No. SHOU-PACT-2014001

Test Report

Product Name:	Ballast water management system
Applicant:	PACT Environmental Technology Co., LTD
Test Category:	Sampling test
Sending time:	30/04/2014

Ballast Water Detecting Lab of Shanghai Ocean University

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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.

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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-2014001

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-017A1~A18
Sample	Liquid	**Sampling personnel**	Liu Liang
Sample delivery date	2014-04-03 2014-04-05	**Test date**	2014-04-03~2014-04-10
Sampling location	**Uptake:**Yellow Sea, **ship:** Hong Tai 158 **Discharge:**Bohai Sea, **ship:** Hong Tai 158		
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	Shipboard test to PACT marine™ -BWMS (With a capacity of 300 m^3/h)		

Written by: Yuan Lin **Checked by:** Wang Qiang **Approved by:** Xue Jinzeng

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

No.SHOU-PACT-2014001

Sampling time	Sampling site	Sampling period	Sample number	Result(cells/mL)	Directories of viable organisms during ballasting
2014-04-03	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-017A1	345.00	**Pyrrophyta** *Prorocentrum sigmoides* (20.5) *Alexandrium tamarense* (4.55) **Bacillariophyta** *Coscinodiscus minor* (61.05) *Coscinodiscus marginato-lineatus* (25) *Coscinodiscus subtilis* var.*minorus* *Coscinodiscus* sp. (45.25) *Chaetoceros paradoxus* (18) *Chaetoceros lauderi* (8) *Chaetoceros borealis* (47.95) *Chaetoceros debilis* *Chaetoceros lorenzianas* (22.5) *Chaetoceros subsecundus* *Eucampia zoodiacus* (6.45) *Thalassionema nitzschioides* (10) *Skeletonema costatum* (3) *Cyclotella striata* *Cyclotella* sp. (44.2) *Ditylum* sp. (5) L*icmophora flabellate* **Chrysophyta** *Dictyocha fibula* (16.05) *Distephanus speculum* var. *octonarium* (7.5)
		Middle	SHOU-BWDL-PACT-017A2	235.00	
		End	SHOU-BWDL-PACT-017A3	395.00	
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-017A4	280.00	
		Middle	SHOU-BWDL-PACT-017A5	110.00	
		End	SHOU-BWDL-PACT-017A6	285.00	
2014-04-05	Treated discharge S-4	Beginning	SHOU-BWDL-PACT-017A7	0.10	
			SHOU-BWDL-PACT-017A8	0.05	
			SHOU-BWDL-PACT-017A9	0.00	
		Middle	SHOU-BWDL-PACT-017A10	0.00	
			SHOU-BWDL-PACT-017A11	0.25	
			SHOU-BWDL-PACT-017A12	0.00	
		End	SHOU-BWDL-PACT-017A13	0.25	
			SHOU-BWDL-PACT-017A14	0.00	
			SHOU-BWDL-PACT-017A15	0.20	
	Control discharge S-3	Beginning	SHOU-BWDL-PACT-017A16	122.00	
		Middle	SHOU-BWDL-PACT-017A17	95.00	
		End	SHOU-BWDL-PACT-017A18	129.00	

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-2014001

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-017B1~B18
Sample	Liquid	**Sampling personnel**	Liu Liang
Sample delivery date	2014-04-03 2014-04-05	**Test date**	2014-04-03~2014-04-10
Sampling location	**Uptake:**Yellow Sea, **ship:** Hong Tai 158 **Discharge:**Bohai Sea, **ship:** Hong Tai 158		
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	Shipboard test to PACT marine™ -BWMS (With a capacity of 300 m^3/h)		

Written by: Yuan Lin **Checked by:** Liu Liang **Approved by:** Xu Junzong

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

No.SHOU-PACT-2014001

Sampling time	Sampling site	Sampling period	Sample number	Result(ind./m^3)	Directories of viable organisms during ballasting
2014-04-03	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-017B1	6.90×10^3	**Arthropoda**
		Middle	SHOU-BWDL-PACT-017B2	5.68×10^3	Nauplius（2765）
		End	SHOU-BWDL-PACT-017B3	5.82×10^3	*Paracalanus* sp. （210）
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-017B4	6.14×10^3	*Oithona* sp. （2030）
		Middle	SHOU-BWDL-PACT-017B5	7.32×10^3	*Corycaeus* sp. （35）
		End	SHOU-BWDL-PACT-017B6	5.86×10^3	Opossum shrimp（270）
2014-04-05	Treated discharge S-4	Beginning	SHOU-BWDL-PACT-017B7	5	Copepodid larva（70）
			SHOU-BWDL-PACT-017B8	3	*Acartia clausi*（35）
			SHOU-BWDL-PACT-017B9	1	**Bacillariophyta**
		Middle	SHOU-BWDL-PACT-017B10	3	*Coscinodiscus* sp. （1470）
			SHOU-BWDL-PACT-017B11	6	**Rotifera**
			SHOU-BWDL-PACT-017B12	2	*Notholca* sp. （10）
		End	SHOU-BWDL-PACT-017B13	2	**Pyrrophyta**
			SHOU-BWDL-PACT-017B14	3	*Pleurosigma* sp.
			SHOU-BWDL-PACT-017B15	4	
	Control discharge S-3	Beginning	SHOU-BWDL-PACT-017B16	1.18×10^3	
		Middle	SHOU-BWDL-PACT-017B17	1.68×10^3	
		End	SHOU-BWDL-PACT-017B18	1.17×10^3	

Ballast Water Detecting Lab of Shanghai Ocean University

Test report of bacteria test

No. SHOU-PACT-2014001

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-017C1~C18
Sample	Liquid	**Sampling personnel**	Liu Liang
Sample delivery date	2014-04-03 2014-04-05	**Test date**	2014-04-03~2014-04-08
Sampling location	**Uptake:**Yellow Sea, **ship:** Hong Tai 158 **Discharge:**Bohai Sea, **ship:** Hong Tai 158		
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 *Vibrio cholerae* 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	Shipboard test to PACT marine™ -BWMS (With a capacity of 300 m^3/h)		

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

Test report of bacteria test

No.SHOU-PACT-2014001

Sampling time	Sampling site	Sampling period	Sample number	Heterotrophic bacteria (CFU /ml)	*Escherichia coli* (CFU/100ml)	*Intestinal Enterococci* (CFU/100ml)	Vibrio cholerae (CFU/100ml)
2014-04-03	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-017C1	1.2×10^4	2.3×10^4	Not Detected	Not Detected
		Middle	SHOU-BWDL-PACT-017C2	9.4×10^3	1.1×10^4	Not Detected	Not Detected
		End	SHOU-BWDL-PACT-017C3	8.5×10^3	9.4×10^3	1	Not Detected
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-017C4	1.1×10^4	7.2×10^3	Not Detected	Not Detected
		Middle	SHOU-BWDL-PACT-017C5	1.9×10^5	6.8×10^3	1	Not Detected
		End	SHOU-BWDL-PACT-017C6	2.4×10^4	9.8×10^3	Not Detected	Not Detected
2014-04-05	Treated discharge S-4	Beginning	SHOU-BWDL-PACT-017C7	78	14	Not Detected	Not Detected
			SHOU-BWDL-PACT-017C8	62	61	Not Detected	Not Detected
			SHOU-BWDL-PACT-017C9	121	78	Not Detected	Not Detected
		Middle	SHOU-BWDL-PACT-017C10	44	20	Not Detected	Not Detected
			SHOU-BWDL-PACT-017C11	92	39	Not Detected	Not Detected
			SHOU-BWDL-PACT-017C12	45	57	Not Detected	Not Detected
		End	SHOU-BWDL-PACT-017C13	142	120	Not Detected	Not Detected
			SHOU-BWDL-PACT-017C14	121	12	Not Detected	Not Detected
			SHOU-BWDL-PACT-017C15	66	13	Not Detected	Not Detected
	Control discharge S-3	Beginning	SHOU-BWDL-PACT-017C16	6.8×10^3	5.3×10^3	Not Detected	Not Detected
		Middle	SHOU-BWDL-PACT-017C17	7.2×10^3	6.0×10^3	Not Detected	Not Detected
		End	SHOU-BWDL-PACT-017C18	5.4×10^3	7.8×10^3	Not Detected	Not Detected

Ballast Water Detecting Lab of Shanghai Ocean University

Test report of water quality test

No. SHOU-PACT-2014001

Sample name	Ballast water	**Applicant**	PACT Environmental Technology Co., LTD
Test category	Shipboard test	**Address of the applicant**	No. 700, Luban Rd.,Shanghai
No. of the samples	18	**Sample ID**	SHOU-BWDL-PACT-017D1~D18
Sample	Liquid	**Sampling personnel**	Liu Liang
Sample delivery date	2014-04-03 2014-04-05	**Test date**	2014-04-03~2014-04-08
Sampling location	**Uptake:**Yellow Sea, **ship:** Hong Tai 158 **Discharge:**Bohai Sea, **ship:** Hong Tai 158		
Test item	Water temperature; salinity; TSS; POC		
Reference standard	The Specification for Marine Monitoring - Part 4: Seawater Analysis GB17378.4-2007/25.1: surface temperature method, 27: gravimetric method, 29.1: salinometer method, Gulf Ecosystem Observation Methods (China Environmentalal Science Press, 2005/4.5.14.1) - Spectrophotometer Method		
Test result	Refer to the following table for the detailed information on the test results		
Remarks	Shipboard test to PACT marine™ -BWMS (With a capacity of 300 m^3/h)		

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

Test report of water quality test

No. SHOU-PACT-2014001

Sampling time	Sampling site	Sampling period	Sample number	T(℃)	S(PSU)	TSS(mg/L)	POC(mg/L)
2014-04-03	Untreated S-1 at uptake	Beginning	SHOU-BWDL-PACT-017D1	12.0	31.2	26.2	0.27
		Middle	SHOU-BWDL-PACT-017D2	12.0	31.1	19.7	0.51
		End	SHOU-BWDL-PACT-017D3	12.0	31.1	26.2	0.18
	Control S-2 at uptake	Beginning	SHOU-BWDL-PACT-017D4	12.1	31.1	23.4	0.39
		Middle	SHOU-BWDL-PACT-017D5	12.0	31.0	20.8	0.24
		End	SHOU-BWDL-PACT-017D6	12.0	31.1	20.2	0.25
2014-04-05	Treated discharge S-4	Beginning	SHOU-BWDL-PACT-017D7	11.2	31.0	43.8	0.16
			SHOU-BWDL-PACT-017D8	11.9	31.1	38.0	0.15
			SHOU-BWDL-PACT-017D9	11.7	31.1	17.0	0.17
		Middle	SHOU-BWDL-PACT-017D10	12.1	31.0	19.4	0.10
			SHOU-BWDL-PACT-017D11	11.8	31.2	18.7	0.14
			SHOU-BWDL-PACT-017D12	11.8	31.0	19.9	0.17
		End	SHOU-BWDL-PACT-017D13	11.7	31.1	21.6	0.18
			SHOU-BWDL-PACT-017D14	11.8	31.1	17.5	0.09
			SHOU-BWDL-PACT-017D15	11.9	31.2	18.2	0.18
	Control discharge S-3	Beginning	SHOU-BWDL-PACT-017D16	11.8	31.1	20.2	0.19
		Middle	SHOU-BWDL-PACT-017D17	11.8	31.2	20.4	0.13
		End	SHOU-BWDL-PACT-017D18	11.6	31.2	19.7	0.17