simplify ballast

BWMP Supplement for BWMS Operations in Challenging Water Quality

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BWMS Operation in Challenging Water Quality

Challenging water quality (CWQ) refers to ambient uptake water having water quality parameters (including but not limited to high total suspended solids and turbidity) that cause a properly installed, maintained and operated type-approved BWMS to be temporarily inoperable due to an operational limitation or an inability to meet operational demand. Water temperature and salinity, however, are not parameters that define CWQ. The inoperability of the BWMS in these conditions, does not indicate a BWMS failure (ref. MEPC.387(81)) but instead reflects a temporary condition where the BWMS cannot be known to be fully treating the ballast water to the D-2 standard.

These instructions are provided in order to supplement the normal operations of the installed BWMS, provided that the system is installed, operated, and maintained in accordance with the MANUFACTURER Operations, Maintenance, and Safety Manual OM5M. Operations under these instructions have been developed in accordance with the IMO's *Interim Guidance on the Application of the BWM Convention to Ships Operating in Challenging Water Quality*, MEPC.387(81). Operations under MEPC.387(81) are considered to meet the requirements of the Convention.

This guidance does not address situations in which a BWMS is inoperable for reasons unrelated to CWQ, or in which inadequate performance is due to installation, operation or maintenance issues. Such situations must be addressed on a case-by-case basis in consultation with the vessel's Flag Administration and the impacated port States (see also the *Guidance on contingency measures under the BWM Convention* (BWM.2/Circ.62).

1. CWQ Procedural Overview

During normal operations of the BWMS, there will be times when the system is not performing at its full treatment rated capacity (TRC). This observation alone is not sufficient to determine that the vessel is operating in challenging water. In situations where the crew observes the reduction of TRC below normal expectations, the operator must first ensure that the system is being properly operated, that all power levels and dosage levels are at their highest level, and that all valves and components of the BWMS are correctly aligned.

Maintenance timetables and checklists for maintaining the system in optimal condition should be verified completed and up to date and the calibration of all critical sensors should be checked to ensure they are within proper date.

To the best of the ability of the crew, through either visual examination of the water quality or through experience in similar waters, the crew should assess which water quality

parameters are causing the limitation of system functions. Possible parameters to assess whether or not the BWMS NAME BWMS is experiencing challenging water include:

Potential CWQ parameters	Impacts	Types of BWMS affected
Turbidity	Decreased light transfer through water due to deflection from particles/organisms (UV scatter), increased filter differential pressure	UV, filtration
UV transmissivity	Decreased penetration of UV light through seawater	UV
Dissolved organic carbon	Increased consumption of Active Substance, UV absorption	UV, Active Substance
Particulate organic carbon	Increased consumption of Active Substance, UV scatter	UV, Active Substance
Total suspended solids (sediment and/or organism load)	Increased consumption of Active Substance, UV scatter, increased filter differential pressure	UV, filtration, Active Substance

Table 1: Water quality parameters for challenging water (reprinted from MEPC.387(81))

Some noted water quality parameters may not be able to be independently assessed by the crew, however correlation between aspects of the BWMS operation and the noted parameters (e.g. high differential pressure indicated by the filter may indicate high turbidity, low TRO alarms after initial treatment may indicate high dissolved organic or particulate carbon) to assess whether or not the system is currently encountering challenging water. It should be noted that salinity (low or high) and temperature (low or high) are specifically excluded as parameters that are considered as challenging water quality.

Once the crew has determined that the vessel is currently operating in challenging water, the specific operational troubleshooting and operational optimization steps outlined in section 2 of this guidance should be implemented in order to ensure that the system is providing the highest possible flow rate possible in the water conditions being encountered.

After all operational optimization and troubleshooting steps have been completed as per section 2 of this guidance, the crew should determine the vessel's current operational demand for ballast water. Operational demand is defined by MEPC.387(81) as the minimum flow rate defined in the Ballast Water Management Plan that will permit the ship to continue cargo operations while using the BWMS, which should be no greater than 50% of the BWMS TRC. If the current throughput of the BWMS, as limited by the CWQ is less than the Operational Demand, then a bypass of the system is authorized under the provisions of this guidance.

In cases where the BWMS is bypassed due to operational demands of the vessel, crews should take care to ensure:

A. Only the minimum amount of ballast required for the safe operation of the vessel should be brought onboard during the bypass event;
B. Care should be taken to load bypassed ballast water into the minimum number of tanks practical;
C. Each tank where water is loaded during a bypass event should be recorded in the Ballast Water Record Book (BWRB);
D. Each tank where water is loaded during a bypass event should be isolated following the completion of loading to avoid potential contamination of other, fully-treated tanks; and
E. Any tanks which have been loaded with fully treated ballast water but are not isolated from tanks which have been loaded during a bypass event should be considered contaminated and should be mitigated through the steps contained in section 5 of these instructions.

An overview of this process is provided below:

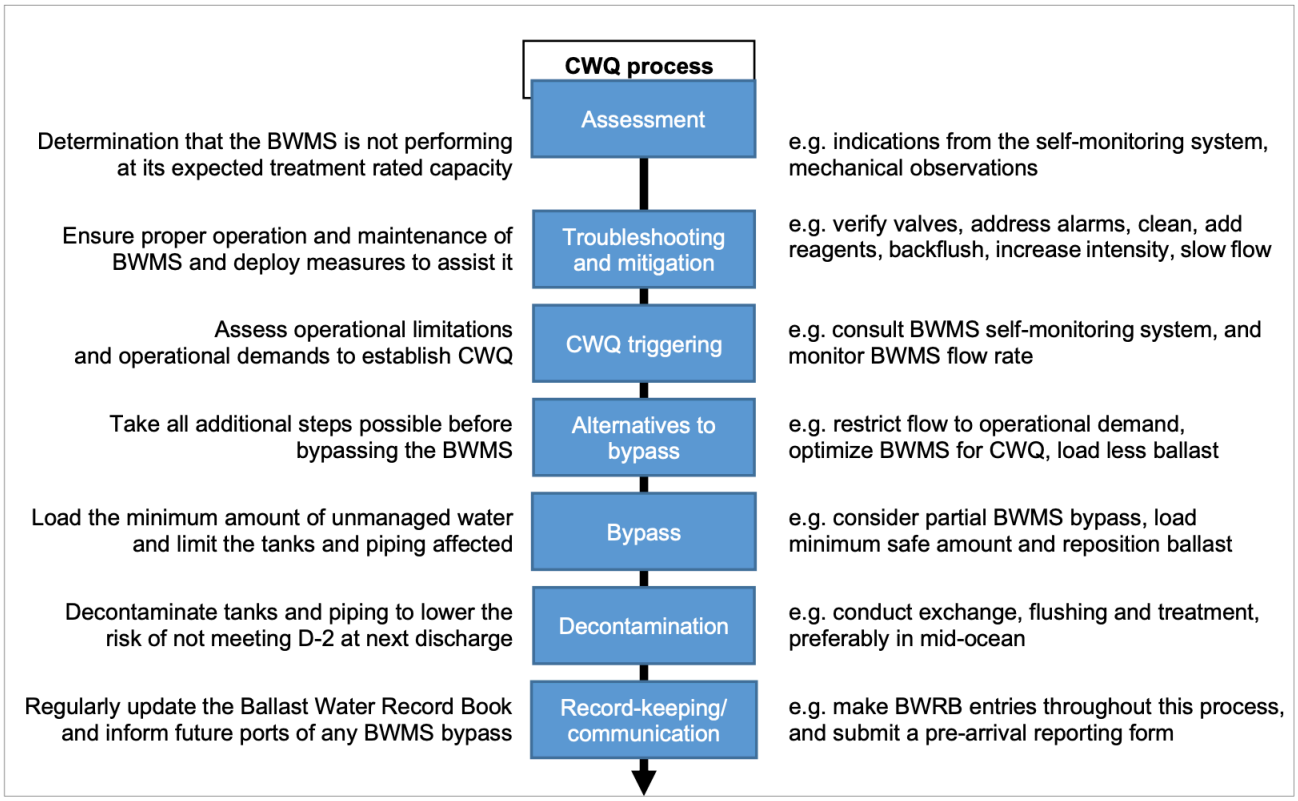


Figure 1: Conceptual Overview of the CWQ Process (reprinted from MEPC.387(81))

Pre-emptively bypassing the BWMS based on historical CWQ issues experienced at a location is discouraged because water quality conditions may vary by precise location, ship and/or nearby port operations, time of day, tide, weather or seasonality. Through the self-monitoring system, the BWMS is the most suitable and technical method to precisely

determine the water quality challenge at any moment and relieves the ship crew of this determination.

If a pre-emptive bypass is warranted due to regular visits to a port or location with known and recurring CWQ, this should be agreed in advance bilaterally between the vessel, the Flag Administration and the Port State or States expected to receive the ballast water following the pre-emptive bypass as per MEPC.387 (81), Appendix 2.

2. CWQ parameters for the BWMS NAME BWMS

The BWMS NAME BWMS by MANUFACTURER has the following design limitations as indicated on their Type Approval documentation:

Parameter	Normal Value	BWMS NAME Design Limitation

Assessment, troubleshooting, and optimization steps for each of these parameters are listed below.

2.1 Parameter 1

2.1.1 Assessment

2.1.2 Troubleshooting

2.1.3 Optimization

If, after all these troubleshooting and mitigations steps have been completed, the crew may continue to Section

3 Alternatives to Bypass. (add this paragraph to the end of each parameter section)

2.2 Parameter 2

2.2.1 Assessment

2.2.2 Troubleshooting

2.2.3 Optimization

2.3 Parameter 3 (if appropriate)

2.3.1 Assessment

2.3.2 Troubleshooting

2.3.3 Optimization

2.4 Parameter 4 (if appropriate)

2.4.1 Assessment

2.4.2 Troubleshooting

2.4.3 Optimization

2.5 Parameter 5 (if appropriate)

2.5.1 Assessment

2.5.2 Troubleshooting

2.5.3 Optimization

3 Alternatives to Bypass

The bypassing of the BWMS NAME BWMS is the last potential option to address concerns about the vessel's need to achieve a ballast rate according to their operational demand for ballast. When a BWMS is bypassed, organisms can pass into the ballast tanks and ballast piping and may result in discharging harmful organisms and failed discharge compliance tests long after the ballast tanks have been properly filled with treated ballast water. In order to prevent bypass, the following should be considered prior to engaging in any bypass of the BWMS NAME BWMS.

- **Is ballasting critical to the safety of the ship?** If ballasting can be postponed or if the cargo loading rates can be slowed to reduce the operational demands of vessel down to below the possible loading rate of the BWMS, then these actions should be undertaken prior to engaging in a bypass of the system.

- **Is partial treatment possible?** In some cases, the BWMS NAME system may be able to continue providing a partial treatment at the required flow rate to meet the vessel's operational demands, but one or more alarms may indicate that the system is not fully treating the ballast water (e.g. low filter outlet pressure, low UVI, low TRO/ORP value, etc). In these cases, the BWMS should remain on and providing a partial treatment, but the tanks should be indicated for future remedial action according to section 5 of this guidance.

If ballasting is critical to the ship, and partial treatment is possible, the BWMS should be left in operation and the minimum amount of ballast should be brought onboard to ensure the safety of the operation. Additionally, the tanks receiving this partially treated ballast water should be limited to the extent possible to limit the amount of remediation required by the vessel. If partial treatment of the ballast is not possible, proceed to Section 4 Safe bypass procedures to minimize the exposure of tanks / piping to unmanaged water.

The flow chart for this part of the procedure, reprinted from MEPC.387(81) is:

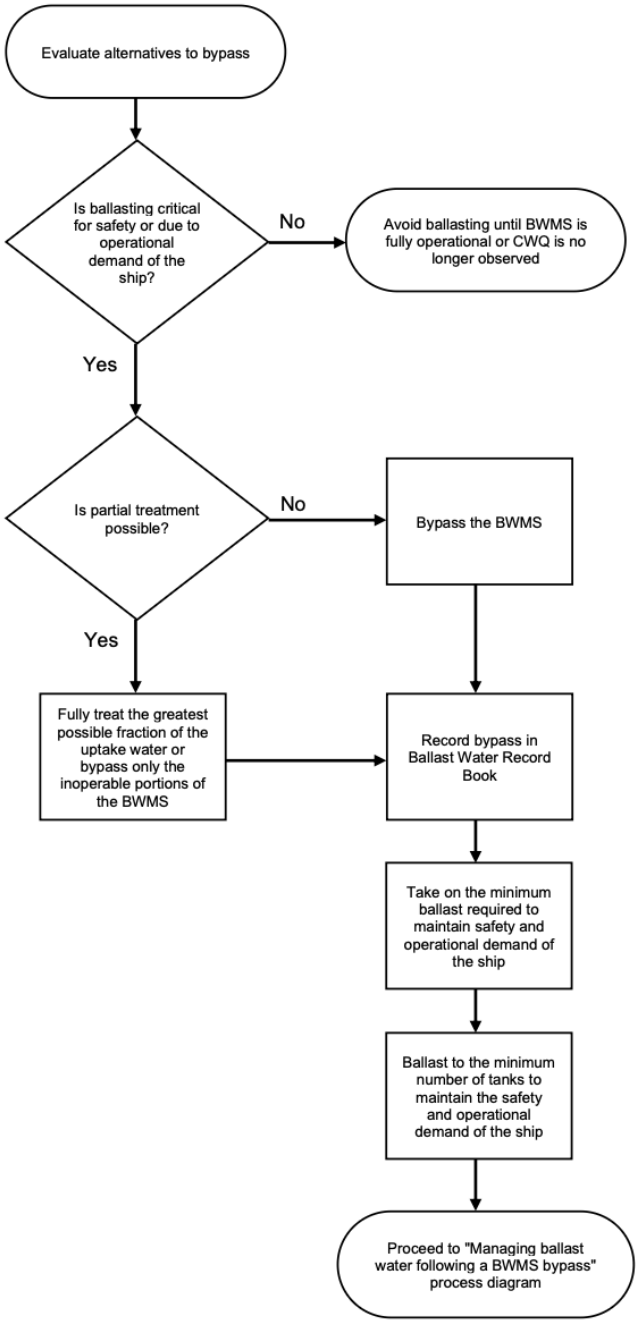


Figure 2: Alternatives to bypass (reprinted from MEPC.387(81))

4 Safe bypass procedures to minimize the exposure of tanks / piping to unmanaged water

The proper sequence of to safely bypass the BWMS NAME BWMS should be followed any time the BWMS is bypassed. Check the operations section of the Ballast Water Management Plan in order to identify which valves should be opened to bypass the system.

The crew should note that partially managed or unmanaged ballast water loaded through a bypass event is likely to contaminate ballast tanks and piping systems with harmful aquatic organisms and pathogens that pose a risk to the environment. Therefore, consideration should be given to limiting the number of ballast tanks that will be exposed to partially treated or unmanaged ballast water.

Only the minimum safe volume of ballast water should be taken on board during any bypass event.

Following any bypass event, the ship should proceed to section 5 Mitigating untreated or partially treated water taken up during a bypass

5 Mitigating untreated or partially treated water taken up during a bypass

Following a bypass event, the ship should proceed to a nearby area where less challenging uptake water may be obtained to mitigate the untreated or partially treated water taken on during the bypass event.

To minimizing the exposure of tanks/piping to unmanaged water during bypass procedure, and the risk to future receiving ports, these steps should be undertaken as close as practical to the uptake area for the potentially contaminated ballast water.

Mitigation of all affected tanks should be accomplished as follows:

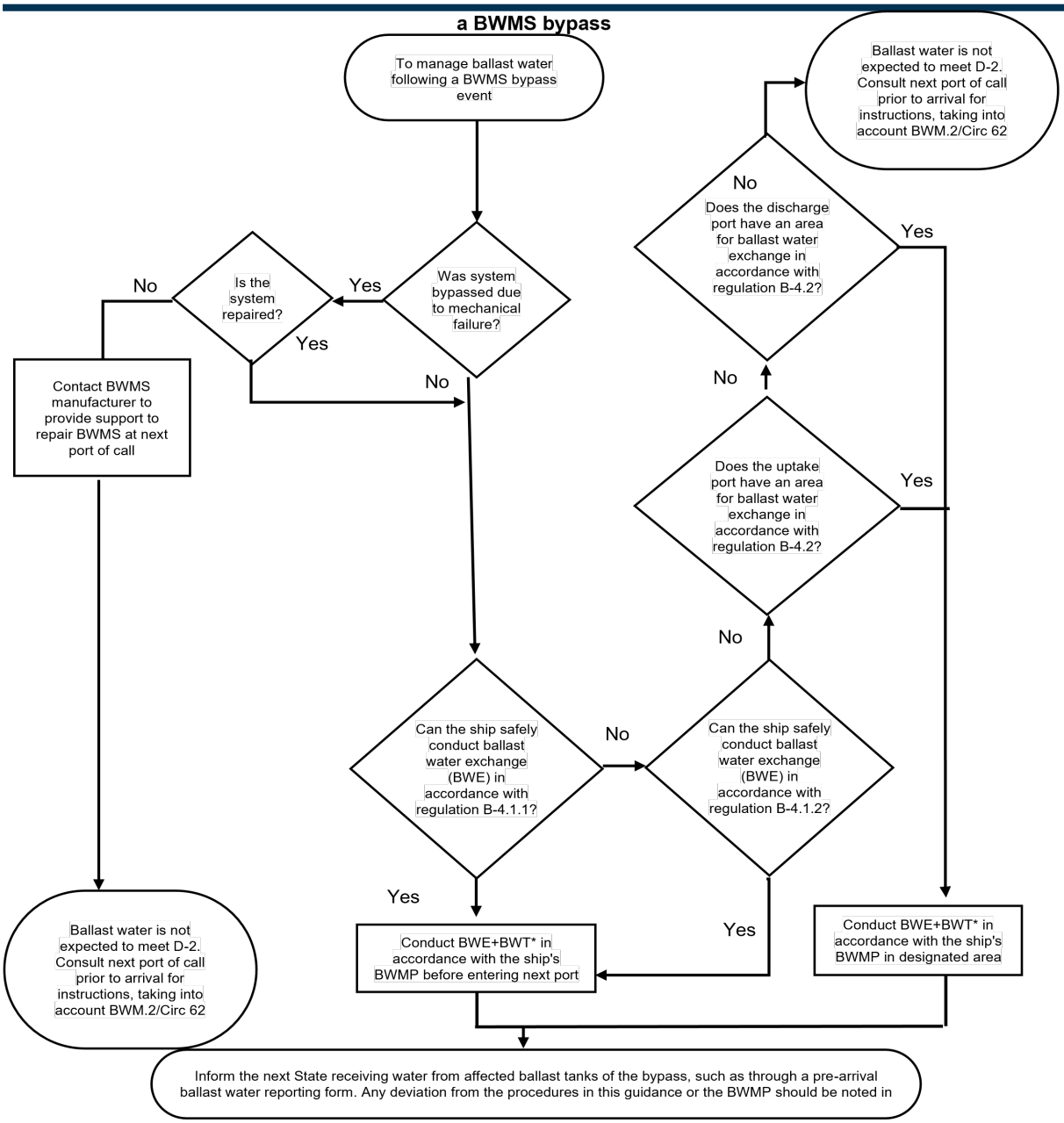
a) De-ballasting each tank affected via the most direct route possible, using gravity discharge to the extent possible. All BWMS piping should be bypassed, if possible, during this process to avoid contaminating the BWMS with affected water. The stripping pump, if fitted, should be used to remove the greatest possible extent of ballast water from the tanks.
b) Once the affected water has been removed to the extent possible, the ship should complete one full ballast water exchange plus treatment (BWE+BWT) for each tank which was impacted by the bypass event. This should, at a minimum, involve the filling of each tank with fully treated ballast water, holding that ballast water for the minimum XX-hour hold time required by the BWMS NAME Type Approval, and then discharging this water through the BWMS and refilling the tank a second time with fully treated water. If the next port of call is not expected within the XX-hour hold time requirement, the vessel may commence the voyage and engage in the second half of the BWE+BWT procedure during the voyage to the next port of call.
c) Ballast Water Record Book entries should be made for both the discharge, refilling, hold time, subsequent discharge, and final refilling of each affected tank. These

records will serve as the notification to future Port States of the completion of the proper BWE+BWT procedure as required under MEPC.387(81).

d) All BWE+BWT should take place inside the exchange areas designated by the uptake or discharge port, depending on the location of the vessel at the time of the operation.

IMPORTANT NOTE: Pumping through 1.66 times the normal volume of treated ballast water can promote a return to D-2 compliance by ensuring that a sufficient proportion of the unmanaged water (and the organisms contained within it) has been replaced with the treated water.

A flow chart, describing this part of the procedure is included as Figure 3.



* For decontamination purposes, BWE+BWT is to be done in method, ballast tanks should be emptied, residual ballast water and sediments should be managed (by flushing the tank with treated water in accordance with the OMSM, approved Ballast Water Management Plan, and best practices. For the sequential eated water, if required by the receiving port State), and then the tank should be refilled with treated water. For non-sequential methods, a sufficient volume of treated uptake water should be pumped through to reduce the concentration of organisms in the tank to the standard in regulation D-2, at least 1.66 times the volume specified by regulation D-1.2 if required by the receiving port State. The BWMS should be used during emptying of contaminated tanks, as well as subsequent uptakes, flushing and discharges during decontamination. See appendix 1.

Figure 3: Mitigating a bypass event (reprinted from MEPC.387(81))

Following a bypass event, the ship is still responsible for meeting the D-2 standard at subsequent discharge locations. Whenever a full or partial bypass of a BWMS is undertaken, the next State receiving water from affected ballast tanks should be informed of the bypass, such as through a pre-arrival ballast water reporting form when such a form is required.

The use of the flow-through or dilution method for BWE+BWT is not recommended. However, in the case of a ship which must use the flow-through or dilution method:

- a sufficient volume of treated uptake water should be pumped through to reduce the concentration of organisms in the tank to the standard in regulation D-2, at least 1.66 times the volume specified by regulation D-1.2, if required by the receiving port State; and
- to reduce the risk that non-neutralized Active Substances could damage the environment, human health, property or resources, a ship with a BWMS that uses Active Substances should only conduct this exchange in a location described in regulation B-4.1 and in compliance with any precautions in the approved BWMP designed to ensure the safety of the ship and crew.

6 Record Keeping

In cases where these instructions have been used to operate the BWMS either to partially treat the ballast water or to bypass the BWMS due to encountering CWQ, the use of this procedure should be recorded in the Ballast Water Record Book, taking into account the Guidance on ballast water record-keeping and reporting (BWM.2/Circ.80, as may be revised).

The ship's Ballast Water Record Book should include a description of:

- The reason why normal ballasting operations were interrupted;
- Any steps taken to optimize the treatment process and resolve BWMS potential malfunctions;
- The minimum ballast flow required due to the operational demands at the time the CWQ operational limitations were encountered;
- The steps that were taken prior to a bypass being initiated (as relevant);
- The tanks which have received bypassed or partially treated ballast water;
- The date, time and location where the bypass took place; and
- The decontamination steps that were taken to recover from BWMS bypass as per the approved BWMP, including: the start and end locations (GPS coordinates) at which any flushing and/or exchange took place, the start date and time; end date and time, the method of exchange and the volume exchanged and/or flushed.

SUBSTITUTION KEY

This substitution key is inserted to allow the direct substitution of key words in order to facilitate the insertion of this section into an established Ballast Water Management Plan for a specific vessel.

In order to use this substitution key, use the “Replace All” feature typing the text in Column A in the “Find” box and the desired text as indicated in Column B in the “Replace” box and selecting “Replace All”.

Column A	Column B
MANUFACTURER	Name of the BWMS Manufacturer
BWMS NAME	Trade Name of the installed BWMS
OM5S	Part number of the Operations, Maintenance, and Safety Manual
FLAG ADMINISTRATION	Name of the Flag Administration of the vessel