No. SHOU-PACT-2012012

Test Report

Product Name:	Ballast water management system
Applicant:	PACT Environmental Technology Co., LTD
Test Category:	Sampling test
Sending time:	25/08/2012

Ballast Water Detecting Lab of Shanghai Ocean University

Ballast Water Detecting Lab of Shanghai Ocean University

Ballast Water Detecting Lab of Shanghai Ocean University

Notice

1. The report is considered to be invalid in case of no official stamp of "Ballast Water Detecting Lab of Shanghai Ocean University" on it;

2. Partly copy of the Testing report is not allowed without written approval of the lab, except copy of full text;

3. The report is considered to be invalid without signatures of the reviewer and approver;

4. The report is considered to be invalid once it is altered;

5. Any questions on the report should be raised to the test organization within 15 days from the date you receive the report and the overdue is inadmissible.

6. Test results only indicate this sampling.

Adress:No.999, Huchenghuan Rd , Nanhui New City, Shanghai, P.R. China

Tel.:+86-021- 61900428

Fax:+86-021-61900428

Code:201306

Email: hxwu@shou.edu.cn

Contact:Wu huixian

Ballast Water Detecting Lab of Shanghai Ocean University

Testing report of viable organisms greater than or equal to 10 micrometres and less than 50 micrometres in minimum dimension

No. SHOU- PACT-2012012

Sample name	Ballast water	**Applicant**	PACT Environmental Technology Co., LTD
Test category	Sampling test	**Address of the applicant**	No. 700, Luban Rd.,Shanghai
No. of samples	18	**Sample ID number**	SHOU-BWDL-PACT-012A1~A18
Sample	Liquid	**Sampling personnel**	Wang Qiong, Yuan Lin, Liu Liang
Sample delivery date	2012-07-19 2012-07-24	**Test date**	2012-07-21 2012-07-26
Sampling location	Ballast Water Detecting Laboratory of Shanghai Ocean University Land-Based Testing Base		
Test item	Viable organisms of 10~50μm in minimum dimension		
Reference standard	GB 17378.7-2007/5.3.2.3 concentration counting method		
Test result	Refer to the following table for the detailed information on the test results		
Remarks	With a capacity of 300 m^3/h		

Written by: Yuan Lin **Checked by:** Wang Qiong **Approved by:** Xue Junzeng

Test report of viable organisms greater than or equal to 10 micrometres and less than 50 micrometres in minimum dimension

NO. SHOU- PACT-2012012

Sampling time	Sampling site	Sampling period	Sample number	Result (cells/mL)
2012-07-19	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-012A1	2.35×10^3
		Middle	SHOU-BWDL-PACT-012A2	2.27×10^3
		End	SHOU-BWDL-PACT-012A3	2.38×10^3
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-012A4	2.22×10^3
		Middle	SHOU-BWDL-PACT-012A5	2.23×10^3
		End	SHOU-BWDL-PACT-012A6	2.33×10^3
	After treated S-3	Beginning	SHOU-BWDL-PACT-012A7	3.70
		Middle	SHOU-BWDL-PACT-012A8	4.75
		End	SHOU-BWDL-PACT-012A9	2.75
2012-07-24	Treated discharge before UV (after 5d) S-4	Beginning	SHOU-BWDL-PACT-012A10	1.20
		Middle	SHOU-BWDL-PACT-012A11	1.60
		End	SHOU-BWDL-PACT-012A12	1.10
	Treated discharge (after 5d) S-5	Beginning	SHOU-BWDL-PACT-012A13	0.25
		Middle	SHOU-BWDL-PACT-012A14	0.20
		End	SHOU-BWDL-PACT-012A15	0.30
	Control discharge (after 5d) S-6	Beginning	SHOU-BWDL-PACT-012A16	178.00
		Middle	SHOU-BWDL-PACT-012A17	164.75
		End	SHOU-BWDL-PACT-012A18	168.80

Directories of viable organisms during ballasting

Chlorophyceae

Platymonas sp. (2168.5)

Euglenophyta

Trachelomonas sp. (0.5)

Bacillariophyceae

Cyclotella sp. (1.5)
Navicula parua (4)
Amphora coffeaeformis (168)
Thalassiosira nordenskioldii (1.0)
Skeletonema costatum (2.5)
Navicula viridula var. (4.0)
Nitzschia constricta (2.0)
Thalassionema nitzschioides (1.5)

Ballast Water Detecting Lab of Shanghai Ocean University

Testing report of viable organisms greater than or equal to 50 micrometres in minimum dimension

No. SHOU- PACT-2012012

Sample name	Ballast water	**Applicant**	PACT Environmental Technology Co., LTD
Test category	Sampling test	**Address of the applicant**	No. 700, Luban Rd.,Shanghai
No. of samples	18	**Sample ID number**	SHOU-BWDL-PACT-012B1~B18
Sample	Liquid	**Sampling personnel**	Wang Qiong,Yuan Lin,Liu Liang
Sample delivery date	2012-07-19 2012-07-24	**Test date**	2012.07.21-2012.07.22 2012.07.26-2012.07.27
Sampling location	Ballast Water Detecting Laboratory of Shanghai Ocean University Land-Based Testing Base		
Test item	Viable organisms of ≥ 50μm in minimum dimension		
Reference standard	GB17378.7-2007/5.3.3.3 individual counting method		
Test result	Refer to the following table for the detailed information on the test results		
Remarks	With a capacity of 300 m^3/h		

Written by: Yuan Lin **Checked by:** Liu Liang **Approved by:** Xue Jungang

Testing report of viable organisms greater than or equal to 50 micrometres in minimum dimension

NO. SHOU- PACT-2012012

Sampling time	Sampling site	Sampling period	Sample number	Result (ind./m^3)
2012-07-19	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-012B1	1.39×10^5
		Middle	SHOU-BWDL-PACT-012B2	1.41×10^5
		End	SHOU-BWDL-PACT-012B3	1.41×10^5
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-012B4	1.06×10^5
		Middle	SHOU-BWDL-PACT-012B5	1.09×10^5
		End	SHOU-BWDL-PACT-012B6	1.04×10^5
	After treated S-3	Beginning	SHOU-BWDL-PACT-012B7	12
		Middle	SHOU-BWDL-PACT-012B8	4
		End	SHOU-BWDL-PACT-012B9	14
2012-07-24	Treated discharge before UV (after 5d) S-4	Beginning	SHOU-BWDL-PACT-012B10	4
		Middle	SHOU-BWDL-PACT-012B11	5
		End	SHOU-BWDL-PACT-012B12	2
	Treated discharge (after 5d) S-5	Beginning	SHOU-BWDL-PACT-012B13	3
		Middle	SHOU-BWDL-PACT-012B14	3
		End	SHOU-BWDL-PACT-012B15	1
	Control discharge (after 5d)S-6	Beginning	SHOU-BWDL-PACT-012B16	1.02×10^4
		Middle	SHOU-BWDL-PACT-012B17	1.02×10^4
		End	SHOU-BWDL-PACT-012B18	1.15×10^4

Directories of viable organisms during ballasting

Arthropoda

Brine Shrimp（137000）

Bacillariophyta

Skeletonema sp. （500）

Rotifera

Notholca sp. （500）
Brachionus sp. （500）

Protozoa

Euplotes sp. （500）

Ballast Water Detecting Lab of Shanghai Ocean University

Test report of bacteria test

No. SHOU- PACT-2012012

Sample name	Ballast water	**Applicant**	PACT Environmental Technology Co., LTD
Test category	Sampling test	**Address of the applicant**	No. 700, Luban Rd.,Shanghai
No. of samples	18	**Sample ID number**	SHOU-BWDL-PACT-012C1~C18
Sample	Liquid	**Sampling personnel**	Wang Qiong,Yuan Lin,Liu Liang
Sample delivery date	2012-07-19 2012-07-24	**Test date**	2012-07-19 2012-07-24
Sampling location	Ballast Water Detecting Laboratory of Shanghai Ocean University Land-Based Testing Base		
Test item	Heterotrophic bacteria, *Escherichia coli*, Vibrio cholerae, *Intestinal Enterococci*		
Reference standard	The Specification for Marine Monitoring—Part 7:Ecological survey for offshore pollution and biological monitoring GB17378.7-2007/9.1-fermentation method; 9.2 -filter membrane method; 10.1-plate count method Diagnosis Standard for *Vibriocholerae* WS289-2008; Water Quality - Detection and Enumeration of Intestinal Enterococci in Surface and waste water - Membrane Filtration Method. ISO 7899-2:2000		
Test result	Refer to the following table for the detailed information on the test results		
Remarks	With a capacity of 300 m^3/h		

Written by: Yuan Lin **Checked by:** Wu Junxian **Approved by:** Xue Jinzeng

Test report of bacteria test

No. SHOU-PACT-2012012

Sampling time	Sampling site	Sampling period	Sample number	Heterotrophic bacteria (CFU /ml)	*Escherichia coli* (CFU/100ml)	*Intestinal Enterococci* (CFU/100ml)	Vibrio cholerae (CFU/100ml)
2012-07-19	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-012C1	6.2×10^4	4.3×10^6	ND	ND
		Middle	SHOU-BWDL-PACT-012C2	5.9×10^4	5.4×10^6	ND	ND
		End	SHOU-BWDL-PACT-012C3	5.4×10^4	1.6×10^6	ND	ND
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-012C4	6.0×10^4	5.4×10^6	ND	ND
		Middle	SHOU-BWDL-PACT-012C5	5.9×10^4	5.4×10^6	ND	ND
		End	SHOU-BWDL-PACT-012C6	5.7×10^4	9.2×10^6	ND	ND
	After treated S-3	Beginning	SHOU-BWDL-PACT-012C7	40	6	ND	ND
		Middle	SHOU-BWDL-PACT-012C8	80	9	ND	ND
		End	SHOU-BWDL-PACT-012C9	20	14	ND	ND
2012-07-24	Treated discharge before UV (after 5d) S-4	Beginning	SHOU-BWDL-PACT-012C10	190	62	ND	ND
		Middle	SHOU-BWDL-PACT-012C11	170	56	ND	ND
		End	SHOU-BWDL-PACT-012C12	120	72	ND	ND
	Treated discharge (after 5d) S-5	Beginning	SHOU-BWDL-PACT-012C13	3	<2	ND	ND
		Middle	SHOU-BWDL-PACT-012C14	6	<2	ND	ND
		End	SHOU-BWDL-PACT-012C15	5	<2	ND	ND
	Control discharge (after 5d)S-6	Beginning	SHOU-BWDL-PACT-012C16	1.8×10^4	350	ND	ND
		Middle	SHOU-BWDL-PACT-012C17	1.2×10^4	360	ND	ND
		End	SHOU-BWDL-PACT-012C18	2.3×10^4	540	ND	ND

Note: "ND" represents not detected.

Ballast Water Detecting Lab of Shanghai Ocean University

Test report of water quality test

No. SHOU- PACT-2012012

Sample name	Ballast water	**Applicant**	PACT Environmental Technology Co., LTD
Test category	Sampling test	**Address of the applicant**	No. 700, Luban Rd.,Shanghai
No. of the samples	18	**Sample ID**	SHOU-BWDL-PACT-012D1~D18
Sample	Liquid	**Sampling personnel**	Wang Qiong,Yuan Lin,Liu Liang
Sample delivery date	2012-07-19 2012-07-24	**Test date**	2012-07-19 2012-07-24
Sampling location	Ballast Water Detecting Laboratory of Shanghai Ocean University Land-Based Testing Base		
Test item	pH value; Temperature; Salinity; Dissolved Oxygen (DO); Total Suspended Solids(TSS); Particulate Organic Carbon(POC); Dissolved Organic Carbon(DOC); Turbidity; Total Residual Oxidants (TRO)		
Reference standard	Marine Monitoring—Part 4:Seawater analysis GB17378.4-2007/25.2 Reversing Thermometer Method、26 pH Meter Method, 27 Gravimetric Method, 29.1 Salinometer Method, 30.1 Turbidimeter Method, 34.1 Dissolved Organic Carbon Instrument Method, 31 Iodometric Method Water Quality. Determination of Free Chlorine and Total Chlorine. Spectrophotometric Method Using N,N-diethyl-1,4-Phenylenediamine HJ 586-2010 "Gulf ecosystem observation method" China Environmentalal Science Press 2005 / 4.5.14.1 Spectrophotometric Method		
Test result	Refer to the following table for the detailed information on the test results		
Remarks	With a capacity of 300 m^3/h		

Written by: Yuan Lin **Checked by:** Wang Qiong **Approved by:** Xue Jinzong

Test report of water quality test

No. SHOU-PACT-2012012

Sampling time	Sampling site	Sample number	Sampling period	Turbidity NTU	pH	T (℃)	S (PSU)	TSS (mg/L)	TRO (mg/L)	POC (mg/L)	DOC (mg/L)	DO (mg/L)
2012-07-19	Untreated S-1 at uptake	SHOU-BWDL-PACT-012D1	Beginning	18.14	7.97	27.30	19.40	56.90	ND	5.39	8.12	7.73
		SHOU-BWDL-PACT-012D2	Middle	18.37	8.00	27.30	19.40	54.80	ND	5.32	8.86	8.00
		SHOU-BWDL-PACT-012D3	End	18.08	8.03	27.30	19.40	55.00	ND	5.29	8.11	8.01
	Control S-2 at uptake	SHOU-BWDL-PACT-012D4	Beginning	18.04	8.03	27.30	19.40	55.00	ND	5.38	8.68	7.53
		SHOU-BWDL-PACT-012D5	Middle	18.12	8.05	27.30	19.40	56.50	ND	5.35	8.64	7.74
		SHOU-BWDL-PACT-012D6	End	18.15	8.05	27.30	19.40	55.20	ND	5.32	8.25	8.07
	After treated S-3	SHOU-BWDL-PACT-012D7	Beginning	5.46	8.05	27.30	19.40	17.90	ND	1.36	9.42	8.01
		SHOU-BWDL-PACT-012D8	Middle	5.57	8.04	27.30	19.40	17.70	ND	1.27	9.34	7.89
		SHOU-BWDL-PACT-012D9	End	5.57	8.05	27.30	19.40	17.40	ND	1.33	9.89	8.22
2012-07-24	Treated discharge before UV (after 5d) S-4	SHOU-BWDL-PACT-012D10	Beginning	5.08	7.94	26.30	19.40	17.20	ND	1.32	11.71	6.81
		SHOU-BWDL-PACT-012D11	Middle	5.42	7.98	26.30	19.40	17.60	ND	1.27	11.77	6.87
		SHOU-BWDL-PACT-012D12	End	5.03	8.02	26.30	19.40	17.70	ND	1.25	11.77	6.59
	Treated discharge (after 5d) S-5	SHOU-BWDL-PACT-012D13	Beginning	5.05	7.97	26.30	19.40	17.00	ND	1.29	11.62	6.66
		SHOU-BWDL-PACT-012D14	Middle	5.11	7.98	26.30	19.40	17.20	ND	1.24	11.78	7.24
		SHOU-BWDL-PACT-012D15	End	5.02	7.95	26.20	19.40	17.10	ND	1.28	11.54	6.88
	Control discharge (after 5d)S-6	SHOU-BWDL-PACT-012D16	Beginning	13.18	7.96	26.20	19.40	37.70	ND	2.33	10.21	6.25
		SHOU-BWDL-PACT-012D17	Middle	13.98	7.96	26.20	19.40	37.50	ND	2.26	10.30	5.47
		SHOU-BWDL-PACT-012D18	End	13.85	7.95	26.20	19.40	37.70	ND	2.25	10.16	4.96
Method reporting limit (mg/L)									0.03		0.03	

Note:"ND" represents not detected.