Alternate Management System Review Checklist_PANASIA			
A Guideline (G8) Specification (GB section noted in brackets)	B (Applicant to identify page, paragraph and/or table where this information is located)	C Adequacy (USCG to note Y/N/NA)	D Comments (Applicant - black; USCG - red)
I. BWMS documentation [5]			
1.1 BWMS description, including diagrammatic drawing(s) showing typical pumping and piping arrangements (including a Bill of Materials and the specifications and standard/s which it meets), sampling facilities for control and monitoring systems, operational outlets for treated water and waste streams [5.1]	-Page4~12, Operation manual in Manual part1, Section B in Binder 2 -Page17, 29, 31, Instruction manual in Manual part2, Section B in Binder2 (P&ID, Back flushing, Sampling) -Bill of Materials, part3, Section A in Binder2 -Page14,20, Operation manual in Manual part1, Section B in Binder 2		
1.1.1 Control equipment automatically monitors and adjusts necessary treatment dosages, intensities or other aspects of the BWMS necessary for proper administration of necessary treatment [4.10]	-Page 46, Operating manual in Manual part 1, Section B in Binder 2		
1.1.2 Control equipment incorporates a continuous selfmonitoring function when BWMS is in operation [4.11]	-Page 46, Operating manual in Manual part 1, Section B in Binder 2		
1.1.3 Monitoring equipment records the proper functioning or failure of the BWMS. [4.12]	-Page 47, Operating manual in Manual part 1, Section B in Binder 2		
1.1.4 Control equipment stores data on monitored functions and conditions for at least 24 months; stored data can be displayed or printed for inspection. [4.13]	-Page 53, Operating manual in Manual part 1, Section B in Binder 2		
1.2 Protections against interference [4.5]			
1.2.1 Every access beyond requirements of 4.4 requires breaking a seal [4.5.1]	-Page18, Manual part 2, Section B in Binder 2		
1.2.2 Visual alarm is activated whenever the BWMS is in operation for purpose of cleaning, calibration, or repair;	-Page 31,47 Operating manual in Manual part 1, Section B in		

such events recorded by control equipment [4.5.2]	Binder 2		
1.2.3 Suitable emergency over-rides/by-passes to protect ship and crew [4.5.3]	-Page 44,58, Operating manual in Manual part 1, Section B in Binder 2		
1.2.4 By-passes activate an alarm and the event is recorded by the control equipment [4.5.4]	-Page58, Operating manual in Manual part 1, Section B in Binder 2		
1.3 Audible and visual alarm signals in stations from which ballast water operations and ballast water management are controlled [4.3]	-Page36, Operating manual in Manual part 1, Section B in Binder 2		
1.4 Manufacturer's equipment manuals containing details of major components of the BWMS and their operation and maintenance [5.1.2]	- Manual Part2, Section B in Binder 2 -Flow Meter Manual, Section A in Binder3		
1.5 Operation and technical manual for complete BWMS covering arrangements, operation, and maintenance of the BWMS as a whole, and specifically describing any parts not covered by manufacturers equipment manuals [5.1.3]	- Manual Part1, 2, Section B in Binder 2		
1.5.1 Operations section of the manual includes normal operational procedures [5.1.4]	-Page 45~51, Operating manual in Manual part 1, Section B in Binder 2		
1.5.2 Documentation of simple and effective means for operation and control [4.8]	-Page22~37, Operating manual in Manual part 1, Section B in Binder 2		
1.5.3 Operations manual includes procedures in the event of a malfunction of the BWMS, including emergency actions necessary for securing the ship [5.1.4]	-Page44, Operating manual in Manual part 1, Section B in Binder 2		
1.5.4 Operations manual contains maintenance procedures [5.1.3]	-Page38~52, Manual part 2, Section B in Binder 2		
1.6 All working parts of the BWMS liable to wear or damage easily accessible for maintenance [4.4]	-Page38~52, Manual part 2, Section B in Binder 2		
1.6.1 Means provided to check on drift of, repeatability by, measuring devices that are part of control	-Initial Calibration Procedure, Section D in Binder 3		

equipment, and for re-zeroing control equipment meters. [4.14]			
1.6.2 Facilities incorporated for checking the performance / calibration of components of BWMS that take measurements [4.6]	-Initial Calibration Procedure, Section D in Binder 3		
1.7 Operations manual describes methods for conditioning of treated water prior to discharge to control residual treatment chemicals, disinfection by products, and the general sUitability of the treated water for discharge. [5.1.5]	-Page31, Manual part 2, Section B in Binder 2		
1.8 Technical section of the manual includes adequate information (including description and diagrammatic drawings of monitoring and electrical/electronic wiring) to enable faultfinding. [5.1.7]	-Page57, Manual part 2, Section B in Binder 2		
1.9 Technical section of the manual includes specifications defining, inter alia, requirements for location and mounting of components, arrangements for sampling by control and monitoring equipment, and arrangements for ensuring safe operation. [5.1.8]	-Page17~29, Manual part 2, Section B in Binder 2		
1.9.1 BWMS components, if intended for fitting in locations where flammable atmospheres may be present, comply with relevant safety regulations; certified by Administration as safe for use in a hazardous area [4.9]	-DNV ATEX PU250-Ex, Section B in Binder5 -DNV ATEX PU500-Ex, Section B in Binder5		
1.10 Operations and technical manual contains a recommended test and checkout procedure, specifying all the checks to be carried out in a functional test following installation and a test by a surveyor when carrying out an onboard survey to confirm the installation meets the manufacturer's specific installation criteria. [5.1.9)	-On Board Test Procedure_Standard, Section C in Binder3 -Test Certificate for Compatibility Test, Section D in Binder1		
1.11 BWMS is robust and suitable for working in the shipboard environment, with design, construction and materials, including electronic and electrical components (including a Bill of Materials and the specifications and standard/s which it meets), adequate for intended service [4.7.1]	-Test Certificate for Environmental Test, Section C in Binder1		
2. Type approval certificate			

2.1 Type approval certificate issued by, or on behalf of, the Administration [6.1]	-Type Approval Certificate, Section A in Binder 1		
2.1.1 Specification of any limiting conditions on the usage of the BWMS, including but not limited to ballast water volumes, flow rates, salinity, temperature, etc. [6.1. and 6.2]	-Type Approval Certificate, Section A in Binder 1		
2.1.2 Specification of the type and model of the BWMS, including identification of duly dated equipment assembly drawings bearing model specification numbers or equivalent identification details [6.5]	-Page 4~5, Instruction manual in Manual part 2, Section B in Binder 2		
3. Environmental and public health impacts assessment documentation.			
3.1 Protections reduce to minimum danger to persons (i.e., hot surfaces, moving parts, exposure to chemicals, UV, etc) [4.7]	-Page30~36, Safety of Ship & Crew in Manual part 2, Section B in Binder 2		
3.2 Complete application dossiers for IMO active substance basic and final approvals [Annex Part 1, 1.6.4]	-Chemical Analysis, Section A in Binder 4 -Toxicity Test Report, Section B in Binder 4 and Section A in Binder 5		There are no active substance applied technology using Filter and Ultraviolet disinfection. Please refer to Chemical Analysis and Toxicity Test Report as attached files.
3.3 Adequate arrangements for storage, application, mitigation, and safe handling of any substances of a dangerous nature [4.2)	- N/A		
4 Quality Assurance (QA) and Quality Control (QC) [Annex Part 1, 2.1]			
4.1 Quality Management Plan (QMP) addressing the quality control management structure and policies of the testing body, including all subcontractors and outside laboratories) [Annex Part 2, 2.1.2.2]	-Page 26~27, Quality Management plan in QAPP, Section E in Binder 1		
4.2 Quality Assurance Project Plan (QAPP) describing the specifics of the BWMs, the test facility, and other conditions affecting the design and implementation of the test procedures [Annex Part 2, 2.1.2.3]	-Page 28~34 in QAPP, Section E in Binder 1		
4.3 Shipboard Test Plan and Report [Annex Part 2, 2.2.2.1]			
4.3.1 Documentation that treatment rated capacity of BWMs was appropriate for ship [Annex Part 2,2.2.2.2]	-Report for land-based and shipboard test parameter, Part2, Section B in Binder1		

	-Shipboard test data, Part4, Section B in Binder 1		
4.3.2 Documentation that the volume and pumping rate of ballast water during test was consistent with normal ballast operations of ship [Annex Part 2, 2.2.2.3]	-Land-based and shipboard test report, Section B in Binder 1		
4.3.3 Documentation of all test cycles, demonstrating three valid consecutive test cycles showing discharge of treated ballast water meeting regulation D-2 standard [Annex Part 2, 2.2.2.4 and 2.2.2.8]	-Page33~36, Land-based and Shipboard test report, Section B in Binder 1		
4.3.4 Tests meet minimum organism concentrations during uptake of more than 10 times the maximum permitted values in regulation D-2.1 [Annex Part 2,2.2.2.5]	-Page33~36, Land-based and Shipboard test report, Section B in Binder 1		
4.3.5 Documentation that sampling regime was appropriate, either by meeting G8 recommendations for control and treated ballast water including: 1) Control tank replicates; 2) Treatment tank replicates 3) Sample sizes; or 4) By documenting appropriate validation of sample volumes and numbers, per EPA ETV. [Annex Part 2, 2.2.2.6]	1~2) Page 27~29 in Land-based and Shipboard test, Section B in Binder 1 3) Page 44 in Land-based and Shipboard test report, Section B in Binder 1 4) Page37 in QAPP, Section E in Binder 1		
4.3.6 Documentation that test cycles completed over at least six months [Annex Part 2,2.2.2.7]	-Logging Data from T/Y EVER for shipboard test, Section B in Binder 1		
4.3.7 Documentation of source water characterization for salinity, temperature, POC, and Tss [Annex Part 2, 2.2.2.9]	-Page34~36 in Land-based and Shipboard test report Section B in Binder 1		
4.3.8 Documentation of system operations, including: 1) Volume and locations of uptake & discharge volume; 2) Possible reasons for unsuccessful test cycle or failure of a cycle to meet D-2 standard; 3) Scheduled maintenance; 4) Unscheduled maintenance and repair; 5) Appropriate engineering parameters; and 6) Proper functioning of control & monitoring equipment. [Annex Part 2, 2.2.2.10]	1) Report for land-based and shipboard test parameter 2~4) N.A. 5) Report for land-based and shipboard test parameter 6) Operating manual in Manual part 1, Section B in Binder 2		
4.4 Land-based Test Plan and Report [Annex Part 2,2.4]			

4.4.1 Description of test set-up, including: 1) Arrangement of BWMS (Annex part 2, 2.3.9); 2) Piping and pumping arrangements (Annex part 2, 2.3.9); 3) Tank specifications (treatment and control) (Annex Part 2 2.3.10); 4) Facilities for representative sampling (Annex Part 2, 2.3.12; 5) Augmentation facilities for DOC, POC, TSS and standard test organisms if used (Annex part 2,2.3.12; and 6) Monitoring facilities for environmental parameters including pH, temperature, salinity, dissolved oxygen, TSS, DOC, POc, and turbidity. [Annex Part 2,2.3.12] pH, temperature, salinity, dissolved oxygen,	1~4) -Page 7~10 in Land-based and Shipboard test report, Section B in Binder 1 -Page 28~33 in QAPP, Section E in Binder 1 5) -Page 11 in Land-based and Shipboard test report, Section B in Binder 1 -Page 34~36 in QAPP, Section E in Binder QAPP 6) -Page 11~13 in Land-based and Shipboard test report, Section B in Binder 1page 11 -Page 48~52 in QAPP, Section E in Binder 1		
4.4.2 Documentation system was operated at treatment rated capacity, or scaled as follows: 1) 200 M3/hr<TRC<1,000 M3/hr - downscaled no more than 1:5; 2) TRC>l,OOO M3/hr - downscaled no more than 1:100; and 3) Documentation of mathematical modeling and/or calculations demonstrating downscaling used would not affect functioning and effectiveness onboard ship at full scale for which certification is intended. [Annex Part 2, 2.3.13]	1~2) Page 8 in Operating parameter record for Land-based and Shipboard test, Part 2, Section B in Binder 1 3) CFD Modeling for Scaled Up Chamber, Section B in Binder 3		
4.4.3 Description of cleaning procedures for test set-up before starting testing, and between test cycles [Annex Part 2, 2.3.11]	-Page 44~47 in QAPP, Section E in Binder 1 -Page 11 in Land-based and Shipboard test report, Section B in Binder 1		
4.4.4 Description of sampling and analysis procedures for organisms and environmental/water quality	-Page 39~84 in QAPP, Section E in Binder 1 -Page 9~16 in Land-based and Shipboard test report, Section B in Binder 1		
4.4.5 Results of all analyses for organisms, challenge	-Page 16 ~26 in Land-based		

conditions, and BWMS performance indicators [Annex Part 2,2.3.23; 2.3.25)	and Shipboard test report, Section B in Binder 1		
4.4.6 Documentation the BWMS was operated, and performed as designed, within its specified parameters, including power consumption, flow rate, etc. [Annex Part 2, 2.3.4; 2.3.24]	- Operating parameter record for Land-based and Shipboard test, Part 2, Section B in Binder 1		
4.4.7 Documentation of all test cycles, demonstrating 5 valid tests with treated water meeting the D-2 discharge standard for each salinity regime for which testing was conducted [Annex Part 2, 2.3.1; 2.3.17; 2.3.18; 2.3.19; 2.3.20; 2.3.36)	-Page16~26 in Land-based and Shipboard test report, Section B in Binder 1		
4.5 Environmental Testing [Annex Part 3]			
4.5.1 Documentation of vibration tests [Annex Part 3, 3.4- 3.7]	-Test Certificate for Environmental Test, Section C in Binder 1		
4.5.2 Documentation of temperature tests [Annex Part 3, 3.8- 3.10]	-Test Certificate for Environmental Test, Section C in Binder 1		
4.5.3 Documentation of humidity tests [Annex Part 3, 3.11]	-Test Certificate for Environmental Test, Section C in Binder 1		
4.5.4 Documentation of heavy seas protection tests [Annex Part 3, 3.12)	-Test Certificate for Environmental, Section C in Binder 1 -Type Approval Certificate, Section A in Binder 1		
4.4.5 Documentation of power supply fluctuation tests [Annex Part 3, 3.13]	-Test Certificate for Environmental Test, Section C in Binder 1		
4.5.6 Documentation of inclination tests [Annex Part 3,3.14]	-Test Certificate for Environmental Test, Section C in Binder 1		

PAASIA