibrio cholera: second phase, alkaline peptone water	N.D.	N.D.	N.D.	350	217	179	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Vibrio cholera: O1 and O139	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Escherichia coli group	360	540	420	780	820	700	280	540	480	N.D.	0.2	N.D.	N.D.	N.D.	N.D.
Escherichia coli	20	20	20	N.D.	N.D.	N.D.	N.D.	60	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Enterococci group	3.0	4.2	3.6	0.4	3.6	3.4	3.6	3.8	4.6	0.6	N.D.	N.D.	N.D.	3.0	N.D.
Enterococci	1.5	3.1	1.5	0.4	3.2	3.4	2.0	2.5	3.3	N.D.	N.D.	N.D.	N.D.	3.0	N.D.
Heterotrophic bacteria	13,180	11,300	10,800	85,800	80,600	106,400	30,800	20,400	20,600	52	44	44	164	96	124

Unit: Vibrio cholera, Escherichia coli and Enterococci: cfu/100 ml; Heterotrophic bacteria: cfu/ml. N.D. = Not Detected.

4.4 Water quality

4.4.1 Water quality I (TSS, POC, DOC)

All the test water met the land-based test standards that each of TSS, POC and DOC should be included over 1 mg/L in the seawater requirement, and TSS and each of POC and DOC should be included over 50 mg/L and over 5 mg/L, respectively in the brackish water requirement.

4.4.2 Water quality II (water temperature, pH, salinity, dissolved oxygen (DO), Turbidity (NTU))

All the test water met the land-based test standards that the salinity should be over 32 psu in the seawater requirement and 3 to 32 psu in the brackish water requirement, where the salinity difference between seawater and brackish water should be at least 10 psu.

Water quality I in the seawater requirement

					TSS [mg/L]	POC [mg/L]	DOC [mg/L]
Test cycle 1	During ballasting	Control water		Beg	13.1	2.9	2.4
				Mid	12.7	3.3	2.9
				End	10.1	2.7	2.6
		Treated water	Before treatment	Beg	15.2	5.7	2.0
				Mid	10.3	1.7	6.0
				End	12.5	4.7	2.8
			Immediately after treatment	Beg	6.0	1.7	3.4
				Mid	5.3	2.2	4.0
				End	6.0	1.2	3.3
	During de-ballasting	Control water		Beg	2.4	0.7	0.9
				Mid	2.3	0.3	1.2
				End	3.8	0.5	1.2
		Treated water		Beg	3.5	0.3	1.1
				Mid	4.4	0.7	1.3
				End	7.7	0.8	1.0
Test cycle 2	During ballasting	Control water		Beg	15.3	4.1	4.6
				Mid	14.2	4.0	3.7
				End	15.8	4.9	4.3
		Treated water	Before treatment	Beg	10.4	4.0	1.2
				Mid	10.6	3.7	2.3
				End	9.8	4.0	2.5
			Immediately after treatment	Beg	8.4	1.3	2.0
				Mid	9.1	3.0	2.0
				End	7.7	1.0	2.3
	During de-ballasting	Control water		Beg	1.2	0.8	1.7
				Mid	2.4	1.0	1.6
				End	4.8	0.8	1.5
		Treated water		Beg	4.2	0.8	1.9
				Mid	5.9	1.0	1.7
				End	6.3	0.8	1.8
Test cycle 3	During ballasting	Control water		Beg	Analysis was not conducted because this test cycle was invalidated.		
				Mid			
				End			
		Treated water	Before treatment	Beg			
				Mid			
				End			
			Immediately after treatment	Beg			
				Mid			
				End			
	During de-ballasting	Control water		Beg			
				Mid			
				End			
		Treated water		Beg			
				Mid			
				End			

Test cycle 4	During ballasting	Control water		Beg	15.3	3.5	3.7
				Mid	17.0	4.6	2.8
				End	15.5	3.8	2.8
		Treated water	Before treatment	Beg	18.0	4.6	4.4
				Mid	16.7	4.5	4.1
				End	16.9	3.8	2.9
			Immediately after treatment	Beg	12.5	2.7	4.0
				Mid	14.4	3.1	4.7
				End	13.1	3.0	4.1
	During de-ballasting	Control water		Beg	1.8	0.4	1.4
				Mid	1.8	0.7	1.2
				End	1.9	0.5	1.3
		Treated water		Beg	1.3	0.5	1.9
				Mid	2.9	0.6	1.8
				End	1.8	0.6	1.9
Test cycle 5	During ballasting	Control water		Beg	13.7	4.2	1.6
				Mid	14.3	3.1	1.6
				End	14.1	2.9	1.7
		Treated water	Before treatment	Beg	16.4	3.6	2.1
				Mid	16.0	4.8	2.4
				End	13.4	4.4	1.9
			Immediately after treatment	Beg	10.9	3.2	2.9
				Mid	9.9	3.2	1.6
				End	11.8	4.3	1.4
	During de-ballasting	Control water		Beg	3.3	0.4	1.6
				Mid	3.0	0.7	1.6
				End	4.1	0.2	1.6
		Treated water		Beg	3.4	0.4	2.1
				Mid	3.8	0.3	2.1
				End	2.8	0.2	2.1
Test cycle 6	During ballasting	Control water		Beg	12.3	2.9	3.0
				Mid	12.1	3.2	2.9
				End	12.2	3.2	2.8
		Treated water	Before treatment	Beg	11.8	1.9	3.5
				Mid	11.8	2.1	3.3
				End	12.0	2.7	3.5
			Immediately after treatment	Beg	9.4	1.5	3.9
				Mid	8.8	2.4	3.8
				End	8.4	2.4	3.9
	During de-ballasting	Control water		Beg	1.2	0.6	1.5
				Mid	1.8	0.7	1.3
				End	1.9	0.5	1.4
		Treated water		Beg	3.0	0.8	1.4
				Mid	3.0	0.7	1.5
				End	3.0	1.0	1.5

Table 8-1 Water quality I in the brackish water requirement

					TSS [mg/L]	POC [mg/L]	DOC [mg/L]
Test cycle 1	During ballasting	Control water		Beg	76.5	29.2	7.8
				Mid	70.1	28.4	7.6
				End	77.3	31.5	7.5
		Treated water	Before treatment	Beg	75.2	29.1	8.9
				Mid	77.9	29.3	8.7
				End	72.8	28.5	7.5
			Immediately after treatment	Beg	60.1	22.3	8.7
				Mid	61.0	21.4	8.6
				End	57.0	22.0	8.0
	During de-ballasting	Control water		Beg	3.2	0.5	6.8
				Mid	3.3	0.7	6.3
				End	3.1	1.0	6.1
		Treated water		Beg	3.9	0.7	6.4
				Mid	3.8	0.8	6.9
				End	3.4	0.6	6.9
Test cycle 2	During ballasting	Control water		Beg	72.4	26.9	8.1
				Mid	64.1	25.0	8.0
				End	72.3	27.5	8.5
		Treated water	Before treatment	Beg	55.5	26.3	8.7
				Mid	54.3	25.6	8.4
				End	55.1	26.7	8.3
			Immediately after treatment	Beg	31.2	22.0	9.0
				Mid	29.0	20.3	8.7
				End	28.0	19.4	8.6
	During de-ballasting	Control water		Beg	3.3	1.0	6.4
				Mid	3.2	1.5	6.2
				End	3.8	1.1	6.4
		Treated water		Beg	1.9	1.8	6.5
				Mid	2.3	0.8	6.7
				End	2.4	1.2	6.6
Test cycle 3	During ballasting	Control water		Beg	77.0	29.1	8.9
				Mid	77.9	27.9	9.1
				End	78.2	19.9	9.1
		Treated water	Before treatment	Beg	72.5	26.4	8.6
				Mid	71.1	26.5	8.5
				End	71.4	19.4	8.6
			Immediately after treatment	Beg	53.2	22.4	8.6
				Mid	57.2	21.5	8.5
				End	57.8	22.2	8.8
	During de-ballasting	Control water		Beg	4.4	0.7	7.6
				Mid	3.4	0.8	7.7
				End	4.0	0.8	7.6
		Treated water		Beg	3.2	8.0	7.4
				Mid	3.1	0.7	7.3
				End	3.0	0.6	7.3

Test cycle 4	During ballasting	Control water		Beg	72.8	8.3	11.4
				Mid	71.7	8.3	11.4
				End	71.6	8.4	11.5
		Treated water	Before treatment	Beg	65.6	8.3	11.4
				Mid	69.2	8.3	11.6
				End	69.1	8.3	11.7
			Immediately after treatment	Beg	52.3	8.3	11.4
				Mid	57.3	8.3	11.5
				End	54.4	8.3	11.6
	During de-ballasting	Control water		Beg	3.2	8.1	8.4
				Mid	3.0	8.2	8.3
				End	2.9	8.1	8.2
		Treated water		Beg	2.8	8.1	8.4
				Mid	2.8	8.2	8.3
				End	3.1	8.1	8.2
Test cycle 5	During ballasting	Control water		Beg	76.0	28.5	9.5
				Mid	70.0	24.2	8.8
				End	84.0	32.0	10.0
		Treated water	Before treatment	Beg	70.0	22.3	8.7
				Mid	75.0	27.8	9.2
				End	73.0	23.0	9.0
			Immediately after treatment	Beg	48.0	20.1	8.9
				Mid	53.0	21.9	9.1
				End	56.0	22.7	9.3
	During de-ballasting	Control water		Beg	4.0	3.9	4.9
				Mid	4.0	3.3	5.3
				End	4.0	5.3	4.4
		Treated water		Beg	4.0	1.3	7.9
				Mid	4.0	1.3	7.9
				End	4.0	1.3	7.9

Table 9-1 Water quality II in the seawater requirement

					Water temp. [°C]	Salinity [psu]	pH	DO [mg/L]	NTU
Test cycle 1	During ballasting	Control water		Beg	21.6	33.4	8.1	5.94	35.2
				Mid	21.6	33.4	8.1	5.94	26.7
				End	21.8	33.4	8.1	5.95	16.6
		Treated water	Before treatment	Beg	21.4	33.2	8.1	6.47	33.7
				Mid	21.4	33.4	8.1	6.31	30.7
				End	21.4	33.3	8.1	6.22	17.5
			Immediately after treatment	Beg	21.3	33.3	8.1	6.40	35.7
				Mid	21.4	33.4	8.1	6.27	28.6
				End	21.3	33.4	8.1	6.19	23.4
	During de-ballasting	Control water		Beg	21.4	33.3	7.6	4.78	27.4
				Mid	21.5	33.3	7.6	4.53	37.9
				End	21.5	33.3	7.6	4.47	33.0
		Treated water		Beg	21.2	32.9	7.6	4.23	34.1
				Mid	21.2	32.8	7.6	3.94	34.6
				End	21.2	32.7	7.6	3.73	35.5
Test cycle 2	During ballasting	Control water		Beg	22.3	32.9	8.1	5.10	17.4
				Mid	22.3	32.9	8.1	4.68	16.6
				End	22.4	32.9	8.1	4.53	15.4
		Treated water	Before treatment	Beg	22.3	33.3	8.1	4.79	18.6
				Mid	22.5	33.2	8.1	4.65	19.7
				End	22.4	33.3	8.1	4.65	19.4
			Immediately after treatment	Beg	22.2	33.3	8.1	4.80	17.6
				Mid	22.2	33.3	8.1	4.63	17.9
				End	22.2	33.3	8.1	4.64	18.5
	During de-ballasting	Control water		Beg	20.5	32.9	7.5	5.01	18.8
				Mid	20.5	32.9	7.5	4.48	19.5
				End	20.5	32.9	7.5	4.42	20.1
		Treated water		Beg	20.4	33.3	7.4	3.65	25.6
				Mid	20.5	33.2	7.4	3.33	22.0
				End	20.5	33.3	7.5	3.01	24.4
Test cycle 3	During ballasting	Control water		Beg	19.3	34.0	8.2	4.70	14.1
				Mid	19.3	34.0	8.2	4.68	13.7
				End	19.3	34.0	8.2	4.68	13.2
		Treated water	Before treatment	Beg	19.2	33.8	8.2	5.11	15.3
				Mid	19.4	33.7	8.2	5.03	15.5
				End	19.3	33.9	8.2	4.85	14.4
			Immediately after treatment	Beg	19.0	33.8	8.2	5.07	13.3
				Mid	19.1	33.8	8.2	5.01	14.7
				End	19.1	33.9	8.2	4.77	13.8
	During de-ballasting	Control water		Beg	17.8	33.9	7.3	4.41	30.1
				Mid	17.9	33.4	7.1	4.92	30.5
				End	17.9	33.3	7.1	4.45	23.5
		Treated water		Beg	17.8	33.3	7.6	3.91	15.8
				Mid	17.9	33.4	7.6	3.59	13.8
				End	17.9	33.3	7.3	3.80	17.7

Test cycle 4	During ballasting	Control water		Beg	16.5	32.2	8.4	6.49	28.5
				Mid	16.5	32.1	8.4	6.32	27.0
				End	16.7	32.2	8.4	6.34	29.3
		Treated water	Before treatment	Beg	16.6	32.3	8.3	6.40	35.9
				Mid	16.4	32.3	8.4	6.37	23.5
				End	16.4	32.4	8.4	6.35	30.0
			Immediately after treatment	Beg	16.4	32.4	8.3	6.41	18.4
				Mid	16.5	32.4	8.4	6.34	18.6
				End	16.4	32.4	8.3	6.27	20.7
	During de-ballasting	Control water		Beg	16.5	32.2	7.9	5.86	14.3
				Mid	16.5	32.1	7.9	5.91	20.9
				End	16.7	32.2	7.9	5.95	14.4
		Treated water		Beg	15.7	32.2	7.9	5.80	28.9
				Mid	16.0	32.3	7.9	5.02	25.1
				End	16.0	32.3	7.9	4.93	17.9
Test cycle 5	During ballasting	Control water		Beg	17.8	33.3	8.2	6.09	20.4
				Mid	18.0	33.3	8.3	5.97	17.8
				End	18.0	33.3	8.2	5.96	19.3
		Treated water	Before treatment	Beg	17.9	33.5	8.3	6.25	20.7
				Mid	17.9	33.4	8.3	6.68	14.8
				End	18.0	33.3	8.3	6.13	18.0
			Immediately after treatment	Beg	17.9	33.4	8.3	6.13	18.8
				Mid	17.9	33.4	8.3	6.26	33.5
				End	18.0	33.5	8.3	5.96	24.8
	During de-ballasting	Control water		Beg	18.0	33.1	7.8	6.25	22.7
				Mid	18.1	33.3	7.9	5.86	24.8
				End	18.0	33.3	7.8	5.89	27.1
		Treated water		Beg	17.8	33.2	7.8	4.93	26.6
				Mid	17.8	33.2	7.8	4.84	32.7
				End	17.8	33.1	7.8	4.73	37.3
Test cycle 6	During ballasting	Control water		Beg	18.1	33.4	8.2	5.82	34.1
				Mid	18.1	33.4	8.2	5.82	33.4
				End	18.0	33.4	8.2	5.80	34.0
		Treated water	Before treatment	Beg	18.3	33.6	8.3	5.82	32.3
				Mid	18.4	33.6	8.3	5.85	37.5
				End	18.3	33.6	8.3	5.88	38.4
			Immediately after treatment	Beg	18.3	33.7	8.3	5.80	35.7
				Mid	18.3	33.7	8.3	5.78	37.2
				End	18.3	33.6	8.3	5.77	34.3
	During de-ballasting	Control water		Beg	16.0	33.1	7.8	5.43	8.2
				Mid	16.0	33.0	7.8	5.37	13.0
				End	16.0	33.1	7.8	5.72	13.4
		Treated water		Beg	15.9	33.5	7.8	4.92	18.8
				Mid	15.9	33.5	7.8	4.96	19.2
				End	15.9	33.5	7.8	4.92	19.5

Table 9-2 Water quality II in the brackish water requirement

					Water temp. [°C]	Salinity [psu]	pH	DO [mg/L]	NTU
Test cycle 1	During ballasting	Control water		Beg	15.2	20.1	8.1	6.71	86.5
				Mid	15.4	19.9	8.1	6.56	90.6
				End	15.0	19.1	8.1	6.53	83.6
		Treated water	Before treatment	Beg	15.5	21.5	8.1	6.07	89.1
				Mid	15.6	21.4	8.1	6.19	88.3
				End	15.4	21.0	8.1	6.29	109.0
			Immediately after treatment	Beg	15.4	21.3	8.0	6.21	94.5
				Mid	15.5	21.5	8.1	6.36	79.8
				End	15.3	21.0	8.1	6.32	91.7
	During de-ballasting	Control water		Beg	13.9	20.1	7.8	7.23	21.4
				Mid	13.9	20.2	7.8	7.09	17.9
				End	13.9	20.0	7.8	7.63	14.2
		Treated water		Beg	13.9	21.6	7.8	7.17	22.4
				Mid	14.0	21.6	7.8	7.07	29.9
				End	13.9	21.8	7.8	7.09	33.9
Test cycle 2	During ballasting	Control water		Beg	12.6	19.7	8.1	7.24	52.2
				Mid	12.6	19.8	8.1	6.20	50.1
				End	12.7	20.0	8.1	7.09	57.1
		Treated water	Before treatment	Beg	13.1	19.9	8.1	6.61	50.7
				Mid	13.0	19.9	8.1	6.61	48.5
				End	13.1	19.9	8.2	6.47	52.2
			Immediately after treatment	Beg	13.0	19.9	8.1	6.58	50.1
				Mid	13.1	19.9	8.1	6.57	49.7
				End	13.1	19.9	8.1	6.39	49.3
	During de-ballasting	Control water		Beg	12.8	21.5	7.9	9.64	10.8
				Mid	12.7	21.5	7.9	8.45	8.0
				End	12.8	21.6	7.9	8.58	9.3
		Treated water		Beg	12.5	21.6	7.8	8.82	18.8
				Mid	12.8	21.3	7.8	8.79	11.9
				End	12.9	21.4	7.8	8.88	12.5
Test cycle 3	During ballasting	Control water		Beg	11.4	21.4	8.2	9.50	82.3
				Mid	11.4	21.3	8.2	10.68	91.1
				End	11.5	21.3	8.2	10.72	97.3
		Treated water	Before treatment	Beg	11.4	20.5	8.2	9.63	66.1
				Mid	11.6	20.7	8.3	9.55	70.5
				End	11.7	20.5	8.3	9.55	77.3
			Immediately after treatment	Beg	11.4	20.7	8.2	9.40	62.1
				Mid	11.5	20.6	8.3	9.36	69.1
				End	11.6	20.6	8.3	9.61	66.5
	During de-ballasting	Control water		Beg	10.3	21.2	8.2	9.71	14.9
				Mid	10.3	21.3	8.1	9.72	14.2
				End	10.3	21.3	8.2	9.64	14.4
		Treated water		Beg	10.3	20.9	8.0	7.62	11.9
				Mid	10.4	20.6	7.9	8.75	13.3
				End	10.4	20.8	8.0	8.29	13.1

Test cycle 4	During ballasting	Control water		Beg	11.4	21.4	8.3	10.01	96.7
				Mid	11.4	21.3	8.3	9.29	98.3
				End	11.5	21.3	8.4	9.08	85.6
		Treated water	Before treatment	Beg	11.4	20.5	8.3	9.15	89.3
				Mid	11.6	20.7	8.3	9.14	97.5
				End	11.7	20.5	8.3	9.16	94.8
			Immediately after treatment	Beg	11.4	20.7	8.3	9.34	84.3
				Mid	11.5	20.6	8.3	9.24	90.5
				End	11.6	20.6	8.3	9.20	77.7
	During de-ballasting	Control water		Beg	8.4	20.8	8.1	9.80	12.0
				Mid	8.3	20.8	8.2	9.71	10.8
				End	8.2	20.6	8.1	9.73	14.5
		Treated water		Beg	8.5	19.9	8.0	9.92	13.8
				Mid	8.5	20.0	8.0	9.38	11.8
				End	8.4	19.9	8.0	9.26	16.3
Test cycle 5	During ballasting	Control water		Beg	12.4	19.0	8.3	8.45	36.4
				Mid	12.3	18.9	8.2	8.5	38.4
				End	12.1	18.9	8.2	8.53	39.7
		Treated water	Before treatment	Beg	12.1	17.8	8.2	8.71	40.3
				Mid	12.1	18.1	8.2	9.60	40.5
				End	12.3	18.1	8.2	8.56	39.6
			Immediately after treatment	Beg	12.1	18.1	8.2	8.80	29.0
				Mid	12.2	18.1	8.2	8.65	30.8
				End	12.2	18.1	8.2	8.56	31.4
	During de-ballasting	Control water		Beg	8.7	20.7	8.0	8.07	13.6
				Mid	8.9	20.8	8.0	8.88	12.6
				End	9.0	20.7	8.0	8.53	13.3
		Treated water		Beg	8.7	19.7	8.0	7.98	14.2
				Mid	8.9	19.7	7.9	7.95	14.3
				End	8.7	19.7	8.0	7.98	16.9

4.5 operating parameters

The following parameters were monitored and recorded together with any leakages and the sampling flow rate conducted by isokinetic sampling at 100 L/min. In all the test cycles, any malfunction was not detected and the system operated properly:

- Flow rates of the system, and the inlet and the outlet of the filter unit;
- Pressures of the system, and the inlet, the inside and the outlet of the filter unit;
- Turbidities of the system, and the inlet and the outlet of the filter unit;
- Power consumption of the UV unit; and
- UV intensity

It was determined by the flow rates and the UV intensities that the system operated properly and this test was conducted under appropriate controls.

The flow rates of the outlet of the filter unit in all the test cycles exceeded 200 m^3/h and were controlled within 200+6 m^3/h (TRC: 200 m^3/h).

The UV intensities were controlled within 115+15 W/m^2 (preset value: 115 W/m^2)

Table 10-1 Operating parameters in the seawater requirement (test cycle 1)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:39	252	203	86	59.1	54.5	93	66.2	66.4	10.8	123.7	107.57
After 10 minutes	10:45	251	203	85	58.9	54.6	93	66.9	65.8	10.8	123.7	107.57
After 15 minutes	10:49	251	203	85	57.8	52.8	92	64.8	65.1	11.0	122.4	106.43
After 20 minutes	10:54	250	202	85	57.7	53.3	91	64	64.7	11.0	122.4	106.43
After 25 minutes	10:59	250	202	85	56.8	50.6	91	63.6	64.3	11.0	122.4	106.43
After 30 minutes	11:04	249	202	84	57.4	52.1	91	63.5	63.9	11.0	123.7	107.57
After 35 minutes	11:09	249	201	83	55.4	51.4	89	62.4	63.1	11.0	123.7	107.57
After 40 minutes	11:14	247	201	85	58.6	52.4	90	64.4	64.3	11.0	122.4	106.43
After 45 minutes	11:19	250	203	86	59.3	53.4	93	65.1	65.2	11.0	123.7	107.57
After 50 minutes	11:24	248	201	74	48.5	43	80	54.9	54.5	9.6	123.7	107.57

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	12:16	206	203
After 10 minutes	12:22	206	203
After 15 minutes	12:26	205	204
After 20 minutes	12:31	206	203
After 25 minutes	12:36	206	203
After 30 minutes	12:41	205	203
After 35 minutes	12:46	205	203
After 40 minutes	12:51	205	203
After 45 minutes	12:56	205	203
After 50 minutes	13:00	205	203

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	10:15	207	202	14.84	123.7	107.57
After 10 minutes	10:20	207	202	15.20	123.7	107.57
After 15 minutes	10:25	207	203	15.21	123.7	107.57
After 20 minutes	10:30	207	202	15.41	123.7	107.57
After 25 minutes	10:35	207	202	15.40	123.7	107.57
After 30 minutes	10:40	207	202	15.41	123.7	107.57
After 35 minutes	10:45	205	201	9.93	123.7	107.57

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	12:08	208	206
After 10 minutes	12:13	207	206
After 15 minutes	12:18	207	206
After 20 minutes	12:23	206	205
After 25 minutes	12:28	207	205
After 30 minutes	12:33	207	205
After 35 minutes	12:39	206	202

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 10-2 Operating parameters in the seawater requirement (test cycle 2)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:34	251	204	85	57.7	53	92	64.1	64.9	10.9	123.7	107.6
After 10 minutes	10:39	250	203	84	57.7	52.9	92	63.5	63.9	10.9	123.7	107.6
After 15 minutes	10:44	250	203	85	58.2	52.3	92	62.7	64.4	11.0	123.7	107.6
After 20 minutes	10:50	249	202	86	58.3	53.5	92	64.4	64.4	11.0	123.7	107.6
After 25 minutes	10:54	249	203	85	58.8	53.3	92	64.7	64.4	11.0	123.7	107.6
After 30 minutes	10:59	249	203	85	59.1	53	91	65	66	11.0	123.7	107.6
After 35 minutes	11:04	249	202	86	58.8	53	91	63.9	64.8	11.0	123.7	107.6
After 40 minutes	11:09	249	201	86	59.4	54.5	92	65.1	65.9	11.0	123.7	107.6
After 45 minutes	11:15	247	201	86	59.9	54.4	92	65.2	65.4	11.0	123.7	107.6
After 50 minutes	11:19	248	200	86	59.9	54.7	92	65.3	64.7	11.0	123.7	107.6
After 55 minutes	11:23	246	200	85	58.9	53	92	64.8	66	11.0	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	12:42	206	204
After 10 minutes	12:47	206	204
After 15 minutes	12:52	206	205
After 20 minutes	12:57	206	204
After 25 minutes	13:02	206	204
After 30 minutes	13:07	206	203
After 35 minutes	13:12	205	204
After 40 minutes	13:17	205	203
After 45 minutes	13:22	205	203
After 50 minutes	13:27	205	203
After 55 minutes	13:31	205	204

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:41	205	201	19.79	123.7	107.6
After 10 minutes	9:46	205	201	19.76	123.7	107.6
After 15 minutes	9:51	208	203	19.77	123.7	107.6
After 20 minutes	9:56	208	203	19.76	123.7	107.6
After 25 minutes	10:01	208	203	19.76	123.7	107.6
After 30 minutes	10:06	208	203	19.76	123.7	107.6
After 37 minutes	10:13	206	201	9.24	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:47	203	201
After 10 minutes	10:52	202	200
After 15 minutes	10:57	203	202
After 20 minutes	11:02	204	202
After 25 minutes	11:07	203	201
After 30 minutes	11:12	203	200
After 35 minutes	11:17	201	200

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 10-3 Operating parameters in the seawater requirement (test cycle 3)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:16	250	201	85	57.7	52.1	92	66.6	65.9	11.34	123.7	107.6
After 10 minutes	10:21	251	201	85	57.3	51.6	91	64.4	65.7	11.34	123.7	107.6
After 15 minutes	10:26	250	201	87	58.4	53.2	93	66.5	65.2	11.34	123.7	107.6
After 20 minutes	10:31	250	200	85	58	53.7	92	65.7	66.7	11.34	123.7	107.6
After 25 minutes	10:36	250	202	86	58.7	53.1	93	67.7	68.4	11.35	123.7	107.6
After 30 minutes	10:41	249	201	88	60.9	53.9	93	65.6	66.1	11.34	123.7	107.6
After 35 minutes	10:46	249	200	88	59.3	54.1	94	68	67.9	11.35	123.7	107.6
After 40 minutes	10:51	253	202	91	61.1	56.4	96	70	69.1	11.35	123.7	107.6
After 45 minutes	10:56	251	202	89	61.8	57	96	69.2	69	11.35	123.7	107.6
After 50 minutes	11:01	250	201	90	62.4	56.7	97	70.7	70.1	11.35	123.7	107.6
After 55 minutes	11:06	250	200	90	61.6	56.4	96	70	69.6	11.35	119.9	107.6
After 60 minutes	11:11	247	200	83	56.3	50.5	90	65.2	64.2	9.56	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:59	203	202
After 10 minutes	12:04	203	201
After 15 minutes	12:09	203	202
After 20 minutes	12:14	203	200
After 25 minutes	12:19	202	201
After 30 minutes	12:24	202	200
After 35 minutes	12:29	204	202
After 40 minutes	12:34	205	204
After 45 minutes	12:39	205	202
After 50 minutes	12:44	204	201
After 55 minutes	12:48	203	202

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:31	209	204	13.52	123.7	107.6
After 10 minutes	9:36	208	203	13.52	123.7	107.6
After 15 minutes	9:41	208	203	13.53	123.7	107.6
After 20 minutes	9:46	208	202	13.70	123.7	107.6
After 25 minutes	9:51	208	203	13.73	123.7	107.6
After 31 minutes	9:57	205	200	9.40	127.0	110.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:23	202	200
After 10 minutes	10:28	205	203
After 15 minutes	10:33	205	202
After 20 minutes	10:38	205	203
After 25 minutes	10:43	205	202

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 10-4 Operating parameters in the seawater requirement (test cycle 4)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:07	249	202	67	40.4	35	74	49.1	48.3	11.11	122.4	106.4
After 10 minutes	10:12	248	201	66	40.7	34.9	74	47.6	47.8	11.31	122.4	106.4
After 15 minutes	10:17	248	201	65	39.6	35.1	74	47.8	47.4	11.31	122.4	106.4
After 20 minutes	10:22	247	201	66	38.6	34.6	74	46.7	47.3	11.31	122.4	106.4
After 25 minutes	10:27	247	200	63	38.4	33.8	74	47.8	45.8	11.32	122.4	106.4
After 30 minutes	10:32	247	201	63	38.2	32.9	72	46.6	45	11.51	122.4	106.4
After 35 minutes	10:37	246	201	64	38.6	31.9	72	45.4	45.7	11.51	122.4	106.4
After 40 minutes	10:42	246	200	62	37.5	33.4	71	45.4	45	11.52	122.4	106.4
After 45 minutes	10:47	248	201	66	40.4	34.4	74	47.7	47	11.52	122.4	106.4
After 50 minutes	10:52	247	201	65	40	35.1	73	47	46.9	11.53	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:46	203	201
After 10 minutes	11:51	203	200
After 15 minutes	11:56	203	200
After 20 minutes	12:01	202	200
After 25 minutes	12:06	202	201
After 30 minutes	12:11	206	204
After 35 minutes	12:16	206	204
After 40 minutes	12:21	207	203
After 45 minutes	12:26	205	203
After 50 minutes	12:31	206	203

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:30	201	201	12.33	122.4	106.4
After 10 minutes	9:35	201	200	12.33	122.4	106.4
After 15 minutes	9:40	201	201	12.34	122.4	106.4
After 20 minutes	9:45	201	201	12.43	123.7	107.6
After 25 minutes	9:50	203	202	12.42	123.7	107.6
After 30 minutes	9:55	202	201	12.42	123.7	107.6
After 35 minutes	10:00	202	200	9.59	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:31	203	204
After 10 minutes	10:36	204	204
After 15 minutes	10:41	203	204
After 20 minutes	10:46	203	204
After 25 minutes	10:51	203	205
After 30 minutes	10:56	201	203

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 10-5 Operating parameters in the seawater requirement (test cycle 5)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:03	247	201	66	40.4	48	73	48.2	48	11.43	123.7	107.6
After 10 minutes	10:08	247	201	65	38.4	46.8	73	47	46.8	11.41	122.4	106.4
After 15 minutes	10:13	247	201	65	40.1	47.2	72	47	47.2	11.40	122.4	106.4
After 20 minutes	10:18	246	200	64	39.3	47.2	73	47.3	47.2	11.41	122.4	106.4
After 25 minutes	10:23	250	202	67	40.9	50.1	75	51.1	50.1	11.40	122.4	106.4
After 30 minutes	10:28	250	201	66	40.6	49	76	49.2	49	11.39	122.4	106.4
After 35 minutes	10:33	249	201	66	41.3	47.4	74	48.9	47.4	11.39	122.4	106.4
After 40 minutes	10:38	249	201	66	40.8	48	74	49.4	48	11.38	122.4	106.4
After 45 minutes	10:43	248	200	67	40.3	48.7	75	48.7	48.7	11.37	122.4	106.4
After 50 minutes	10:48	248	200	67	40.4	48.2	74	48.4	48.2	11.37	123.7	107.6
After 55 minutes	10:52	248	200	66	40.5	47.5	73	49.2	47.5	11.38	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:44	205	202
After 10 minutes	11:49	204	203
After 15 minutes	11:54	204	203
After 20 minutes	11:59	204	201
After 25 minutes	12:04	204	203
After 30 minutes	12:09	204	202
After 35 minutes	12:14	204	203
After 40 minutes	12:19	204	202
After 45 minutes	12:24	204	202
After 50 minutes	12:29	203	201
After 55 minutes	12:34	203	201

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:15	201	200	15.62	122.4	106.4
After 10 minutes	9:20	201	200	15.82	123.7	107.6
After 15 minutes	9:25	201	200	16.01	123.7	107.6
After 20 minutes	9:30	201	200	16.01	123.7	107.6
After 25 minutes	9:35	201	201	16.38	123.7	107.6
After 30 minutes	9:40	200	200	16.57	123.7	107.6
After 34 minutes	9:44	199	200	9.23	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:06	203	205
After 10 minutes	10:11	203	204
After 15 minutes	10:16	203	204
After 20 minutes	10:21	201	203
After 25 minutes	10:26	202	204
After 30 minutes	10:33	200	202
After 35 minutes	10:37	199	201

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 10-6 Operating parameters in the seawater requirement (test cycle 6)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:13	248	202	82	55.5	49.8	90	61.9	61.7	10.03	123.7	107.6
After 10 minutes	10:18	247	202	82	55.7	50.4	90	63.1	62.5	10.03	123.7	107.6
After 15 minutes	10:24	247	202	81	55.4	50	89	62.4	61.5	10.03	122.4	106.4
After 20 minutes	10:28	247	203	81	55.1	49.8	89	63.2	61.5	10.02	122.4	106.4
After 25 minutes	10:33	247	202	83	55	49.3	88	62.4	61.6	10.02	122.4	106.4
After 30 minutes	10:38	246	201	81	54.5	49.7	88	61.1	60.5	10.02	123.7	107.6
After 35 minutes	10:43	246	201	80	54.5	50.7	88	62.4	62.6	10.02	123.7	107.6
After 40 minutes	10:49	245	201	80	55.2	49.4	88	61.4	62.7	10.02	123.7	107.6
After 45 minutes	10:54	245	201	84	57.3	52.7	90	63.7	64.3	10.02	123.7	107.6
After 50 minutes	10:59	245	201	84	57.7	51.9	89	64.2	63.2	10.03	122.4	106.4
After 55 minutes	11:04	242	201	83	57.1	52	89	63.9	63.7	9.79	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	12:10	205	206
After 10 minutes	12:15	205	206
After 15 minutes	12:20	204	206
After 20 minutes	12:25	204	206
After 25 minutes	12:30	204	206
After 30 minutes	12:35	204	206
After 35 minutes	12:40	204	206
After 40 minutes	12:45	204	206
After 45 minutes	12:50	203	205
After 50 minutes	12:55	203	205
After 55 minutes	12:58	203	204

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	10:30	202	201	12.46	123.7	107.6
After 10 minutes	10:35	202	201	12.71	122.4	106.4
After 15 minutes	10:40	201	201	12.90	122.4	106.4
After 20 minutes	10:45	200	200	12.90	122.4	106.4
After 25 minutes	10:50	202	202	13.09	122.4	106.4
After 30 minutes	10:54	201	200	13.10	122.4	106.4
After 35 minutes	10:59	201	200	9.21	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:21	202	205
After 10 minutes	11:26	203	204
After 15 minutes	11:32	203	204
After 20 minutes	11:36	201	202
After 25 minutes	11:41	201	203
After 30 minutes	11:46	200	202

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 11-1 Operating parameters in the brackish water requirement (test cycle 1)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:02	245	202	63	39.8	33.9	72	47	45.6	10.09	122.4	106.4
After 10 minutes	10:07	245	202	63	38.9	35.1	70	45.9	45.3	11.11	122.4	106.4
After 15 minutes	10:12	244	202	63	38.4	35.1	71	45.9	46.1	11.12	122.4	106.4
After 20 minutes	10:17	244	201	63	38.9	35.2	72	46.6	46.1	11.13	123.7	107.6
After 25 minutes	10:22	244	200	63	40.1	35.9	72	46.3	46.4	11.13	122.4	106.4
After 30 minutes	10:27	250	205	67	42.3	38.3	75	48.8	49	11.13	122.4	106.4
After 35 minutes	10:32	250	204	67	42	37.9	75	49.6	48.9	11.13	122.4	106.4
After 40 minutes	10:37	248	205	66	42.1	38.4	76	49.4	49	10.86	122.4	106.4
After 45 minutes	10:42	248	204	66	42.3	39	76	49.1	48.9	10.86	122.4	106.4
After 50 minutes	10:47	247	204	67	42.8	37.8	75	50	49.7	10.85	123.7	107.6
After 55 minutes	10:51	247	203	67	42.4	38.1	75	50.2	48.1	10.85	122.4	106.4
After 62 minutes	10:58	247	202	70	46.1	41.4	78	53	51.6	10.16	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:44	205	207
After 10 minutes	11:49	205	207
After 15 minutes	11:54	204	206
After 20 minutes	11:59	203	205
After 25 minutes	12:04	204	205
After 30 minutes	12:09	203	204
After 35 minutes	12:14	202	204
After 40 minutes	12:19	202	204
After 45 minutes	12:24	201	203
After 50 minutes	12:29	201	203
After 55 minutes	12:34	201	203

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:41	204	203	11.14	122.3	106.3
After 10 minutes	9:46	203	203	11.16	123.7	107.6
After 15 minutes	9:51	204	203	11.18	123.7	107.6
After 20 minutes	9:56	204	202	11.18	122.4	106.4
After 25 minutes	10:01	204	203	11.18	123.7	107.6
After 30 minutes	10:06	202	202	11.19	123.7	107.6
After 34 minutes	10:10	203	202	9.42	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:44	202	203
After 10 minutes	10:49	202	203
After 15 minutes	10:55	201	203
After 20 minutes	11:00	202	204
After 25 minutes	11:05	202	204
After 30 minutes	11:09	209	210
After 34 minutes	11:13	205	205

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 11-2 Operating parameters in the brackish water requirement (test cycle 2)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	9:53	249	205	79	52.7	47.3	87	59.7	59	10.39	122.4	106.4
After 10 minutes	9:59	248	204	79	52.4	47.5	86	62	61.1	10.39	123.7	107.6
After 15 minutes	10:03	247	204	79	53.2	48.2	87	59.9	59	10.38	122.4	106.4
After 20 minutes	10:08	247	204	78	52.3	48	86	59.9	59.2	10.38	122.4	106.4
After 25 minutes	10:13	247	204	77	51.6	46.6	86	59.2	58.4	10.38	122.4	106.4
After 30 minutes	10:18	247	204	76	51.8	46.4	85	57.5	57	10.38	122.4	106.4
After 35 minutes	10:23	246	203	76	51.3	47	84	57.1	56.8	10.38	122.4	106.4
After 40 minutes	10:28	245	202	74	49.6	44.7	83	57.5	56	10.39	123.7	107.6
After 45 minutes	10:33	245	201	74	51.2	45.8	84	57.2	57.1	10.38	122.4	106.4
After 50 minutes	10:38	244	202	75	51	45.9	84	57.8	56.8	10.39	122.4	106.4
After 55 minutes	10:43	243	201	75	49.5	45.2	82	57	56	10.39	122.4	106.4
After 63 minutes	10:51	247	202	68	42.6	37.4	77	49.1	48.1	9.42	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:38	205	207
After 10 minutes	11:43	204	206
After 15 minutes	11:48	204	206
After 20 minutes	11:53	204	206
After 25 minutes	11:58	204	206
After 30 minutes	12:03	204	207
After 35 minutes	12:08	204	205
After 40 minutes	12:13	203	205
After 45 minutes	12:18	203	206
After 50 minutes	12:23	203	205
After 54 minutes	12:27	203	205

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:40	203	202	10.43	122.4	106.4
After 10 minutes	9:46	203	202	10.42	122.4	106.4
After 15 minutes	9:51	203	202	10.42	122.4	106.4
After 20 minutes	9:56	203	202	10.42	122.4	106.4
After 25 minutes	10:01	203	202	10.42	122.4	106.4
After 30 minutes	10:06	202	201	10.42	122.4	106.4
After 34 minutes	10:10	200	200	9.40	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:42	204	205
After 10 minutes	10:47	204	205
After 15 minutes	10:52	203	204
After 20 minutes	10:57	204	205
After 25 minutes	11:02	204	205
After 30 minutes	11:07	202	204

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 11-3 Operating parameters in the brackish water requirement (test cycle 3)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:07	250	201	76	49.5	44	84	56.8	56.3	10.22	122.4	106.4
After 10 minutes	10:11	249	204	77	51	45.6	86	57.7	56.9	10.22	122.4	106.4
After 15 minutes	10:16	249	204	77	49.7	44.7	85	57.7	57.3	10.22	122.4	106.4
After 20 minutes	10:21	249	205	76	49.8	44.6	85	58	57.3	10.22	122.4	106.4
After 25 minutes	10:26	249	204	77	51.4	46.4	86	58.5	58.2	10.22	122.4	106.4
After 30 minutes	10:31	248	203	77	50	45.7	86	58.4	58	10.23	123.7	107.6
After 35 minutes	10:36	249	202	78	51.1	46.2	85	58.1	57.3	10.22	122.4	106.4
After 40 minutes	10:42	247	202	78	52	47.7	86	59.1	58.9	10.22	122.4	106.4
After 45 minutes	10:46	247	203	78	52.4	47.9	87	58.5	58.1	10.22	122.4	106.4
After 50 minutes	10:51	247	202	80	54.1	49.3	87	59.1	58.7	10.23	122.4	106.4
After 55 minutes	10:56	247	202	80	53.5	49.4	87	57.5	57.4	10.20	122.4	106.4
After 62 minutes	11:03	240	202	79	54.6	50.1	87	61.2	60.9	8.67	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:49	202	205
After 10 minutes	11:54	202	205
After 15 minutes	11:58	202	204
After 20 minutes	12:03	203	205
After 25 minutes	12:08	201	204
After 30 minutes	12:13	201	204
After 35 minutes	12:18	201	203
After 40 minutes	12:23	201	203
After 45 minutes	12:28	201	203
After 50 minutes	12:33	201	203
After 55 minutes	12:39	201	202
After 61 minutes	12:45	204	206

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:23	206	205	10.95	123.7	107.6
After 10 minutes	9:28	204	203	10.95	123.7	107.6
After 15 minutes	9:33	205	204	10.95	123.7	107.6
After 20 minutes	9:39	205	204	11.13	123.7	107.6
After 25 minutes	9:43	204	203	11.14	123.7	107.6
After 30 minutes	9:48	203	201	11.34	123.7	107.6
After 35 minutes	9:53	203	201	8.65	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:12	205	207
After 10 minutes	10:17	205	207
After 15 minutes	10:22	205	207
After 20 minutes	10:27	204	206
After 25 minutes	10:32	204	206
After 30 minutes	10:36	202	203
After 34 minutes	10:40	202	203

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 11-4 Operating parameters in the brackish water requirement (test cycle 4)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	9:53	246	202	68	43.5	38.8	77	51	50.3	9.7	122.4	106.4
After 10 minutes	9:58	245	201	70	44.4	39	78	51.3	50.5	9.7	122.4	106.4
After 15 minutes	10:03	244	203	69	42.5	37.5	77	50.7	50.1	9.71	122.4	106.4
After 20 minutes	10:08	244	202	67	42.8	37.4	75	49.9	49.4	9.71	122.4	106.4
After 25 minutes	10:13	243	202	67	41.3	36.4	75	49.9	49.4	9.71	122.4	106.4
After 30 minutes	10:18	246	204	68	42.8	37.4	76	50	49.4	9.71	122.4	106.4
After 35 minutes	10:23	246	204	68	42.6	37	76	50.1	49.3	9.72	122.4	106.4
After 40 minutes	10:28	245	203	67	41.9	36.1	76	48.9	48.6	9.72	122.4	106.4
After 45 minutes	10:33	245	202	68	42.4	37	75	50	49	9.72	122.4	106.4
After 50 minutes	10:38	243	203	68	42.7	37.4	77	50.1	49.4	9.72	122.4	106.4
After 57 minutes	10:45	246	203	60	35	29.3	69	42.3	40.9	8.83	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 2-1 Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.

UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	11:29	202	204
After 10 minutes	11:34	202	204
After 15 minutes	11:39	202	204
After 20 minutes	11:44	201	204
After 25 minutes	11:49	202	204
After 30 minutes	11:54	202	204
After 35 minutes	11:59	201	203
After 40 minutes	12:04	201	203
After 45 minutes	12:09	202	203
After 50 minutes	12:14	200	202
After 55 minutes	12:18	201	202
After 60 minutes	12:23	205	206

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	8:22	203	202	11.21	122.4	106.4
After 10 minutes	8:27	203	202	11.21	122.4	106.4
After 15 minutes	8:32	203	202	11.21	122.4	106.4
After 20 minutes	8:37	203	202	11.20	122.4	106.4
After 25 minutes	8:42	203	202	11.20	122.4	106.4
After 30 minutes	8:47	201	200	11.20	122.4	106.4
After 34 minutes	8:51	200	200	9:40	122.4	106.4

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.

UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	9:13	204	205
After 10 minutes	9:18	204	205
After 15 minutes	9:23	203	205
After 20 minutes	9:28	203	205
After 25 minutes	9:33	203	205
After 30 minutes	9:38	201	203
After 34 minutes	9:42	201	203

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Table 11-5 Operating parameters in the brackish water requirement (test cycle 5)

During ballasting: treated water

Elapsed time	Time	Flow rate		Pressure						Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]	Unit 1 inlet [kPa]	Unit 1 inside [kPa]	Unit 1 outlet [kPa]	Unit 2 inlet [kPa]	Unit 2 inside [kPa]	Unit 2 outlet [kPa]			
After 5 minutes	10:46	246	203	62	38	31.6	70	44.3	43.7	10.75	123.7	107.6
After 10 minutes	10:51	245	202	64	38.8	30.4	71	44	44	10.75	123.7	107.6
After 15 minutes	10:56	244	202	61	36.6	30.1	69	43.7	43	10.77	123.7	107.6
After 20 minutes	11:01	244	201	61	35.1	30	69	42.5	42.7	10.77	123.7	107.6
After 25 minutes	11:07	244	201	60	35.8	31.4	68	42.5	41.7	10.78	123.7	107.6
After 30 minutes	11:11	244	202	58	34.7	28.8	67	40	41.6	10.78	123.7	107.6
After 35 minutes	11:16	243	202	58	33.3	27.6	65	40.3	40.4	10.78	123.7	107.6
After 40 minutes	11:21	242	201	56	32.9	27.5	66	39.5	38	10.79	123.7	107.6
After 45 minutes	11:26	242	201	56	32.5	26.9	65	38.3	39	10.79	123.7	107.6
After 50 minutes	11:31	241	201	56	32.3	27.1	65	39.7	38.1	10.79	123.7	107.6
After 55 minutes	11:36	241	201	55	31.9	26.3	64	39.4	38.6	10.79	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	12:28	207	208
After 10 minutes	12:32	206	207
After 15 minutes	12:38	206	207
After 20 minutes	12:43	206	207
After 25 minutes	12:49	207	207
After 30 minutes	12:54	207	207
After 35 minutes	12:59	206	206
After 40 minutes	13:03	206	207
After 45 minutes	13:08	205	207
After 50 minutes	13:13	205	207

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

During de-ballasting: treated water

Elapsed time	Time	Flow rate		Power consumption of UV unit [kW]	UV intensity [W/m^2]	UV dose [mJ/cm^2]
		Inlet [m^3/h]	Outlet [m^3/h]			
After 5 minutes	9:39	203	203	12.71	123.7	107.6
After 10 minutes	9:44	204	203	12.91	123.7	107.6
After 15 minutes	9:49	203	203	12.92	123.7	107.6
After 20 minutes	9:54	202	202	12.94	123.7	107.6
After 25 minutes	9:59	204	203	12.94	123.7	107.6
After 30 minutes	10:04	203	202	13.12	123.7	107.6
After 34 minutes	10:08	202	201	8.67	123.7	107.6

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.
Pressure: measured at the inlet, the inside and the outlet of the 2 filter units.
UV intensity: measured by 3 UV sensors installed in the UV reactor.

During de-ballasting: control water

Elapsed time	Time	Flow rate	
		Inlet [m^3/h]	Outlet [m^3/h]
After 5 minutes	10:32	204	207
After 10 minutes	10:37	205	206
After 15 minutes	10:42	204	206
After 20 minutes	10:48	203	205
After 25 minutes	10:52	204	206
After 30 minutes	10:57	203	205
After 36 minutes	11:03	202	204

Flow rate: measured at the inlet and the outlet of the system. The difference of flow rate between inlet and outlet is an amount of un-treated water used for the cleaning of the filter unit.

Annexes

Annex 1 Analysis of L size group

Annex 2 Analysis of S size group

Annex 1 Analysis of L size group

- Seawater test cycle 1

Date of test	Oct. 28, 2011									Nov. 2, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	20	25	22.5	30	30	32.5	28	20	20	37.5	45	47.5	29	30	30
Amount of test water (ml)	20	25	22.5	30	30	32.5	28	20	20	37.5	45	47.5	29	30	30
Number of organisms															
HETEROKONTOPHYTA															
Stephanopyxis spp.				24	6										
PROTOZOA															
Ciliata		3	25			11									
Radiolaria		3	1												
Tintinnopsis spp.			113			356									
CNIDARIA															
Planula larva				1											
PLATYHELWINTHES															
Larva of Turbellaria	9	4	4	7	11					1,138	212	617			
NEMERTINEA															
Pilidium larva				8	4										
ROTIFERA															
Brachionus spp.	2,248	2,891	2,840	3,520	3,902	3,965	1		1	23,075	17,850	21,137			
Synchaeta spp.											226	22			
MOLLUSCA															
Larva of Gastropoda	2	35	11	8	7	3				6		14			
Larva of Bivalvia	2	28	7		1	7				285	54	1,662		1	3
ANNELIDA															
Larva of Polychaeta	6	27	52	9	6	10				71	637	237			
ARTHROPODA															
Acartia spp.	1		91	1		125				364	25	142			
Acartia copepodite	1				6										
Acrocalanus spp.				1											
Acrocalanus copepodite	1														
Corycaeus spp.			54			5				655	126	237			
Euterpina acutifrons					2										
Euterpina copepodite	2	2			1										
Harpacticoida	1	3	122			33				650	425	285			
Microsetella spp.	8	6	2	8	5	3						4			
Oithona attenuate	2			2	3										
Oithona brevicornis	25			26	13										
Oithona davisae	88			53	47										
Oithona nana				1											
Oithona similis					1										
Oithona spp.		115	720	1,248	1,166	746				51,025	45,088	26,362			
Oithona copepodite	1,392	653													
Oncaea spp.				1											
Paracalanus crassirostris	83		44	50											

Paracalanus parvus	1		4	2											
Paracalanus spp.		23								19	6	21			
Paracalanus copepodite	72	127		76	111										
Poecilostomatoida	2	3			2										
Pseudodiaptomus copepodite					1										
Temora turbinate				1											
Temora copepodite					1										
Nauplius of Copepoda	1,328	1,380	1,170	1,424	951	1,267			1	10,076	5,124	4,987			
Nauplius of Cirripedia	4	3	3	7	2	2				38	6	191			
Cypris of Cirripedia										17	8	21			
Zoea of Decapoda	5		2									3			
PHORONIDA															
Actinotrocha larva			7												
CHAETOGNATHA															
Sagitta spp.	9	8	7	9	6	3				37	15	20			
Unknown															
Trochophora larva				1											
Number of taxon (m^{-3})	6	7	8	10	8	6	1	0	2	6	6	6	0	1	1
Number of species (m^{-3})	23	18	18	24	25	14	1	0	2	14	14	17	0	1	1
Total (m^{-3})	264,600	265,700	261,550	324,200	315,350	326,800	1	0	2	87,456	69,802	55,962	0	1	3

- Seawater test cycle 2

Date of test	Nov. 4, 2011									Nov. 9, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	30	20	22.5	25	27.5	22.5	20	20	20	35	38	37	30	35	33
Amount of test water (ml)	30	20	22.5	25	27.5	22.5	20	20	20	35	38	37	30	35	33
Number of organisms															
DINOPHYTA															
Dinphysis spp.					3										
HETEROKONTOPHYTA															
Coscinodiscus spp.						1									
Ditylum spp.	2	4	5	5	2										
Stephanopyxis spp.				12	12	14				30					
PROTOZOA															
Ciliata	2											4			
Codonellopsis spp.						1									
Radiolaria	4	1	1												
Tintinnopsis spp.						10									
PLATYHELWINTHES															
Larva of Turbellaria	7	35	22	246	41	20				139	286	190			
ROTIFERA															
Brachionus spp.	510	533	579	35	113	28				4	36	169			
Synchaeta spp.	2		1	1		1						2			
MOLLUSCA															
Larva of Gastropoda	1	3	7	1	1	5						1		1	
Larva of Bivalvia	43	260	122	220	453	540				2	3		1	1	1
ANNELIDA															
Larva of Polychaeta		3	2	11	11	2				4	5	6			
ARTHROPODA															
Penilia avirostris	1														
Acartia spp.		2		7	2	5				2	1	2			
Acartia copepodite		1	1												
Corycaeus copepodite												1			
Euterpina acutifrons											1	1			
Euterpina copepodite			1												
Harpacticoida				16	6	23									
Microsetella spp.		1		4	3	8									
Oithona attenuate										13	5	5			
Oithona brevicornis										86	182	52			
Oithona davisae										468	619	675			
Oithona spp.	51	39	65	1,325	756	697									
Oithona copepodite	514	456	493							8,528	7,245	9,262			
Oncaea copepodite	1														
Paracalanus crassirostris										155	78	121			
Paracalanus spp.	15	17	25	11		6									
Paracalanus copepodite	102	50	81							86	52	43			
Poecilostomatoida	2	2	1							121	92	86			
Pseudodiaptomus marinus												1			
Pseudodiaptomus copepodite										3	2				
Temora copepodite										1	1				
Nauplius of Copepoda	948	568	631	743	412	303				1,664	2,479	1,987			

Nauplius of Cirripedia	17	29	16	10	6	4				23	15	5			
Cypris of Cirripedia					1						1	1			
Zoea of Decapoda	1	2	1	3		2									
Mysis of Decapoda		1													
PHORONIDA															
Actinotrocha larva		2	1												
CHAETOGNATHA															
Sagitta spp.	3	2	1	1	1	2				7	6	9			
CHORDATA															
Appendicularia larva	1														
Number of taxon (m^{-3})	8	9	9	7	8	8	0	0	0	7	6	7	1	1	1
Number of species (m^{-3})	20	21	20	17	16	19	0	0	0	18	19	21	1	2	2
Total (m^{-3})	111,350	100,550	102,800	132,550	91,150	83,600	0	0	0	11,336	11,109	12,623	1	2	1

- Seawater test cycle 3

Date of test	Nov. 14, 2011									Nov. 19, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	25	22.5	27.5	25	25	25	30	30	30	32.5	35	37	20	20	22
Amount of test water (ml)	25	22.5	27.5	25	25	25	30	30	30	32.5	35	37	20	20	22
Number of organisms															
HETEROKONTOPHYTA															
Coscinodiscus spp.						2									
Ditylum spp.	70	63	47	104	76	83									
Guinardia spp.				55	91	68									
Stephanopyxis spp.	20	31	19	340	121	205					1				
CNIDARIA															
Planula larva	2	2								32	18				
PLATYHELWINTHES															
Larva of Turbellaria					1	2				62	40	97			
NEMERTINEA															
Pilidium larva															
ROTIFERA				3											
Brachionus spp.	11,880	9,651	8,272	6,032	5,217	6,669			1	51	46	14			
Synchaeta spp.										2					
Trichocerca spp.						1									
MOLLUSCA															
Larva of Gastropoda	1	5	10		1							6			
Larva of Bivalvia	27	43	66	2		2			1	68	91				
ANNELIDA															
Larva of Polychaeta	4		14		2	1				52	126	46			
ARTHROPODA															
Penilia avirostris		2								5	5				
Acartia spp.	1		1	4	1	4				52	35	26			
Acartia copepodite		3	6		2					175	112	94			
Centropages copepodite										1					
Corycaeus spp.										1	5				
Corycaeuss copepodite	2			1	3	1				10	11				
Euterpina acutifrons										70	63	50			
Euterpina copepodite	1	1	2		2	3				214	147	220			
Harpacticoida		1								121	85	94			
Microsetella spp.	1	2	5	5	5	9				2	3				
Microsetella copepodite	1														
Oithona attenuate				1	2	3									
Oithona brevicornis				47	26	82									
Oithona davisae				5	3										
Oithona spp.	89	81	88							825	1,043	1,241			
Oithona copepodite	610	371	297	494	565	667				6,176	8,217	8,970			
Oncaea spp.						1									
Oncaea copepodite		1			1						1				
Paracalanus crassirostris					1	1									
Paracalanus parvus				1											
Paracalanus spp.	13	6	5							72	51	91			
Paracalanus copepodite	45	41	39	7	10	3				455	385	358			
Poecilostomatoida			3	3	3	2				28	19	14			

Temora spp.										1					
Temora copepodite										4	1	2			
Tortanus spp.										4	4				
Tortanus copepodite										9	13	5			
Nauplius of Copepoda	1,042	463	473	1,196	938	914				17,026	12,148	16,185			
Nauplius of Cirripedia	16	26	33	27	19	11				286	183	118			
Mysidacea												2			
Amphipoda										1					
Zoea of Decapoda	1	1								1	1				
Mysis of Decapoda															
PHORONIDA															
Actinotrocha larva												11			
CHAETOGNATHA															
Sagitta spp.	1	1	3		1					9	2	3			
Number of taxon (m^{-3})	7	6	6	5	7	6	0	0	2	7	8	7	0	0	0
Number of species (m^{-3})	20	20	19	18	23	22	0	0	2	30	29	21	0	0	0
Total (m^{-3})	691,350	539,750	469,200	416,350	354,550	436,700	0	0	2	25,815	22,857	27,647	0	0	0

- Seawater test cycle 4

Date of test	Nov. 21, 2011									Nov. 26, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	25	30	25	25	25	25	10	10	15	27.5	30	32.5	17.5	22.5	17.5
Amount of test water (ml)	25	30	25	25	25	25	10	10	15	27.5	30	32.5	17.5	22.5	17.5
Number of organisms															
HETEROKONTOPHYTA															
Ditylum spp.		2		5		8									
Stephanopyxis spp.	3	6	2	10	5	10				15					
PROTOZOA															
Ciliata	6	5	5		13	5									
Favella spp.	2				3							11			
Radiolaria		3		9		6									
Tintinnopsis spp.	23	6	9	9	8	9									
PLATYHELWINTHES															
Larva of Turbellaria	3									10	26	4			
ROTIFERA															
Brachionus spp.	9,405	9,144	6,705	4,463	8,694	4,240	1	1		16,960	29,312	79,170			
Synchaeta spp.				4						17	7	37			
MOLLUSCA															
Larva of Gastropoda				2		1					6				
Larva of Bivalvia	113	246	25	219	346	235				2	4	36			
ANNELIDA															
Larva of Polychaeta	7	2	4	4	2	4				80	36	25			
ARTHROPODA															
Penilia avirostris				1											
Acartia spp.	21	2	2	1						16	5	230			
Acartia copepodite		4		1		1				62	58				
Acrocalanus spp.										5					
Acrocalanus copepodite										9	3				
Corycaeus spp.	4		2												
Euterpina acutifrons										11					
Euterpina copepodite											8				
Harpacticoida										13	25	133			
Microsetella spp.	3	1	2	1	3					2		2			
Microsetella copepodite				1											
Oithona attenuate										29	8				
Oithona brevicornis										144	61				
Oithona davisae										304	272				
Oithona spp.	93	32	52	90	42	35						1,332	1		
Oithona copepodite		90		175		165				1,760	864				
Paracalanus crassirostris										11					
Paracalanus parvus										5					
Paracalanus spp.	13	2	2	2	2	1						65			
Paracalanus copepodite				19		4				96	47				
Poecilostomatoida		2									79				
Pseudodiaptomus copepodite											5				
Sinocalanus tenellus										1					
Tortanus copepodite		1								1					
Nauplius of Copepoda	67	184	13	622	9	365				17,856	11,904	3,705			

Nauplius of Cirripedia		4		1	6	4				112	82	292	1		
Cypris of Cirripedia										1					
Isopoda		1													
CHAETOGNATHA															
Sagitta spp.	2	2		3		4				3	2				
Unknown															
Trochophora larva											1				
Number of taxon (m^{-3})	8	7	6	7	6	7	1	1	0	7	7	6	1	0	0
Number of species (m^{-3})	15	20	12	21	12	17	1	1	0	26	22	13	2	0	0
Total (m^{-3})	488,250	486,950	341,150	282,100	456,650	254,850	1	1	0	37,525	42,815	85,042	2	0	0

- Seawater test cycle 5

Date of test	Nov. 23, 2011									Nov. 28. 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	21.5	25	22.5	20	20	32.5	15	12.5	15	34	32	31.5	17.5	15	12.5
Amount of test water (ml)	21.5	25	22.5	20	20	32.5	15	12.5	15	34	32	31.5	17.5	15	12.5
Number of organisms															
HETEROKONTOPHYTA															
Stephanopyxis spp.	1		3	3	4	1									
PROTOZOA															
Ciliata						6				5		16			
Radiolaria			1	16	6	1									
Tintinnopsis spp.	6	2				2									
CNIDARIA															
Planula larva			1	1	2										
PLATYHELWINTHES															
Larva of Turbellaria										37	46	6			
ROTIFERA															
Brachionus spp.	6,256	6,426	5,036	8,687	7,649	8,060	1			3,584	7,552	3,213			
Synchaeta spp.			2									2			
MOLLUSCA															
Larva of Gastropoda	2		2			3						2			
Larva of Bivalvia	42	126	90	204	180	132				2	2	12			
ANNELIDA															
Larva of Polychaeta	1	12	9	13	8					36	48	19			
ARTHROPODA															
Penilia avirostris				1											
Acartia spp.	32	23	14	13	11	21				512	416	756			
Acartia copepodite		61	72	104	51					98	20				
Acrocalanus spp.										3	5				
Acrocalanus copepodite											3				
Corycaeus affinis										1					
Corycaeuss copepodite											1				
Euterpina acutifrons										41	16				
Euterpina copepodite				4	3										
Harpacticoida	3			1	1					19		346			
Microsetella spp.												2			
Microsetella copepodite				1											
Oithona attenuate										64					
Oithona brevicornis										704	384				
Oithona davisae										448	370				
Oithona spp.	215	56	76	72	52	228						3,339			
Oithona copepodite		315	180	260	256					5,152	8,448				
Paracalanus crassirostris										238	96				
Paracalanus parvus											1				
Paracalanus spp.	4	11	21	20	23	4						94			
Paracalanus copepodite		40	61	138	61					110	32				
Poecilostomatoida				1	1					46	22				
Pseudodiaptomus copepodite										5	7				
Temora copepodite		1	1												
Tortanus copepodite											1				

Nauplius of Copepoda	581	662	864	1,408	1,693	942				31,104	41,216	29,673			
Nauplius of Cirripedia	13	21	32	21	26	4				384	440	535			
Zoea of Decapoda												1			
CHAETOGNATHA															
Sagitta spp.	2		1	1	5	1				1	2				
CHORDATA															
Appendicularia larva						1									
Number of taxon (m^{-3})	7	5	8	8	8	7	1	0	0	7	6	6	0	0	0
Number of species (m^{-3})	13	13	18	20	18	14	1	0	0	22	22	15	0	0	0
Total (m^{-3})	357,900	387,800	323,300	548,450	501,600	470,300	1	0	0	42,594	59,128	38,016	0	0	0

- Seawater test cycle 6

Date of test	Dec. 2, 2011									Dec. 7, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	20	22.5	22.5	31.5	37.5	22.5	17.5	15	12.5	32.5	32.5	30	22.5	20	25
Amount of test water (ml)	20	22.5	22.5	31.5	37.5	22.5	17.5	15	12.5	32.5	32.5	30	22.5	20	25
Number of organisms															
HETEROKONTOPHYTA															
Ditylum spp.	1														
Stephanopyxis spp.	1	1	3	4		2									
PROTOZOA															
Ciliata	2	2		31	6						22				
Favella ssp.					2					3					
Tintinnopsis spp.	2	1	2	10											
CNIDARIA															
Planula larva	1	1								2		2			
PLATYHELWINTHES															
Larva of Turbellaria		2		5	2	2					14	1			
ROTIFERA															
Brachionus spp.	5,383	5,908	4,897	6,552	9,037	6,615		6	1	1,859	3,640	4,680			
Synchaeta ssp.	268	223	315	63	272	112				87,882	62,790	62,790			
MOLLUSCA															
Larva of Gastropoda	1	3		2	3	4				5	2	4			
Larva of Bivalvia	297	147	405	126	104	427				1,236	1,007	1,106		1	
ANNELIDA															
Larva of Polychaeta	3	7	6	11	4	4				104	61	47			
ARTHROPODA															
Acartia spp.	4	2	1	2		7				143	133	26			
Acartia copepodite	31	6	4							325		183			
Euterpina acutifrons										37		49			
Euterpina copepodite	10	2	1							156		192			
Harpacticoida		1	1	126	112	135				117	521	148			
Microsetella spp.											3				
Microsetella copepodite		1													
Oithona spp.	39	36	18	315	187	225				1,129	5,232	712			
Oithona copepodite	468	343	121							9,943		13,627			
Paracalanus spp.	1	3		7	75	2				11	11	5			
Paracalanus copepodite	5	12	1							95		33			
Poecilostomatoida		1	1							3		3			
Temora copepodite										3					
Nauplius of Copepoda	949	663	922	472	525	607				10,491	7,377	16,770			
Nauplius of Cirripedia	60	47	47	6	32	16				1,755	1,560	990			
Isopoda			1												
Amphipoda					1										
CHAETOGNATHA															
Sagitta spp.	2		1		1										
Number of taxon (m^{-3})	8	8	7	7	7	6	0	1	1	6	6	6	0	1	0
Number of species (m^{-3})	20	22	18	15	15	13	0	1	1	20	14	19	0	1	0
Total (m^{-3})	376,400	370,600	337,350	386,600	518,150	407,900	0	6	1	115,299	82,373	101,368	0	1	0

- Brackish water test cycle 1

Date of test	Dec. 9, 2011									Dec. 14, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	26	26	22.5	21.5	17.5	21.5	17.5	17.5	17.5	22	27.5	28	20	23	24
Amount of test water (ml)	26	26	22.5	21.5	17.5	21.5	17.5	17.5	17.5	22	27.5	28	20	23	24
Number of organisms													N.D.	N.D.	N.D.
HETEROKONTOPHYTA															
Odontella spp.										2					
Stephanopyxis spp.		1		3	6	3									
PROTOZOA															
Ciliata											26				
Favella spp.			1	1											
Tintinnopsis spp.											2				
PLATYHELWINTHES															
Larva of Turbellaria				2		1				5	2				
ROTIFERA															
Brachionus spp.	5,678	6,084	6,547	5,418	5,040	6,041				6,208	20,501	12,928			
Synchaeta spp.	6	4		43	6	3				49	27	95			
MOLLUSCA															
Larva of Gastropoda					1										
Larva of Bivalvia	16	13	65	3	4	9					26	1			
ANNELIDA															
Larva of Polychaeta	2	2	2		1	1					9				
ARTHROPODA															
Acartia spp.				2							11				
Acartia copepodite	1	1	1							1		3			
Acrocalanus copepodite										1					
Corycaeus copepodite			1												
Euterpina acutifrons										2		9			
Euterpina copepodite	7	4	2							5		18			
Harpacticoida	2		1	3		1				3	11	1			
Oithona brevicornis										21		13			
Oithona davisae										85		160			
Oithona spp.	6	13	3	32	71	107					772				
Oithona copepodite	103	72	29							960		1,568			
Paracalanus crassirostris										1		3			
Paracalanus spp.		1	1												
Paracalanus copepodite	4	3	2							2		2			
Poecilostomatoida	1	1								3					
Pseudodiaptomus copepodite	1														
Nauplius of Copepoda	135	208	68	151	105	129				6,112	1,282	4,802			
Nauplius of Cirripedia	7	22	32	11	7	12				134	71	108			
Number of taxon (m^{-3})	4	5	5	6	5	6	0	0	0	4	6	3	0	0	0
Number of species (m^{-3})	14	14	14	11	9	10	0	0	0	17	12	14	0	0	0
Total (m^{-3})	298,450	321,450	337,750	283,450	262,050	315,350	0	0	0	13,594	22,740	19,711	0	0	0

- Brackish water test cycle 2

Date of test	Dec. 11, 2011									Dec. 16, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	22.5	21.5	20	27.5	21.5	27.5	25	20	22	22.5	24	27.5	35	30	27
Amount of test water (ml)	22.5	21.5	20	27.5	21.5	27.5	25	20	22	22.5	24	27.5	35	30	27
Number of organisms															
HETEROKONTOPHYTA															
Coscinodiscus spp.											2				
Odontella spp.			2												
Stephanopyxis spp.	3	7	3	4	3	1				4		3			
PROTOZOA															
Ciliata	18	43	48	8	107	82				4		3			
Tintinnopsis spp.				2											
PLATYHELWINTHES															
Larva of Turbellaria										1		3			
ROTIFERA															
Brachionus spp.	4,172	3,956	3,224	4,592	5,439	4,207				19,372	30,378	38,115	1	2	
Synchaeta spp.	8	7	2		7					247	213	52			
MOLLUSCA															
Larva of Bivalvia	4	16	10	13	21	7				135	8	14			
ANNELIDA															
Larva of Polychaeta	1		1	1		2				2	6	6			
ARTHROPODA															
Acartia spp.		2		3	7	2				6		5			
Acartia copepodite											5				
Corycaeus copepodite											2				
Euterpina acutifrons											10				
Euterpina copepodite											61				
Harpacticoida		5		1	4	5				19	30	39			
Oithona brevicornis											7				
Oithona davisae											66				
Oithona spp.	12	173	7	73	86	54	1			562	640	220			
Oithona copepodite	65		48												
Paracalanus crassirostris											2				
Paracalanus parvus											4				
Paracalanus spp.				1						6		2			
Paracalanus copepodite	6		3								27				
Poecilostomatoida											6				
Nauplius of Copepoda	261	88	104	192	172	220				2,137	6,016	1,815		1	
Nauplius of Cirripedia	1		1		3					12	21	14			
Number of taxon (m^{-3})	6	5	6	6	5	6	1	0	0	7	5	7	1	2	0
Number of species (m^{-3})	12	9	13	11	10	9	1	0	0	13	19	13	1	2	0
Total (m^{-3})	227,750	214,850	173,000	244,500	292,450	229,000	1	0	0	22,507	37,504	40,291	1	3	0

- Brackish water test cycle 3

Date of test	Dec. 18, 2011									Dec. 23, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	20	17.5	27.5	21.5	22.5	22.5	15	12.5	17.5	25	26	25	20	20	20
Amount of test water (ml)	20	17.5	27.5	21.5	22.5	22.5	15	12.5	17.5	25	26	25	20	20	20
Number of organisms	20	17.5	27.5	21.5	22.5	22.5	15	12.5	17.5	25	26	25	20	20	20
HETEROKONTOPHYTA															
Coscinodiscus spp.											2				
Ditylum spp.		1													
Odontella spp.	3	1			2										
Stephanopyxis spp.	2		5	2	5	6				1					
PROTOZOA															
Ciliata	11	5	8	43	12	45					26				
Favella spp.										2	1				
Tintinnopsis spp.										4	6	5			
PLATYHELWINTHES															
Larva of Turbellaria		1		1	2					2	3	3			
ROTIFERA															
Brachionus spp.	5,088	5,280	6,297	5,504	6,637	6,097				3,114	3,224	2,943			
Synchaeta spp.	5	8	8	4	3	5				23	96	47			
MOLLUSCA															
Larva of Bivalvia	2	1	2	2	4					3	3	2			
ANNELIDA															
Larva of Polychaeta			2							2		1			
ARTHROPODA															
Acartia spp.			5	4	2	7					10				
Acartia copepodite										2		1			
Corycaeus spp.										1		2			
Eurytemora spp.										1					
Euterpina acutifrons										1					
Euterpina copepodite	3									3		1			
Harpacticoida					4	1					6				
Oithona spp.	3	4	7	129	16	9				5	104	10			
Oithona copepodite	32	12								68		106			
Paracalanus spp.			1	1	1						3	1			
Paracalanus copepodite	2	1									8	9			
Poecilostomatoida												5			
Nauplius of Copepoda	88	97	165	344	202	315				365	442	527		1	1
Nauplius of Cirripedia	6	3	9	6	7	2				47	47	111			
Number of taxon (m^{-3})	5	6	6	6	6	4	0	0	0	7	6	6	0	1	1
Number of species (m^{-3})	12	12	11	11	13	9	0	0	0	18	14	16	0	1	1
Total (m^{-3})	262,250	270,700	325,450	302,000	344,850	324,350	0	0	0	3,652	3,973	3,774	0	1	1

- Brackish water test cycle 4

Date of test	Dec. 21, 2011									Dec. 26, 2011					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	27.5	32.5	31.5	17.5	27.5	22.5	17.5	17.5	15	26	28	28	12.5	15	20
Amount of test water (ml)	27.5	32.5	31.5	17.5	27.5	22.5	17.5	17.5	15	26	28	28	12.5	15	20
Number of organisms															
HETEROKONTOPHYTA															
Coscinodiscus spp.		1		3		2				42	3				
Ditylum spp.	2	4								6	2				
Odontella spp.	2	1	1	2						42	2	1			
Stephanopyxis spp.	4	2	2	14	2	3				39	23	4			
PROTOZOA															
Ciliata			2			91					1	4			
Favella spp.	2			3								2			
Tintinnopsis spp.	77	52	31	122	22	8						7			
PLATYHELWINTHES															
Larva of Turbellaria				1		1						4			
ROTIFERA															
Brachionus spp.	7,713	8,177	8,442	5,180	8,140	5,490				2,886	12,352	7,224			
Synchaeta spp.	33	39	5	9	2	7				144	112	126			
MOLLUSCA															
Larva of Bivalvia	1	3	1	1			2			3	2	8			
ANNELIDA															
Larva of Polychaeta	1	1								2	3	3			
ARTHROPODA															
Acartia spp.				2	2	2					1	12			
Acartia copepodite	3	1								11	3				
Corycaeus copepodite										4	3				
Euterpina copepodite	6											5		1	
Harpacticoida															
Microsetella spp.										5					
Oithona davisae										31	29				
Oithona spp.	4	4	63	9	3	7						224	2		1
Oithona copepodite	10	21								258	241				
Paracalanus crassirostris										3	1				
Paracalanus parvus										2	1				
Paracalanus spp.			6	1								2			
Paracalanus copepodite	7	4								36	14				
Poecilostomatoida										2	2				
Nauplius of Copepoda	55	78	13	20	137	10				2,210	1,312	868	2	1	
Nauplius of Cirripedia	6	10	3	1	5	3				95	49	24			
Isopoda											1				
Number of taxon (m^{-3})	6	6	5	6	4	6	0	0	0	5	6	7	1	1	1
Number of species (m^{-3})	16	15	11	14	8	12	0	0	0	19	21	16	2	2	1
Total (m^{-3})	396,300	419,900	428,450	268,400	415,650	281,300	0	0	0	5,821	14,157	8,518	4	2	1

- Brackish water test cycle 5

Date of test	Jan. 21, 2012									Jan. 26, 2012					
Sample water	During ballasting									During de-ballasting					
	Control water			Before treatment			Immediately after treatment			Control water			Treated water		
	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End	Beg	Mid	End
Amount of sample water (m^3)	0.02			0.02			1			1			1		
Amount of concentrated water (ml)	27.5	18.5	35	34	28.5	31	15	17.5	17.5	25	30	35	15	17.5	17.5
Amount of test water (ml)	27.5	18.5	35	34	28.5	31	15	17.5	17.5	25	30	35	15	17.5	17.5
Number of organisms															
HETEROKONTOPHYTA															
Coscinodiscus spp.	10	2	1	1	2	5					4	7			
Ditylum spp.												1			
PROTOZOA															
Ciliata						5									
Favella spp.	2	2								1					
Tintinnopsis spp.	8					5				19	13				
PLATYHELWINTHES															
Larva of Turbellaria										1	4	1			
ROTIFERA															
Brachionus spp.	4,152	5,231	5,069	4,692	5,386	5,983				1,371	2,760	2,940			
ANNELIDA															
Larva of Polychaeta										1					
ARTHROPODA															
Podon spp.			1	1	1					45	6	3			
Acartia spp.	67	1	1			11				48	30	182			
Acartia copepodite		27	27	18	6					205	168				
Centropages spp.										1					
Corycaeus spp.												2			
Corycaeus copepodite			1												
Harpacticoida	2					1									
Oithona brevicornis		2	13		3	5									
Oithona davisae		13		3	5										
Oithona spp.	51		10				22			83	96	385			
Oithona copepodite		26	18	5	2					231	170				
Oncaea spp.										1					
Paracalanusparvus		1													
Paracalanus spp.	7									4	5	35			
Paracalanus copepodite		4	3	1	1					36	27				
Poecilostomatoida										1	1				
Pseudodiaptomus copepodite										2	1				
Nauplius of Copepoda	20	52	112	31	19	12				1,120	1,420	3,045			
Number of taxon (m^{-3})	4	4	3	3	3	4	0	0	0	5	5	4	0	0	0
Number of species (m^{-3})	9	11	10	8	8	8	0	0	0	17	14	10	0	0	0
Total (m^{-3})	215,950	268,050	262,150	237,600	271,100	302,200	0	0	0	3,170	4,705	6,601	0	0	0

Annex 2　Analysis of S size group

Seawater test cycle1

試験日 Date	2011/10/28																										
試験名 test	Seawater ①																										海ー①
サンプル名 sample	Control water									Before treatment									Immediatly after treatment								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(孝)	岩木		堤(孝)	岩木		堤(孝)	岩木		小島	小島		小島	小島		小島	小島		堤(孝)	堤(孝)		堤(孝)	堤(孝)		堤(孝)	堤(孝)	
DINOPHYTA																											
Ceratium fusus		1	0.01																								
Gyrodinium spp.		2	0.02					1	0.01					1	0.01												
Heterocapsa triquetra								1	0.01																		
Peridiniales																											
Protoperidinium spp.											1	0.01					1	0.01									
HETEROKONTOPHYTA																											
Amphiprora sp.																											
Asterionella gracillima											8	0.08		4	0.04		6	0.06									
Bacteriastrum spp.		18	0.18		4	0.04																					
Cerataulina daemon		21	0.21		14	0.14		7	0.07		23	0.23		25	0.25												
Chaetoceros compressum		16	0.16		4	0.04		11	0.11					16	0.16												
Chaetoceros curvisetum								4	0.04																		
Chaetoceros lorenzianum					6	0.06		4	0.04																		
Chaetoceros pseudocurvisetum		122	1.22		81	0.81		78	0.78		110	1.10		129	1.29		92	0.92									
Chaetoceros spp.		10	0.10		4	0.04					35	0.35		11	0.11		12	0.12									
Coscinodiscus spp.		4	0.04																								
Detonula pumila		83	0.83		79	0.79		88	0.88		75	0.75		77	0.77		81	0.81		2	0.02		4	0.04			
Diploneis splendica		1	0.01																								
Diploneis sp.														1	0.01											1	0.01
Ebria tripartita					1	0.01																					
Eucampia zodiacus		18	0.18		6	0.06		3	0.03		10	0.10		13	0.13		15	0.15									
Guinardia flaccida		2	0.02		1	0.01		6	0.06					6	0.06		11	0.11									
Hemiaulus sp.		12	0.12		8	0.08		7	0.07																		
Leptocylindrus danicus											10	0.10		2	0.02		1	0.01									
Melosira sulcata														10	0.10												
Navicula spp.											2	0.02		2	0.02		5	0.05		2	0.02		3	0.03		1	0.01
Nitzschia spp.											1	0.01															
Odontella sp.								4	0.04					12	0.12		2	0.02									
Pleurosigma spp.		6	0.06		14	0.14		10	0.10		9	0.09		14	0.14		4	0.04		1	0.01		1	0.01		1	0.01
Rhizosolenia alata																	2	0.02									
Rhizosolenia delicatula											12	0.12		10	0.10												
Rhizosolenia fragilissima					2	0.02		6	0.06					3	0.03		9	0.09					4	0.04			
Rhizosolenia imbricata		2	0.02		2	0.02		4	0.04		3	0.03		10	0.10		4	0.04									
Rhizosolenia setigera		1	0.01																								
Rhizosolenia stolterfothii		26	0.26		32	0.32		13	0.13		38	0.38		22	0.22		28	0.28								2	0.02
Rhizosolenia sp.											2	0.02		3	0.03												
Skeletonema costatum		32	0.32		68	0.68		19	0.19																		
Skeletonema sp.											78	0.78		69	0.69		53	0.53									
Thalassiosira spp.		16	0.16		31	0.31		17	0.17		27	0.27		44	0.44		24	0.24		2	0.02					2	0.02
Thalassiothrix sp.											1	0.01					1	0.01									
CHLOROPHYTA																											
Tetraselmis sp.	596		1,986.67	617		2,056.67	875		2,916.67	520		1,733.33	474		1,580.00	519		1,730.00	59		196.67	45		150.00	52		173.33
PROTOZOA																											
Ciliata		6	0.06		4	0.04		4	0.04		5	0.05		5	0.05		3	0.03									
Stenosemella nivalis		4	0.04																								
Tintinnididae		18	0.18		9	0.09		1	0.01																		
Tintinnopsis sp.														3	0.03		3	0.03									
Number of taxon (inds/ml			4			3			4			4			4			4			2			2			2
Number of species(inds/ml)			23			20			21			20			25			21			5			5			6
Total (inds/ml)			1,990.88			2,060.37			2,919.55			1,737.83			1,584.92			1,733.57			196.74			150.12			173.40

試験日 Date	2011/11/2																													
サンプル名 sample	Control water															Treated water														
	Beg					Mid					End					Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10					10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		中井			堤(俊)		中井			中井		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井		
																ND		ND			ND		ND			ND				
DINOPHYTA																														
Ceratium fusus																														
Gyrodinium spp.			12	0	0.12			14	0	0.14			35	0	0.35													1	0	0.01
Heterocapsa triquetra																														
Peridiniales			2	0	0.02			3	0	0.03			3	0	0.03															
Protoperidinium spp.								1	0	0.01			2	0	0.02															
HETEROKONTOPHYTA																														
Amphiprora sp.			1	0	0.01																									
Asterionella gracillima																														
Bacteriastrum spp.																														
Cerataulina daemon																														
Chaetoceros compressum																														
Chaetoceros curvisetum																														
Chaetoceros lorenzianum																														
Chaetoceros pseudocurvisetum			6	0	0.06																									
Chaetoceros spp.			12	0	0.12			4	0	0.04																				
Coscinodiscus spp.																														
Detonula pumila																														
Diploneis splendica																														
Diploneis sp.																														
Ebria tripartita																														
Eucampia zodiacus			1	0	0.01																									
Guinardia flaccida																														
Hemiaulus sp.																														
Leptocylindrus danicus													2	0	0.02															
Melosira sulcata																														
Navicula spp.																														
Nitzschia spp.			2	0	0.02			1	0	0.01			1	0	0.01															
Odontella sp.																														
Pleurosigma spp.																														
Rhizosolenia alata																														
Rhizosolenia delicatula																														
Rhizosolenia fragilissima																														
Rhizosolenia imbricata																														
Rhizosolenia setigera																														
Rhizosolenia stolterfothii																														
Rhizosolenia sp.			2	0	0.02			2	0	0.02																				
Skeletonema costatum																														
Skeletonema sp.																														
Thalassiosira spp.			4	0	0.04			2	0	0.02			3	0	0.03															
Thalassiothrix sp.																														
CHLOROPHYTA																														
Tetraselmis sp.	49	163			163.33	48	160			160.00	46	153			153.33															
PROTOZOA																														
Ciliata			1	0	0.01																									
Stenosemella nivalis																														
Tintinnididae																														
Tintinnopsis sp.																														
Number of taxon (inds/ml					4					3					3					0					0					1
Number of species(inds/ml)					11					8					7					0					0					1
Total (inds/ml)					163.76					160.27					153.79					0.00					0.00					0.01

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Seawater test cycle2

試験日 Date	2011/11/4																										
試験名 test	Seawater ②																								海ー②		
サンプル名 sample	Control water									Before treatment									Immediatly after treatment								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	岩木	中井		岩木	岩木		岩木	中井		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	中井		堤(俊)	中井		堤(俊)	中井	
DINOPHYTA																											
Gyrodinium spp.		1	0.01		1	0.01		1	0.01		10	0.10					1	0.01									
Protoperidinium spp.		1	0.01					1	0.01					1	0.01												
HETEROKONTOPHYTA																											
Bacteriastrum spp.											4	0.04															
Bellerochea horologicalis														13	0.13												
Bellerochea malleus					16	0.16		14	0.14								30	0.30									
Cerataulina daemon		17	0.17		8	0.08		6	0.06		55	0.55		46	0.46		26	0.26									
Cerataulina pelagica											35	0.35		4	0.04		4	0.04									
Chaetoceros compressum					4	0.04					2	0.02					4	0.04									
Chaetoceros curvisetum											28	0.28															
Chaetoceros didymum		4	0.04					9	0.09																		
Chaetoceros lorenzianum					5	0.05					6	0.06		37	0.37		22	0.22									
Chaetoceros pseudocurvisetum		152	1.52		59	0.59		96	0.96		335	3.35		228	2.28		284	2.84									
Chaetoceros spp.		31	0.31		8	0.08		25	0.25		70	0.70		55	0.55		16	0.16									
Detonula pumila		12	0.12		9	0.09		6	0.06		88	0.88		2	0.02		9	0.09					4	0.04			
Diploneis splendica		3	0.03		1	0.01		1	0.01					1	0.01												
Eucampia zodiacus		73	0.73		41	0.41		57	0.57		198	1.98		62	0.62		98	0.98									
Guinardia flaccida		3	0.03					7	0.07		65	0.65		9	0.09		36	0.36									
Lithodesmium sp.		5	0.05		6	0.06		3	0.03					10	0.10		42	0.42									
Navicula spp.		3	0.03					1	0.01											1	0.01		1	0.01			
Nitzschia spp.		22	0.22		1	0.01		10	0.10		1	0.01					1	0.01		1	0.01						
Odontella mobiliensis					2	0.02					42	0.42		12	0.12		8	0.08									
Odontella sp.		11	0.11					7	0.07		10	0.10															
Pleurosigma spp.		7	0.07		2	0.02		3	0.03		13	0.13		8	0.08		15	0.15		2	0.02		1	0.01		1	0.01
Rhizosolenia alata		2	0.02		1	0.01		1	0.01		3	0.03															
Rhizosolenia fragilissima								2	0.02								2	0.02									
Rhizosolenia imbricata		10	0.10		4	0.04		1	0.01		5	0.05		14	0.14		4	0.04									
Rhizosolenia setigera		107	1.07		4	0.04					1	0.01					1	0.01									
Rhizosolenia stolterfothii					57	0.57		59	0.59		476	4.76		265	2.65		311	3.11		5	0.05		4	0.04		5	0.05
Skeletonema costatum											48	0.48															
Skeletonema sp.								5	0.05																		
Thalassiosira spp.		71	0.71		22	0.22		24	0.24		105	1.05		92	0.92		80	0.80		1	0.01		1	0.01		1	0.01
CHLOROPHYTA																											
Tetraselmis sp.	816		2,720.00	696		2,320.00	918		3,060.00	545		1,816.67	624		2,080.00	797		2,656.67	77		256.67	69		230.00	45		150.00
PROTOZOA																											
Ciliata		1	0.01					1	0.01		1	0.01		2	0.02		1	0.01									
Tintinnidae											1	0.01															
Number of taxon (inds/ml			4			3			4			4			4			4			2			2			2
Number of species(inds/ml)			21			20			24			25			19			22			6			6			4
Total (inds/ml)			2,725.36			2,322.51			3,063.40			1,832.69			2,088.61			2,666.62			256.77			230.11			150.07

試験日 Date	2011/11/9																													
サンプル名 sample	Control water															Treated water														
	Beg					Mid					End					Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10					10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(孝)		小島			堤(孝)		小島			堤(孝)		小島			小島		小島			小島		小島			小島		小島		
																ND		ND			ND		ND			ND		ND		
Gyrodinium spp.			6	0	0.06			12	0	0.12			8	0	0.08															
Protoperidinium spp.			2	0	0.02			1	0	0.01			4	0	0.04															
Rhizosolenia alata			2	0	0.02																									
Rhizosolenia stolterfothii			3	0	0.03								1	0	0.01															
Thalassiosira spp.			3	0	0.03								5	0	0.05															
Tetraselmis sp.	31	103			103.33	36	120			120.00	32	107			106.67															
Ciliata													3	0	0.03															
Number of taxon (inds/ml					3					2					4					0					0					0
Number of species(inds/ml)					6					3					6					0					0					0
Total (inds/ml)					103.49					120.13					106.88					0.00					0.00					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Seawater test cycle3

試験日 Date	2011/11/14																										
試験名 test	Seawater ③																										海ー③
サンプル名 sample	Control water									Before treatment									Immediatly after treatment								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	岩木	中井		岩木	岩木		岩木	中井		堤(俊)	中井		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木	
																				ND			ND			ND	
DINOPHYTA																											
Ceratium furca		2	0.02					1	0.01		3	0.03		1	0.01		11	0.11									
Ceratium fusus					2	0.02		3	0.03		5	0.05					1	0.01									
Gyrodinium spp.		3	0.03		1	0.01					1	0.01															
Peridiniales								1	0.01																		
Prorocentrum sigmoides		3	0.03					5	0.05		4	0.04		7	0.07		4	0.04									
Prorocentrum sp.																											
Protoperidinium pellucidum														3	0.03												
Protoperidinium spp.		3	0.03					11	0.11		7	0.07															
HETEROKONTOPHYTA																											
Actinoptychus senarius								2	0.02																		
Amphora sp.								4	0.04																		
Bacteriastrum spp.		10	0.10					10	0.10																		
Bellerochea malleus														28	0.28		3	0.03									
Cerataulina dentata								4	0.04																		
Chaetoceros debile											5	0.05															
Chaetoceros didymum											16	0.16															
Chaetoceros pseudocurvisetum		340	3.40		686	6.86		625	6.25		435	4.35		705	7.05		413	4.13									
Chaetoceros spp.		915	9.15		1,170	11.70		730	7.30		675	6.75		685	6.85		858	8.58									
Dictyocha fibula								5	0.05					1	0.01		1	0.01									
Diploneis sp.		2	0.02					3	0.03		2	0.02															
Ditylum brightwellii		4	0.04		22	0.22		3	0.03		8	0.08		22	0.22		18	0.18									
Eucampia zodiacus		7	0.07					24	0.24		11	0.11		18	0.18		3	0.03									
Hemiaulus sinensis								5	0.05		4	0.04															
Lauderia annulata		2	0.02		2	0.02											11	0.11									
Licmophora sp.		1	0.01																								
Lithodesmium sp.		4	0.04					4	0.04		9	0.09		3	0.03												
Navicula spp.		8	0.08					10	0.10		5	0.05		4	0.04												
Nitzschia spp.		190	1.90		296	2.96		170	1.70		140	1.40		52	0.52		75	0.75									
Odontella sp.		9	0.09		4	0.04		18	0.18		6	0.06		7	0.07		11	0.11									
Pleurosigma spp.		19	0.19		9	0.09		25	0.25		17	0.17		2	0.02		12	0.12									
Rhizosolenia imbricata		4	0.04		18	0.18		8	0.08		11	0.11		4	0.04		12	0.12									
Rhizosolenia sp.		135	1.35		148	1.48		100	1.00		13	0.13		95	0.95		145	1.45									
Skeletonema costatum														32	0.32		26	0.26									
Skeletonema sp.		54	0.54								27	0.27															
Surirella sp.								2	0.02																		
Thalassiosira spp.		24	0.24		74	0.74		82	0.82		17	0.17		54	0.54		48	0.48									
CHLOROPHYTA																											
Tetraselmis sp.	703		2,343.33	781		2,603.33	514		1,713.33	569		1,896.67	629		2,096.67	634		2,113.33	73		243.33	94		313.33	137		456.67
PROTOZOA																											
Ciliata		2	0.02		6	0.06		10	0.10					12	0.12		4	0.04									
Tintinnididae														2	0.02		10	0.10									
Tintinnopsis sp.		2	0.02		1	0.01					2	0.02															
Number of taxon (inds/ml			4			4			4			4			4			4			1			1			1
Number of species(inds/ml)			24			15			27			24			21			20			1			1			1
Total (inds/ml)			2,360.76			2,627.72			1,731.98			1,910.90			2,114.04			2,129.99			243.33			313.33			456.67

試験日 Date	2011/11/19																													
試験名 test	海ー③																													
サンプル名 sample	Control water															Treated water														
	Beg					Mid					End					Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10					10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	柾		中井			堤(俊)		中井			柾		中井			堤(俊)		中井			堤(俊)		中井			柾		中井		
																ND		ND			ND					ND		ND		
DINOPHYTA																														
Ceratium furca			1	0	0.01								1	0	0.01															
Ceratium fusus																														
Gyrodinium spp.			6	0	0.06			11	0	0.11			14	0	0.14															
Peridiniales			27	0	0.27			33	0	0.33			47	0	0.47								1	0	0.01					
Prorocentrum sigmoides																														
Prorocentrum sp.			1	0	0.01																									
Protoperidinium pellucidum																														
Protoperidinium spp.			1	0	0.01			6	0	0.06			2	0	0.02															
HETEROKONTOPHYTA																														
Chaetoceros spp.			6	0	0.06								1	0	0.01															
Nitzschia spp.			2	0	0.02			7	0	0.07																				
Rhizosolenia imbricata													1	0	0.01															
Thalassiosira spp.			1	0	0.01																									
CHLOROPHYTA																														
Tetraselmis sp.	14	47			46.67	25	83			83.33	13	43			43.33															
PROTOZOA																														
Number of taxon (inds/ml					3					3					3					0					1					0
Number of species(inds/ml)					9					5					7					0					1					0
Total (inds/ml)					47.12					83.90					43.99					0.00					0.01					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Seawater test cycle4

試験日 Date	2011/11/21																										
試験名 test	Seawater ④																										海ー④
サンプル名 sample	Control water									Before treatment									Immediatly after treatment								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	岩木	中井		岩木	中井		岩木	中井		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木	
																							ND				
DINOPHYTA																											
Dinophysis sp.								1	0.01																		
Gyrodinium spp.		1	0.01		2	0.02		1	0.01					1	0.01												
Peridiniales																											
Protoperidinium spp.		4	0.04		2	0.02		1	0.01																		
HETEROKONTOPHYTA																											
Bacteriastrum spp.		2	0.02																								
Bellerochea malleus											13	0.13															
Chaetoceros curvisetum																	12	0.12									
Chaetoceros debile		6	0.06		26	0.26		9	0.09		134	1.34		44	0.44		19	0.19									
Chaetoceros didymum					5	0.05		4	0.04																		
Chaetoceros lorenzianum											36	0.36		10	0.10												
Chaetoceros pseudocurvisetum		15	0.15		11	0.11											13	0.13									
Chaetoceros spp.		40	0.40		44	0.44		33	0.33								11	0.11									
Coscinodiscus spp.																	1	0.01									
Diploneis sp.											1	0.01															
Ditylum brightwellii		3	0.03		2	0.02																					
Eucampia zodiacus		3	0.03		2	0.02		4	0.04					11	0.11												
Navicula spp.					2	0.02		4	0.04		16	0.16		7	0.07					2	0.02						
Nitzschia spp.		3	0.03		7	0.07		3	0.03					1	0.01		3	0.03									
Odontella sp.		3	0.03		6	0.06		4	0.04		1	0.01					1	0.01									
Pleurosigma spp.		7	0.07		6	0.06		9	0.09					5	0.05		1	0.01									
Rhizosolenia alata											1	0.01															
Rhizosolenia imbricata																	1	0.01									
Rhizosolenia setigera		1	0.01																								
Rhizosolenia sp.		4	0.04		3	0.03		2	0.02		12	0.12															
Skeletonema sp.								4	0.04																		
Surirella sp.								1	0.01		31	0.31		9	0.09												
Thalassiosira spp.		14	0.14		26	0.26		24	0.24		21	0.21		32	0.32											1	0.01
CHLOROPHYTA																											
Tetraselmis sp.	910		3,033.33	902		3,006.67	936		3,120.00	708		2,360.00	847		2,823.33	624		2,080.00	57		190.00	113		376.67	71		236.67
PROTOZOA																											
Ciliata					1	0.01					1	0.01		9	0.09		1	0.01									
Euplotes sp.		6	0.06		10	0.10		8	0.08																		
Tintinnididae											4	0.04		3	0.03		1	0.01									
Tintinnopsis sp.		3	0.03					2	0.02																		
Number of taxon (inds/ml			4			4			4			3			4			3			2			1			2
Number of species(inds/ml)			17			17			18			13			12			12			2			1			2
Total (inds/ml)			3,034.48			3,008.22			3,121.14			2,362.71			2,824.65			2,080.64			190.02			376.67			236.68

試験日 Date	2011/11/26																													
サンプル名 sample	Control water															Treated water														
	Beg					Mid					End					Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10					10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井		
																ND		ND			ND		ND			ND		ND		
DINOPHYTA																														
Dinophysis sp.																														
Gyrodinium spp.			4	0	0.04			3	0	0.03			6	0	0.06															
Peridiniales								1	0	0.01																				
Protoperidinium spp.			1	0	0.01																									
HETEROKONTOPHYTA																														
Bacteriastrum spp.																														
Bellerochea malleus																														
Chaetoceros curvisetum																														
Chaetoceros debile																														
Chaetoceros didymum																														
Chaetoceros lorenzianum																														
Chaetoceros pseudocurvisetum																														
Chaetoceros spp.																														
Coscinodiscus spp.																														
Diploneis sp.																														
Ditylum brightwellii																														
Eucampia zodiacus																														
Navicula spp.													1	0	0.01															
Nitzschia spp.																														
Odontella sp.																														
Pleurosigma spp.			1	0	0.01								3	0	0.03															
Rhizosolenia alata																														
Rhizosolenia imbricata																														
Rhizosolenia setigera																														
Rhizosolenia sp.																														
Skeletonema sp.																														
Surirella sp.																														
Thalassiosira spp.			2	0	0.02			2	0	0.02																				
CHLOROPHYTA																														
Tetraselmis sp.	129	430			430.00	104	347			346.67	169	563			563.33															
PROTOZOA																														
Ciliata			1	0	0.01			2	0	0.02			3	0	0.03															
Euplotes sp.																														
Tintinnididae																														
Tintinnopsis sp.													1	0	0.01															
Number of taxon (inds/ml					4					4					4					0					0					0
Number of species(inds/ml)					6					5					6					0					0					0
Total (inds/ml)					430.09					346.75					563.47					0.00					0.00					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Seawater test cycle5

試験日 Date	2011/11/23																											2011/11/28																							
試験名 test	Seawater ⑤ 海ー⑤																																																		
サンプル名 sample	Control water									Before treatment									Immediatly after treatment									Control water									Treated water														
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End			Beg			Mid			End			Beg			Mid			End								
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥						
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10				10			10			10			10			10			10							
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1						
personnel	堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		堤(俊)	岩木		中井	中井		中井	中井		中井	中井		堤(俊)	中井		堤(俊)	中井		堤(俊)	中井		堤(俊)	中井		堤(俊)	中井		堤(俊)	中井							
DINOPHYTA																																								ND			ND			ND			ND		
Dinophysis acuminata																	1	0.01																																	
Gymnodinium sp.											1	0.01																																							
Gyrodinium spp.		2	0.02		2	0.02					1	0.01		6	0.06		2	0.02											4	0	0.04		3	0	0.03			5	0	0.05											
Peridiniales					1	0.01																																													
Prorocentrum triestinum		1	0.01		4	0.04		2	0.02		2	0.02		3	0.03		6	0.06																																	
Protoperidinium pellucidum		1	0.01											1	0.01																																				
HETEROKONTOPHYTA																																																			
Cerataulina pelagica											1	0.01																																							
Chaetoceros debile											8	0.08																																							
Chaetoceros didymum														4	0.04																																				
Chaetoceros lorenzianum											2	0.02																																							
Chaetoceros pseudocurvisetum		5	0.05																																																
Chaetoceros spp.		10	0.10					9	0.09		4	0.04		8	0.08		6	0.06																																	
Diploneis sp.								1	0.01																																										
Guinardia flaccida					3	0.03																																													
Lauderia annulata														11	0.11																																				
Navicula spp.		6	0.06		1	0.01		3	0.03																																										
Nitzschia spp.		10	0.10		10	0.10		6	0.06		7	0.07		8	0.08		1	0.01											1	0	0.01							1	0	0.01											
Pleurosigma spp.					1	0.01					2	0.02		9	0.09		1	0.01					1	0.01		1	0.01																								
Rhizosolenia imbricata		1	0.01								1	0.01																																							
Skeletonema sp.								8	0.08					8	0.08																																				
Surirella sp.											1	0.01		2	0.02																																				
Thalassiosira spp.		8	0.08		30	0.30		15	0.15		7	0.07		14	0.14		6	0.06		1	0.01								4	0	0.04		4	0	0.04			2	0	0.02											
CHLOROPHYTA																																																			
Tetraselmis sp.	634		2,113.33	722		2,406.67	622		2,073.33	748		2,493.33	629		2,096.67	665		2,216.67	136		453.33	104		346.67	155		516.67	41	137		136.67	36	120		120.00	39	130		130.00											
PROTOZOA																																																			
Ciliata																	1	0.01											1	0	0.01							1	0	0.01											
Euplotes sp.		2	0.02		4	0.04		3	0.03		3	0.03		8	0.08		13	0.13																																	
Tintinnididae		1	0.01								2	0.02																																							
Number of taxon (inds/ml			4			4			4			4			4			4			2			2			2				4				3				4				0				0				0
Number of species(inds/ml)			12			10			9			15			13			10			2			2			2				5				3				5				0				0				0
Total (inds/ml)			2,113.80			2,407.23			2,073.80			2,493.75			2,097.49			2,217.04			453.34			346.68			516.68				136.77				120.07				130.09				0.00				0.00				0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Seawater test cycle6

試験日 Date	2011/12/2								
試験名 test	Seawater ⑥								
サンプル名 sample	Control water								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	中井		堤(俊)	中井		堤(俊)	中井	
DINOPHYTA									
Ceratium furca		6	0.06					2	0.02
Ceratium fusus		1	0.01						
Ceratium sp.		3	0.03						
Cochlodinium sp.								2	0.02
Dinophysis acuminata					1	0.01		1	0.01
Dinophysis sp.									
Gymnodiniales									
Gyrodinium spp.		3	0.03		4	0.04		1	0.01
Peridiniales		4	0.04		3	0.03		2	0.02
Prorocentrum micans								1	0.01
Prorocentrum sigmoides					3	0.03		4	0.04
Prorocentrum sp.									
Protoperidinium spp.									
HETEROKONTOPHYTA									
Actinoptychus senarius									
Amphiprora alata									
Asteromphalus cleveanus									
Cerataulina dentata									
Cerataulina pelagica									
Chaetoceros lorenzianum									
Chaetoceros sp.					2	0.02			
Diploneis sp.									
Ditylum brightwellii									
Eucampia zodiacus		7	0.07		2	0.02		8	0.08
Melosira sulcata									
Navicula spp.					2	0.02		2	0.02
Nitzschia spp.		3	0.03		1	0.01		3	0.03
Odontella sp.		7	0.07		3	0.03		4	0.04
Pleurosigma spp.		4	0.04		7	0.07		4	0.04
Rhizosolenia imbricata		1	0.01						
Skeletonema sp.		8	0.08		8	0.08			
Stephanopyxis palmeriana									
Streptotheca thamensis									
Surirella sp.								1	0.01
Thalassiosira spp.		19	0.19		4	0.04		13	0.13
CHLOROPHYTA									
Tetraselmis sp.	541		1,803.33	640		2,133.33	653		2,176.67
PROTOZOA									
Ciliata								1	0.01
Euplotes sp.		21	0.21		19	0.19		33	0.33
Eutintinnus sp.									
Mesodinium rubrum									
Tintinnopsis sp.		36	0.36		28	0.28		30	0.30
Number of taxon (inds/ml			4			4			4
Number of species(inds/ml)			15			15			18
Total (inds/ml)			1,804.56			2,134.20			2,177.79

試験日 Date	2011/12/2								
試験名 test	Seawater ⑥								
サンプル名 sample	Before treatment								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	堤(孝)		堤(俊)	堤(孝)		堤(俊)	堤(孝)	
DINOPHYTA									
Ceratium furca		2	0.02		1	0.01			
Ceratium fusus									
Ceratium sp.									
Cochlodinium sp.					1	0.01			
Dinophysis acuminata									
Dinophysis sp.		1	0.01						
Gymnodiniales		1	0.01		1	0.01			
Gyrodinium spp.		1	0.01		1	0.01			
Peridiniales									
Prorocentrum micans								1	0.01
Prorocentrum sigmoides		2	0.02		1	0.01		2	0.02
Prorocentrum sp.					1	0.01		1	0.01
Protoperidinium spp.					2	0.02		4	0.04
HETEROKONTOPHYTA									
Actinoptychus senarius								1	0.01
Amphiprora alata		3	0.03		2	0.02		4	0.04
Asteromphalus cleveanus								1	0.01
Cerataulina dentata		4	0.04						
Cerataulina pelagica								1	0.01
Chaetoceros lorenzianum		5	0.05						
Chaetoceros sp.									
Diploneis sp.					1	0.01		1	0.01
Ditylum brightwellii					1	0.01			
Eucampia zodiacus		1	0.01						
Melosira sulcata								11	0.11
Navicula spp.		3	0.03		3	0.03		7	0.07
Nitzschia spp.					2	0.02		2	0.02
Odontella sp.		1	0.01		1	0.01		8	0.08
Pleurosigma spp.		11	0.11		10	0.10		17	0.17
Rhizosolenia imbricata									
Skeletonema sp.		8	0.08						
Stephanopyxis palmeriana		2	0.02						
Streptotheca thamensis					1	0.01			
Surirella sp.		3	0.03					3	0.03
Thalassiosira spp.		4	0.04		3	0.03		5	0.05
CHLOROPHYTA									
Tetraselmis sp.	629		2,096.67	744		2,480.00	667		2,223.33
PROTOZOA									
Ciliata									
Euplotes sp.					2	0.02		8	0.08
Eutintinnus sp.		1	0.01						
Mesodinium rubrum								2	0.02
Tintinnopsis sp.		17	0.17		12	0.12		20	0.20
Number of taxon (inds/ml			4			4			4
Number of species(inds/ml)			19			19			20
Total (inds/ml)			2,097.37			2,480.46			2,224.32

試験日 Date	2011/12/2								
試験名 test	海ー⑥								
サンプル名 sample	Immediatly after treatment								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	堤(孝)		堤(俊)	堤(孝)		堤(俊)	堤(孝)	
DINOPHYTA									
Ceratium furca									
Ceratium fusus									
Ceratium sp.									
Cochlodinium sp.									
Dinophysis acuminata									
Dinophysis sp.									
Gymnodiniales									
Gyrodinium spp.									
Peridiniales									
Prorocentrum micans									
Prorocentrum sigmoides									
Prorocentrum sp.									
Protoperidinium spp.									
HETEROKONTOPHYTA									
Actinoptychus senarius									
Amphiprora alata									
Asteromphalus cleveanus		1	0.01						
Cerataulina dentata									
Cerataulina pelagica									
Chaetoceros lorenzianum									
Chaetoceros sp.									
Diploneis sp.								1	0.01
Ditylum brightwellii									
Eucampia zodiacus									
Melosira sulcata									
Navicula spp.		2	0.02						
Nitzschia spp.									
Odontella sp.									
Pleurosigma spp.					1	0.01		1	0.01
Rhizosolenia imbricata									
Skeletonema sp.									
Stephanopyxis palmeriana									
Streptotheca thamensis									
Surirella sp.		1	0.01						
Thalassiosira spp.		1	0.01		1	0.01		1	0.01
CHLOROPHYTA									
Tetraselmis sp.	44		146.67	41		136.67	44		146.67
PROTOZOA									
Ciliata									
Euplotes sp.									
Eutintinnus sp.									
Mesodinium rubrum									
Tintinnopsis sp.					1	0.01			
Number of taxon (inds/ml			2			3			2
Number of species(inds/ml)			5			4			4
Total (inds/ml)			146.72			136.70			146.70

試験日 Date	2011/12/7														
試験名 test	海ー⑥														
サンプル名 sample	Control water														
	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		堤(孝)			堤(俊)		堤(孝)			堤(俊)		堤(孝)		
DINOPHYTA															
Ceratium furca															
Ceratium fusus															
Ceratium sp.															
Cochlodinium sp.															
Dinophysis acuminata															
Dinophysis sp.															
Gymnodiniales			3	0	0.03			3	0	0.03			1	0	0.01
Gyrodinium spp.															
Peridiniales															
Prorocentrum micans															
Prorocentrum sigmoides													1	0	0.01
Prorocentrum sp.													1	0	0.01
Protoperidinium spp.			6	0	0.06			3	0	0.03			3	0	0.03
HETEROKONTOPHYTA															
Actinoptychus senarius															
Amphiprora alata															
Asteromphalus cleveanus															
Cerataulina dentata															
Cerataulina pelagica								4	0	0.04			9	0	0.09
Chaetoceros lorenzianum															
Chaetoceros sp.															
Diploneis sp.															
Ditylum brightwellii															
Eucampia zodiacus															
Melosira sulcata															
Navicula spp.								1	0	0.01					
Nitzschia spp.															
Odontella sp.															
Pleurosigma spp.													1	0	0.01
Rhizosolenia imbricata															
Skeletonema sp.															
Stephanopyxis palmeriana															
Streptotheca thamensis															
Surirella sp.															
Thalassiosira spp.															
CHLOROPHYTA															
Tetraselmis sp.	47	157			156.67	39	130			130.00	40	133			133.33
PROTOZOA															
Ciliata			3	0	0.03			1	0	0.01					
Euplotes sp.															
Eutintinnus sp.															
Mesodinium rubrum															
Tintinnopsis sp.			1	0	0.01										
Number of taxon (inds/ml					3					4					3
Number of species(inds/ml)					5					6					7
Total (inds/ml)					156.80					130.12					133.49

試験日 Date	2011/12/7														
試験名 test	海ー⑥														
サンプル名 sample	Treated water														
	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		堤(孝)			堤(俊)		堤(孝)			堤(俊)		堤(孝)		
	ND					ND		ND			ND				
DINOPHYTA															
Ceratium furca															
Ceratium fusus															
Ceratium sp.															
Cochlodinium sp.															
Dinophysis acuminata															
Dinophysis sp.															
Gymnodiniales			2	0	0.02								1	0	0.01
Gyrodinium spp.															
Peridiniales															
Prorocentrum micans															
Prorocentrum sigmoides															
Prorocentrum sp.															
Protoperidinium spp.															
HETEROKONTOPHYTA															
Actinoptychus senarius															
Amphiprora alata															
Asteromphalus cleveanus															
Cerataulina dentata															
Cerataulina pelagica													2	0	0.02
Chaetoceros lorenzianum															
Chaetoceros sp.															
Diploneis sp.															
Ditylum brightwellii															
Eucampia zodiacus															
Melosira sulcata															
Navicula spp.															
Nitzschia spp.															
Odontella sp.															
Pleurosigma spp.															
Rhizosolenia imbricata															
Skeletonema sp.															
Stephanopyxis palmeriana															
Streptotheca thamensis															
Surirella sp.															
Thalassiosira spp.													1	0	0.01
CHLOROPHYTA															
Tetraselmis sp.															
PROTOZOA															
Ciliata													1	0	0.01
Euplotes sp.															
Eutintinnus sp.															
Mesodinium rubrum															
Tintinnopsis sp.															
Number of taxon (inds/ml					1					0					3
Number of species(inds/ml)					1					0					4
Total (inds/ml)					0.02					0.00					0.05

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Brackishwater test cycle1

試験日 Date	2011/12/9								
試験名 test	Brackishwater ②								
サンプル名 sample	Control water								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(孝)	中井		堤(孝)	中井		堤(孝)	中井	
DINOPHYTA									
Gyrodinium spirale									
Gyrodinium sp.					1	0.01			
Heterocapsa triquetra									
Prorocentrum sigmoides									
Protoperidinium bipes									
Protoperidinium sp.		1	0.01					1	0.01
HETEROKONTOPHYTA									
Actinoptychus senarius									
Amphiprora alata									
Chaetoceros sp.					3	0.03			
Ditylum brightwellii									
Eucampia zodiacus								4	0.04
Melosira nummuloides									
Navicula spp.		1	0.01						
Nitzschia sp.		2	0.02						
Odontella sp.		2	0.02		3	0.03		2	0.02
Pleurosigma spp.					3	0.03			
Rhizosolenia imbricata		1	0.01						
Skeletonema sp.									
Thalassiosira spp.					1	0.01		3	0.03
CHLOROPHYTA									
Tetraselmis sp.	789		2,630.00	1,211		4,036.67	1,094		3,646.67
PROTOZOA									
Ciliata		5	0.05		5	0.05		2	0.02
Codonellopsis sp.									
Euplotes sp.					3	0.03		16	0.16
Tintinnopsis sp.		2	0.02						
Number of taxon (inds/ml			4			4			4
Number of species(inds/ml)			8			8			7
Total (inds/ml)			2,630.14			4,036.86			3,646.95

試験日 Date	2011/12/9								
試験名 test	Brackishwater ②								
サンプル名 sample	Before treatment								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	堤(孝)		堤(俊)	堤(孝)		堤(俊)	堤(孝)	
DINOPHYTA									
Gyrodinium spirale								1	0.01
Gyrodinium sp.									
Heterocapsa triquetra									
Prorocentrum sigmoides								1	0.01
Protoperidinium bipes									
Protoperidinium sp.									
HETEROKONTOPHYTA									
Actinoptychus senarius								1	0.01
Amphiprora alata		1	0.01		1	0.01			
Chaetoceros sp.									
Ditylum brightwellii		1	0.01						
Eucampia zodiacus									
Melosira nummuloides								7	0.07
Navicula spp.								2	0.02
Nitzschia sp.								1	0.01
Odontella sp.								5	0.05
Pleurosigma spp.					1	0.01			
Rhizosolenia imbricata									
Skeletonema sp.									
Thalassiosira spp.		4	0.04					1	0.01
CHLOROPHYTA									
Tetraselmis sp.	685		2,283.33	732		2,440.00	691		2,303.33
PROTOZOA									
Ciliata		1	0.01		2	0.02		1	0.01
Codonellopsis sp.								1	0.01
Euplotes sp.					1	0.01		2	0.02
Tintinnopsis sp.									
Number of taxon (inds/ml			3			3			4
Number of species(inds/ml)			5			5			12
Total (inds/ml)			2,283.40			2,440.05			2,303.56

試験日 Date	2011/12/9								
試験名 test	Brackishwater ②								汽ー②
サンプル名 sample	Immediatly after treatment								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	堤(孝)		堤(俊)	堤(孝)		堤(俊)	堤(孝)	
		ND			ND				
DINOPHYTA									
Gyrodinium spirale									
Gyrodinium sp.									
Heterocapsa triquetra									
Prorocentrum sigmoides									
Protoperidinium bipes									
Protoperidinium sp.									
HETEROKONTOPHYTA									
Actinoptychus senarius									
Amphiprora alata									
Chaetoceros sp.									
Ditylum brightwellii									
Eucampia zodiacus									
Melosira nummuloides									
Navicula spp.									
Nitzschia sp.									
Odontella sp.									
Pleurosigma spp.									
Rhizosolenia imbricata									
Skeletonema sp.									
Thalassiosira spp.									
CHLOROPHYTA									
Tetraselmis sp.	16		53.33	18		60.00	26		86.67
PROTOZOA									
Ciliata								1	0.01
Codonellopsis sp.									
Euplotes sp.									
Tintinnopsis sp.									
Number of taxon (inds/ml			1			1			2
Number of species(inds/ml)			1			1			2
Total (inds/ml)			53.33			60.00			86.68

試験日 Date	2011/12/14														
試験名 test															
サンプル名 sample	Control water														
	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		岩木			堤(俊)		岩木			堤(俊)		岩木		
DINOPHYTA															
Gyrodinium spirale															
Gyrodinium sp.			2	0	0.02								1	0	0.01
Heterocapsa triquetra								1	0	0.01					
Prorocentrum sigmoides			1	0	0.01										
Protoperidinium bipes								1	0	0.01					
Protoperidinium sp.															
HETEROKONTOPHYTA															
Actinoptychus senarius															
Amphiprora alata															
Chaetoceros sp.															
Ditylum brightwellii															
Eucampia zodiacus															
Melosira nummuloides															
Navicula spp.															
Nitzschia sp.															
Odontella sp.															
Pleurosigma spp.															
Rhizosolenia imbricata													1	0	0.01
Skeletonema sp.								6	0	0.06					
Thalassiosira spp.			1	0	0.01										
CHLOROPHYTA															
Tetraselmis sp.	272	907			906.67	262	873			873.33	285	950			950.00
PROTOZOA															
Ciliata													1	0	0.01
Codonellopsis sp.															
Euplotes sp.															
Tintinnopsis sp.															
Number of taxon (inds/ml					3					3					4
Number of species(inds/ml)					4					4					4
Total (inds/ml)					906.71					873.41					950.03

試験日 Date	2011/12/14														
試験名 test															
サンプル名 sample	Treated water														
	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		岩木			堤(俊)		岩木			堤(俊)		岩木		
	ND		ND			ND		ND			ND		ND		
DINOPHYTA															
Gyrodinium spirale															
Gyrodinium sp.															
Heterocapsa triquetra															
Prorocentrum sigmoides															
Protoperidinium bipes															
Protoperidinium sp.															
HETEROKONTOPHYTA															
Actinoptychus senarius															
Amphiprora alata															
Chaetoceros sp.															
Ditylum brightwellii															
Eucampia zodiacus															
Melosira nummuloides															
Navicula spp.															
Nitzschia sp.															
Odontella sp.															
Pleurosigma spp.															
Rhizosolenia imbricata															
Skeletonema sp.															
Thalassiosira spp.															
CHLOROPHYTA															
Tetraselmis sp.															
PROTOZOA															
Ciliata															
Codonellopsis sp.															
Euplotes sp.															
Tintinnopsis sp.															
Number of taxon (inds/ml					0					0					0
Number of species(inds/ml)					0					0					0
Total (inds/ml)					0.00					0.00					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Brackishwater test cycle2

試験日 Date	2011/12/11																	
試験名 test	brackishwater ③																	汽ー③
サンプル名 sample	Control water									Before treatment								
	Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	中井		堤(俊)	中井		堤(俊)	中井		中井	堤(孝)		中井	堤(孝)		中井	堤(孝)	
DINOPHYTA																		
Akashiwo sanguinea		1	0.01		1	0.01		2	0.02		1	0.01		3	0.03		2	0.02
Ceratium furca					1	0.01		1	0.01		2	0.02						
Ceratium fusus														1	0.01		1	0.01
Ceratium kofoidii																	1	0.01
Gymnodinium sp.					1	0.01												
Prorocentrum sigmoides								1	0.01								1	0.01
Protoperidinium bipes																		
Protoperidinium sp.					1	0.01												
HETEROKONTOPHYTA																		
Amphiprora alata		1	0.01								2	0.02						
Chaetoceros pseudocurvisetum																	5	0.05
Chaetoceros spp.								4	0.04					6	0.06			
Dictyocha fibula														1	0.01			
Navicula spp.											5	0.05						
Nitzschia sp.					1	0.01					1	0.01						
Odontella sp.					1	0.01					1	0.01						
Pleurosigma spp.		1	0.01					2	0.02		3	0.03						
Surirella sp.											1	0.01					1	0.01
Thalassiosira spp.		2	0.02		1	0.01		1	0.01		1	0.01					1	0.01
CHLOROPHYTA																		
Tetraselmis sp.	664		2,213.33	662		2,206.67	682		2,273.33	639		2,130.00	687		2,290.00	650		2,166.67
PROTOZOA																		
Ciliata		1	0.01															
Euplotes sp.		9	0.09		6	0.06		7	0.07		7	0.07		13	0.13		12	0.12
Tintinnopsis sp.		1	0.01					1	0.01									
Number of taxon (inds/ml			4			4			4			4			4			4
Number of species(inds/ml)			8			9			9			11			6			9
Total (inds/ml)			2,213.49			2,206.80			2,273.52			2,130.24			2,290.24			2,166.91

試験日 Date	2011/12/11								
サンプル名 sample	Immediatly after treatment								
	Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	中井	堤(孝)		中井	堤(孝)		中井	堤(孝)	
		ND			ND				
Navicula spp.								1	0.01
Tetraselmis sp.	6		20.00	4		13.33	2		6.67
Number of taxon (inds/ml			1			1			2
Number of species(inds/ml)			1			1			2
Total (inds/ml)			20.00			13.33			6.68

試験日 Date	2011/12/16														
サンプル名 sample	Control water														
	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		岩木			堤(俊)		岩木			堤(俊)		岩木		
Ceratium fusus													1	0	0.01
Gymnodinium sp.			1	0	0.01			1	0	0.01			2	0	0.02
Pleurosigma spp.			2	0	0.02										
Thalassiosira spp.			1	0	0.01			1	0	0.01			1	0	0.01
Tetraselmis sp.	442	1,473			1,473.33	380	1,267			1,266.67	416	1,387			1,386.67
Euplotes sp.			1	0	0.01			2	0	0.02					
Number of taxon (inds/ml					4					4					3
Number of species(inds/ml)					5					4					4
Total (inds/ml)					1,473.38					1,266.71					1,386.71

試験日 Date	2011/12/16														
サンプル名 sample	Treated water														
	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		岩木			堤(俊)		岩木			堤(俊)		岩木		
	ND					ND		ND			ND		ND		
Protoperidinium bipes			1	0	0.01										
Number of taxon (inds/ml					1					0					0
Number of species(inds/ml)					1					0					0
Total (inds/ml)					0.01					0.00					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Brackishwater test cycle3

試験日 Date	2011/12/18																											2011/12/23																							
試験名 test	brackishwater ④ 共ー④																																																		
サンプル名 sample	Control water									Before treatment									Immediatly after treatment									Control water									Treated water								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥	*④	*⑤	*⑥
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10			10			10			10			10			10			10		
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	中井		堤(俊)	中井		堤(俊)	小島		小島	中井		小島	小島		小島	中井		堤(俊)	小島		堤(俊)	小島		堤(俊)	小島		中井	中井		中井	中井		中井	中井		堤(孝)	堤(孝)		堤(孝)	堤(孝)		堤(孝)	堤(孝)	
																				ND			ND			ND												ND	ND		ND	ND		ND	ND	
DINOPHYTA																																																			
Akashiwo sanguinea		4	0.04		7	0.07		3	0.03		10	0.10		3	0.03		3	0.03											4	0	0.04		1	0	0.01		4	0	0.04											
Ceratium furca					1	0.01					1	0.01																																							
Gymnodinium sp.														2	0.02																																				
Gyrodinium sp.											1	0.01					1	0.01																																	
Prorocentrum sigmoides		1	0.01																																																
Protoperidinium sp.											1	0.01		1	0.01																																				
HETEROKONTOPHYTA																																																			
Chaetoceros spp.					2	0.02					7	0.07					1	0.01																																	
Ebria tripartita														1	0.01																																				
Eucampia zodiacus		2	0.02		5	0.05					5	0.05					3	0.03																																	
Lithodesmium sp.											5	0.05					1	0.01																																	
Navicula spp.					1	0.01																																													
Nitzschia sp.		1	0.01														1	0.01																																	
Odontella sp.		2	0.02		4	0.04					1	0.01					3	0.03																				1	0	0.01											
Pleurosigma spp.		2	0.02								1	0.01					1	0.01																																	
Rhizosolenia imbricata											1	0.01																																							
Rhizosolenia sp.											1	0.01																	1	0	0.01																					
Thalassiosira spp.		3	0.03		5	0.05		2	0.02																										1	0	0.01														
CHLOROPHYTA																																																			
Tetraselmis sp.	559		1,863.33	591		1,970.00	631		2,103.33	551		1,836.67	462		1,540.00	436		1,453.33	1		3.33	5		16.67	8		26.67	329	1,097		1,096.67	347	1,157		1,156.67	303	1,010		1,010.00											
PROTOZOA																																																			
Ciliata																																			1	0	0.20														
Euplotes sp.		17	0.17		12	0.12		12	0.12		22	0.22		8	0.08		13	0.13																				2	0	0.20											
Number of taxon (inds/ml			4			4			4			4			4			4			1			1			1				3				4				4				0				0				0
Number of species(inds/ml)			9			9			4			13			6			10			1			1			1				3				4				4				0				0				0
Total (inds/ml)			1,863.65			1,970.37			2,103.50			1,837.23			1,540.15			1,453.60			3.33			16.67			26.67				1,096.72				1,156.89				1,010.25				0.00				0.00				0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Brackish test cycle4

試験日 Date: 2011/12/21 (columns below) / 2011/12/26 (following tables)
試験名 test: brackishwater ⑤ 汽ー⑤

2011/12/21

サンプル名 sample	Control water									Before treatment									Immediatly after treatment								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	堤(俊)	中井		堤(俊)	小島		堤(俊)	小島		中井	小島		中井	小島		中井	小島		中井	中井		中井	中井		中井	中井	
																				ND			ND				
DINOPHYTA																											
Akashiwo sanguinea		18	0.18		15	0.15		13	0.13		16	0.16		15	0.15		32	0.32									
Gymnodinium sp.											1	0.01		2	0.02												
Gyrodinium sp.					1	0.01																					
Peridiniales																											
Prorocentrum sigmoides		1	0.01																								
HETEROKONTOPHYTA																											
Chaetoceros spp.		8	0.08					3	0.03								8	0.08									
Coscinodiscus sp.																											
Detonula pumila																											
Dictyocha fibula																	1	0.01									
Ditylum brightwellii														1	0.01		1	0.01									
Ebria tripartita								1	0.01																		
Eucampia zodiacus		2	0.02																								
Lithodesmium sp.		3	0.03																								
Navicula sp.																										1	0.01
Thalassiosira spp.					1	0.01		1	0.01		2	0.02		1	0.01		1	0.01									
CHLOROPHYTA																											
Tetraselmis sp.	667		2,223.33	678		2,260.00	685		2,283.33	644		2,146.67	704		2,346.67	732		2,440.00	11		36.67	11		36.67	11		36.67
PROTOZOA																											
Ciliata								1	0.01		1	0.01					6	0.06									
Euplotes sp.		5	0.05		12	0.12		4	0.04		3	0.03		7	0.07												
Tintinnopsis sp.																											
Number of taxon (inds/ml			4			4			4			4			4			4			1			1			2
Number of species(inds/ml)			7			5			7			6			6			7			1			1			2
Total (inds/ml)			2,223.70			2,260.29			2,283.56			2,146.90			2,346.93			2,440.49			36.67			36.67			36.68

2011/12/26 — Control water

サンプル名 sample	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		堤(孝)			堤(俊)		堤(孝)			堤(俊)		堤(孝)		
DINOPHYTA															
Akashiwo sanguinea			7	0	0.07			6	0	0.06			6	0	0.06
Gymnodinium sp.															
Gyrodinium sp.															
Peridiniales			1	0	0.01										
Prorocentrum sigmoides															
HETEROKONTOPHYTA															
Chaetoceros spp.															
Coscinodiscus sp.			1	0	0.01			1	0	0.01					
Detonula pumila			4	0	0.04										
Dictyocha fibula															
Ditylum brightwellii															
Ebria tripartita								1	0	0.01					
Eucampia zodiacus															
Lithodesmium sp.															
Navicula sp.															
Thalassiosira spp.													1	0	0.01
CHLOROPHYTA															
Tetraselmis sp.	302	1,007			1,006.67	277	923			923.33	292	973			973.33
PROTOZOA															
Ciliata			2	0	0.02			2	0	0.02			2	0	0.02
Euplotes sp.								1	0	0.01			1	0	0.01
Tintinnopsis sp.													1	0	0.01
Number of taxon (inds/ml					4					4					4
Number of species(inds/ml)					6					6					6
Total (inds/ml)					1,006.82					923.44					973.44

2011/12/26 — Treated water

サンプル名 sample	Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(孝)		堤(孝)			堤(孝)		堤(孝)			堤(孝)		堤(孝)		
	ND		ND			ND		ND			ND		ND		
Number of taxon (inds/ml					0					0					0
Number of species(inds/ml)					0					0					0
Total (inds/ml)					0.00					0.00					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.

Brackishwater test cycle5

試験日 Date	2012/1/21																										
試験名 test	brackishwater ⑥																								汽ー⑥		
サンプル名 sample	Control water									Before treatment									Immediatly after treatment								
	Beg			Mid			End			Beg			Mid			End			Beg			Mid			End		
	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③	*①	*②	*③
Amount of Sample water (ml)	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1	0.1×3	1000	1
Amount of Concentration water (ml)		10			10			10			10			10			10			10			10			10	
Amount of test water(ml)	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1	0.1×3	1×1	1
personnel	柾	岩木		柾	岩木		柾	岩木		堤(孝)	岩木		堤(孝)	岩木		堤(孝)	岩木		堤(孝)	岩木		堤(孝)	岩木		堤(孝)	岩木	
DINOPHYTA																											
Akashiwo sanguinea		162	1.62		245	2.45		200	2.00		56	0.56		113	1.13		132	1.32								2	0.02
Gymnodinium sp.																	1	0.01									
Gyrodinium sp.					4	0.04		5	0.05																		
HETEROKONTOPHYTA																											
Chaetoceros sp.					2	0.02																					
Eucampia zodiacus																											
Thalassiosira spp.					1	0.01		1	0.01								1	0.01									
CHLOROPHYTA																											
Tetraselmis sp.	339		1,130.00	339		1,130.00	318		1,060.00	395		1,316.67	360		1,200.00	440		1,466.67	23		76.67	16		53.33	28		93.33
PROTOZOA																											
Ciliata		1	0.01		1	0.01								1	0.01		1	0.01									
Euplotes sp.		6	0.06		7	0.07		11	0.11		3	0.03		1	0.01		6	0.06									
NEMATODA																											
Nematoda											1	0.01															
Number of taxon (inds/ml			3			4			4			4			3			4			1			1			2
Number of species(inds/ml)			4			7			5			4			4			6			1			1			2
Total (inds/ml)			1,131.69			1,132.60			1,062.17			1,317.27			1,201.15			1,468.08			76.67			53.33			93.35

試験日 Date	2012/1/26																													
サンプル名 sample	Control water															Treated water														
	Beg					Mid					End					Beg					Mid					End				
	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥	*④		*⑤		*⑥
Amount of Sample water (ml)	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1	0.1×3	1	1000	1	1
Amount of Concentration water (ml)			10					10					10					10					10					10		
Amount of test water(ml)	0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1		0.1×3		1×1	1	
personnel	堤(俊)		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井			堤(俊)		中井		
DINOPHYTA																														
Akashiwo sanguinea			90	1	0.90			100	1	1.00			110	1	1.10															
Gymnodinium sp.																														
Gyrodinium sp.																														
HETEROKONTOPHYTA																														
Chaetoceros sp.																														
Eucampia zodiacus			2	0	0.02																									
Thalassiosira spp.																														
CHLOROPHYTA																														
Tetraselmis sp.	120	400			400.00	113	377			376.67	133	443			443.33															
PROTOZOA																														
Ciliata																														
Euplotes sp.			2	0	0.02			3	0	0.03			1	0	0.01															
NEMATODA																														
Nematoda																														
Number of taxon (inds/ml					4					3					3					0					0					0
Number of species(inds/ml)					4					3					3					0					0					0
Total (inds/ml)					400.94					377.70					444.44					0.00					0.00					0.00

①Total amount of Tetraselmis sp plus natural organism species in unconcentrated water sample.
②Total amount of natural organism species excluding Tetraselmis sp in concentrated water sample.
③Total organism density of ①plus ②
④Total amount and organism density of Tetraselmis sp. Plus natural organism species in unconcentrated water sample.
⑤Total amount and organism density of natural species excluding Tetraselmis sp. in concentrated water sample.
⑥Higher density between ④ and ⑤.