



TECHNICAL INFORMATION

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No : 2024-IMO-08
Date : 3 July 2024

Subject: Interim Guidance on the Application of the BWM Convention to ships operating in Challenging Water Quality conditions

This technical information is prepared to provide information on the *Interim Guidance on the application of the BWM Convention for ships operating in Challenging Water Quality conditions* (Res.MEPC.387(81)).

1. Background

According to Regulation B-3 of the BWM Convention, as of the D-2 compliance date for ships (no later than 8 September 2024), ships shall intake or discharge ballast water through a Ballast Water Management System (BWMS) treatment process to comply with the D-2 regulation.

In some ports with challenging water quality conditions (e.g., high turbidity), cases where BWMS is inoperable due to exceeding the System Design Limitations (SDL) and self-monitoring parameter of the BWMS have been frequently identified.

Following the ensuing discussion for consistent application and clarification of ballast water management in such cases, IMO Marine Environment Protection Committee (MEPC), at 81st session, adopted **the interim guidance on the application of the BWM Convention for ships operating in challenging water quality conditions** as **resolution MEPC.387(81)**.

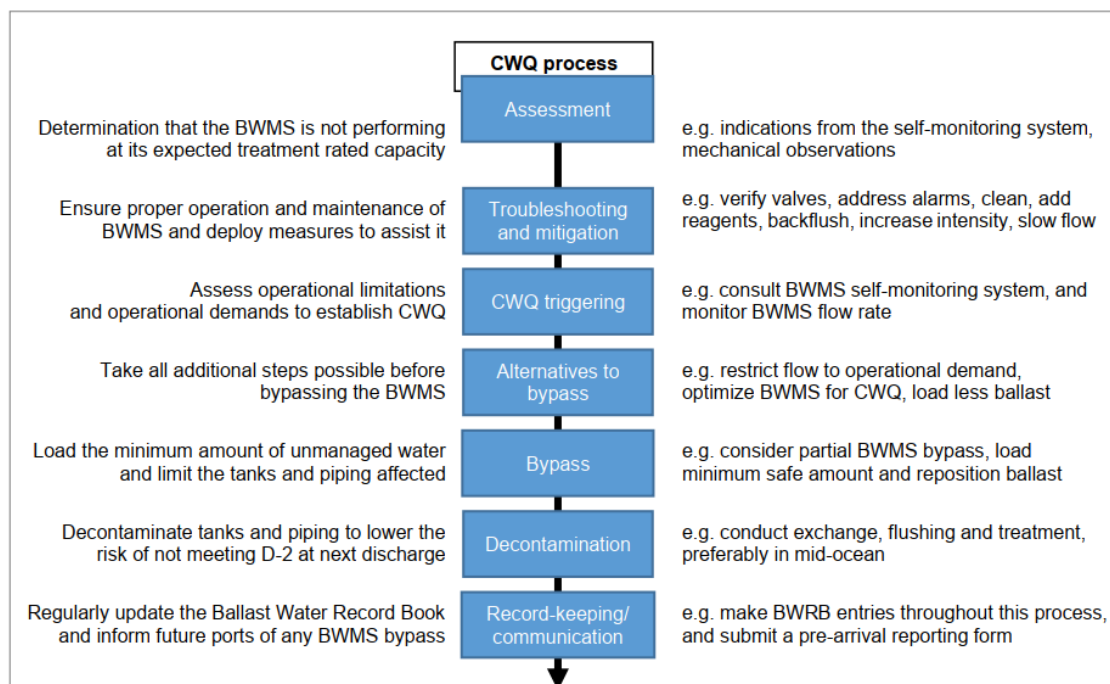
Therefore, please refer to the requirements and measures concerning the ballast water management in ports with challenging water quality conditions.

2. Ballast Water Management in ports with CWQ for Ships

- (1) When managing ballast water in ports with Challenging Water Quality (CWQ) under the BWM Convention, it should be done according to pre-planned procedures. This plan should be established within the ship's BWMP, considering the OMSM (Operation, Maintenance and Safety Manual) of the ship-specific BWMS, in consultation with the BWMS manufacturer, and by referring to this guidance and the flowchart below.

* CWQ refers to ambient uptake water having quality parameters (including but not limited to high total suspended solids or turbidity) that cause a BWMS to be temporarily inoperable due to an operational limitation or an inability to meet operational demand. However, temperature and salinity are not parameters that define CWQ.

- (2) Therefore, the procedures for ballast water management in CWQ ports should be incorporated into the ship's BWMP. In principle, reflecting CWQ procedures in the BWMP does not require re-approval. However, if there are any instructions from Administration, it should be followed.



- (3) In principle, bypass operations are not recommended. As a last resort, only the minimum safe amount required for the vessel's safety should be bypassed since uptake of ballast water bypassing BWMS is likely to contaminate ballast tanks and piping systems with harmful aquatic organisms and pathogens that pose a risk to the environment, human health, property and resources.

(4) For “reactive bypass*” operations, prior consultation with the flag Administration or the port Authority of the current and next port of call is not required. However, any discharge of ballast water from tanks where untreated water was taken in by bypass operation and exchanged with treated water should be reported** to the receiving port State before arrival. Additionally, any deviation from the procedures in this Guidance or the BWMP should be noted in the communication.

* Reactive bypass means a bypass undertaken during a ballasting operation upon reaching an operational limitation or encountering an inability to meet operational demand

** Refer to Ballast Water Reporting Form in accordance with BWM.2/Circ.80

(5) “Pre-emptive bypass*” operations should be discouraged. However, if appropriate, it can be done in specified ports or locations only after prior agreement with the flag Administration and the receiving port State. Detailed procedures should be documented in the BWMP.

* Pre-emptive bypass means a BWMS bypass undertaken, prior to or during a ballasting operation, in anticipation of reaching an operational limitation or encountering an inability to meet operational demand.

(6) If a bypass operation is undertaken, affected ballast water tanks and/or piping should be decontaminated (BWE+BWT) to comply with D-2 standard at subsequent discharge locations. In principle, ballast water should be exchanged in waters compliant with B-4.1 regulations. If no suitable exchange area is available, the ship should follow any instructions provided by subsequent port States. For reference, the list of circulars submitted by port States to the IMO regarding designated exchange areas is provided below. These pertain to vessels applying D-1 standards (BWE) and may be referred to when consulting with port States pertaining to exchange areas.

BWM.2/Circ.1	2005-09-22	Communication received from the Administration of Brazil
BWM.2/Circ.14	2008-08-28	Communication received from the Administration of the United Kingdom (North-East Atlantic Sea and Baltic Sea)
BWM.2/Circ.22	2009-08-14	Communication received from the Administration of Sweden (Baltic Sea, North-East Atlantic Sea)
BWM.2/Circ.35	2011-08-15	Communication received from the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC)
BWM.2/Circ.39	2012-08-20	Communication received from the Administration of Croatia (Mediterranean Sea, North-East Atlantic Sea, Baltic Sea)

BWM.2/Circ.41	2013-03-05	Communication received from the Administration of Colombia
BWM.2/Circ.51	2014-03-03	Communication received from the Government of Lithuania
BWM.2/Circ.56	2015-07-13	Communication received from the Government of the Netherlands (North Sea)
BWM.2/Circ.59	2016-06-20	Communication received from the Government of Australia

(7) Please refer to the following examples for recording BWRB, according to BWM.2/Circ.80 as applicable.

Uptake of B.W by bypass after CWQ triggers	Record the inoperability using (F) Code (Refer to Example 17, record "CWQ trigger alarm" in F-3)
	Record the uptake of B.W using (A) Code (record "bypass operation in accordance with BWMP" in A-5)
Flushing operation for decontamination	Record the flushing using (G) Code (Refer to Example 19. In case of using treated water, record "treated water was used to flush the tank" in G-5)
Ballast water exchange for decontamination	Record the exchange using (C) Code (Refer to Example 9)

(8) The provided technical information includes key points of the Guidance. For detailed information, please refer to the resolution MEPC.387(81). – End -

Attachment

1. Appendix. Summary of CWQ Guidance
2. Attachment - Res.MEPC.387(81)
3. Attachment – BWM.2/Circ.80

Distributions: KR surveyors, Ship owners, Manufacturers, Other relevant parties

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Appendix. Interim Guidance on the Application of the BWM Convention to ships operating in Challenging Water Quality conditions (Summary)

The followings are the key points of the CWQ Guidance. For more detailed information, please refer to the resolution MEPC.387(81).

1. General

(1) Purpose

1. The primary purpose of this Guidance is to assist ships in planning for compliance with the BWM Convention and the D-2 discharge standard when a type-approved BWMS that has been properly installed, operated and maintained encounters operational limitations or has difficulty meeting operational demand in Challenging Water Quality (CWQ) conditions
2. This Guidance includes recommended steps that can be taken to restore or maintain effective operation of a BWMS when operating in CWQ. These include steps to identify when a system is inoperable owing to CWQ; actions to avoid bypass of the system; steps to recover from bypass including steps to return to compliance with the D-2 discharge standard; and planning, record-keeping and communication principles.
3. 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 should be addressed on a case-by-case basis in consultation with the Administration of the ship and implicated port States (see also BWM.2/Circ.62, as amended).

(2) Principle

1. Triggers for implementing CWQ procedures should be included in the BWMP and should be based on the performance and self-monitoring functions of the BWMS. The list of triggers should be developed based on information provided by the BWMS manufacturer in the Operations, Maintenance and Safety Manual (OMSM), based on the BWMS design and operational limitation(s).

** In principle, reflecting CWQ procedures in the BWMP does not require re-approval. However, if there are any instructions from Administration, it should be followed.*

2. CWQ triggers should be assessed on a voyage-by-voyage basis because water quality challenges may vary. Following a bypass event in a location with CWQ, decontamination to ensure that subsequent discharges meet the D-2 performance standard may include ballast water exchange through a BWMS (BWE+BWT). However, BWE+BWT alone may not be sufficient to meet the standard. This risk may be mitigated by ballast water flushing.
3. Bypass should always be considered as the last resort and the BWMS should be used as far as practicable to treat ballast water with CWQ.
4. Ports are requested to take CWQ conditions into account and work with ships to plan arrival, departure and berthing times that will accommodate the consistent use of BWMS at expected ballasting rates. When ballasting rates are impacted by CWQ, ports are requested to exercise flexibility and support the ship in using a BWMS as long as operational demand is met (as defined in this Guidance and the ship's approved BWMP).
5. A ship fully applying this Guidance minimizes the risk of non-compliance with the D-2 standard at subsequent discharges. While this Guidance does not limit the rights of a port State in verifying a ship's compliance with the Convention (including sampling), this Guidance should be taken into account when prioritizing compliance verification activities.

(3) Application

This Guidance is applicable to:

1. ships that are required to meet the ballast water performance standard in accordance with regulation B-3 of the BWM Convention;
2. Administrations approving BWMPs in accordance with regulation B-1 and applying articles 13 and 14 of the BWM Convention;
3. port States applying articles 8 to 10 of the BWM Convention; and
4. BWMS manufacturers defining troubleshooting procedures in the OMSM in accordance with paragraph 4.8 of the BWMS Code.

2. Guidance for Ships operating in CWQ

1. Ship-specific guidance and procedures which should be included in BWMP is provided below. This planning is intended to facilitate ship operations and efficiency by optimizing the performance of BWMS in CWQ, reducing the need to bypass this environmentally protective equipment and decontaminate ballast tanks.

2. The below and example flow charts provided in 2. (1) of this technical information may also help ship crews reduce risks to the environment, human health, property and resources when operating in CWQ. However, this guidance should be read in conjunction with the ship-specific BWMP and OMSM.

Pre-planning

1. Operations in CWQ will be most efficient when the BWMP includes practical and realistic measures specific to the ship that take into account this Guidance, the BWMS technology installed on board, and specific instructions and procedures from the OMSM.
2. The approved BWMP should include a ship-specific definition of operational demand (minimum flow condition)* that identifies the sustained flow rate which cargo operations can practicably be continued by the ship. This operational demand should not be higher than 50% of the treatment rated capacity of the BWMS unless the ship's safety or stability would be affected.

* Minimum flow condition should be no greater than 50% of TRC, in principle. Operational demand should be established in consultation with BWMS manufacturers considering the specifications, technical aspects and type approval conditions of the BWMS.

3. Developing ship-specific process flow charts based on the appended samples and manufacturer's guidance is recommended.
4. A detailed plan for at least the following items should be included in the ship-specific BWMP and BWMS operating instructions, taking into account ship safety and the maintenance and operation instructions in the OMSM.

(1) Maintenance

Maintenance timetables and checklists for maintaining the system in optimal condition for managing CWQ when it is encountered, including:

1. crucial maintenance actions, such as those related to inspection, cleaning, calibration, active substance monitoring, etc.; and
2. ensuring the availability on board of sufficient approved spare parts, Active Substances and neutralizing agents.

(2) Assessment

Indications from the BWMS self-monitoring system or a mechanical observation that the BWMS is not performing at its expected treatment rated capacity.

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.

(3) Troubleshooting and mitigation

Procedures to identify and resolve challenges linked to the operation and maintenance of the BWMS, as well as ship-specific procedures for assisting and optimizing the BWMS in treating CWQ, with a view to completing normal ballast water treatment without bypassing the BWMS, giving consideration to operational demands

If CWQ is impacting ballasting operations, then the crew should implement ship-specific troubleshooting procedures set out in the BWMP and the OMSM and verify that the BWMS has been properly maintained. If the steps above indicate that the BWMS has been properly operated and maintained, the crew should follow procedures in the BWMP and the OMSM to deploy mitigating measures that assist the system in treating the water successfully.

(4) CWQ triggers

In case troubleshooting and mitigation is unsuccessful, a table of critical alarms specific to the BWMS based on the OMSM indicating that an operational limitation has been reached, or the BWMS is not meeting operational demand (minimum flow rate). This should include ship-specific procedures to be taken when an alarm is encountered.

CWQ triggers relating to operational limitations should be based on the system design limitations (SDL) of the BWMS as tested during the type approval process, clearly identified in the ship's approved BWMP, and should be developed with reference to the OMSM. CWQ triggers may consist of relevant alarms concerning matters such as:

1. the required UV transmittance or UV dose of the BWMS;
2. the maximum allowable differential pressure across the filter to prevent permanent damage to the filter element;
3. a reduction in flow rate that is below the minimum operating requirements of the BWMS, as identified by the OMSM; and
4. monitoring data of the BWMS when the self-monitoring system indicates the BWMS is not operating normally, and that cannot be remediated through optimization of the BWMS in accordance with the BWMP

(5) Alternatives to bypass

Pre-planned actions, considerations and procedures, taking into account the OMSM, that may clear operational limitations or allow the BWMS to meet operational demands, before the ship bypasses a BWMS.

Before the BWMS is bypassed, the officer designated in accordance with regulation B-1.5 should:

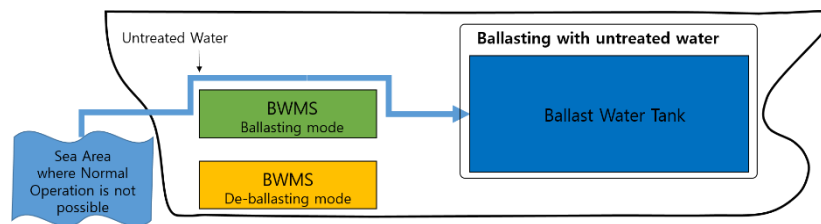
1. ensure that any BWMS alarm that could be ascribed to CWQ is not due to other factors such as malfunction, maintenance, crew familiarity or experience;
2. ensure that the BWMP and OMSM have been followed in troubleshooting the operation of the BWMS, verifying that the BWMS has been properly maintained and ensuring that applicable mitigating measures have been applied to optimize the performance of the BWMS before any bypass;
3. restrict the flow rate of the BWMS to the minimum level consistent with operational demand;
4. consider persisting with using the BWMS in the challenging area to load the minimum safe amount of ballast water and complete remaining ballasting at a nearby less challenging location at a later time, taking into account the ship's stability and cargo condition as well as expected weather conditions.

(6) Bypass procedure

Steps to be taken to bypass the BWMS, including treatment of a fractional part of the ballast water stream and/or bypassing only the inoperative part of the ballast water treatment process.

1. consideration should be given to limiting the number of ballast tanks that will be exposed to partially treated or unmanaged ballast water;

2. consideration should be given to treating the greatest possible fraction of the uptake water, by continuing to apply the BWMS to as much of the uptake water stream as practicable;
3. in cases where only one part of a BWMS treatment process is inoperable, consideration should be given to applying the remainder of the treatment process to the uptake water, if practicable; and
4. only the minimum safe volume of ballast water should be taken on board through the bypass following which, if necessary and practicable, the ship should proceed to a nearby area where less challenging uptake water may be obtained in order to complete ballasting using the BWMS as usual.



(7) Decontamination

Specific procedures for decontaminating ballast tanks and/or piping to reduce the risk of bypassed water, with a view to meeting the D-2 standard at subsequent discharges. Any use of the ballast water exchange plus treatment (BWE+BWT) approach should be clearly detailed in the BWMP.

Regulation B-4.3 does not apply to decontamination following a bypass of a BWMS, in order to restore compliance to regulation D-2

In the case of a ship operating in a sea area where ballast water exchange in accordance with regulations B-4.1 and D-1 is not possible and no ballast water exchange area has been designated, the ship should follow any instructions provided by subsequent port States to reduce the risk of discharging unmanaged ballast water and/or residuals. Port States should take into account adjacent or other States that may be affected by such instructions, as well as the safety of ships.

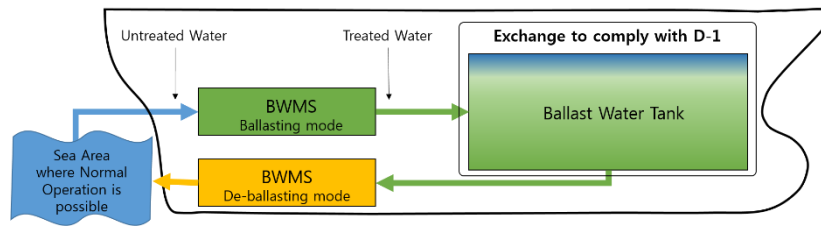
Replace the ballast water in each contaminated tank through ballast water exchange (in accordance with the operational and safety provisions of the BWMP), flushing and treatment. In the case of a ship using the sequential method, which is preferred:

1. the ballast water should be fully discharged through the neutralization (e.g. BWMS using Active Substances such as electro-chlorination or chemical injection type, etc), if applicable, and/or treatment process for the deballasting operation of the BWMS, if technically feasible;
2. the stripping pump (eductor) should be used to remove residual water from the tank;
3. the concentration of organisms in remaining residual ballast water and sediments should be reduced by flushing the tank using the following sequential steps, if allowed and/or required by the receiving port State:
 1. the addition of treated water to the ballast tanks (decontamination will be most effective with the addition of as much treated mid-ocean water into the tank as is safe for the ship and crew, at minimum an amount that will cover the entire bottom of the ballast tank);
 2. the mixing, through the motion of the ship, of the added water with the residual ballast water and any sediments that have settled in the tanks; and
 3. the release of the mixed waters; and
 4. the tank should be refilled with treated ballast water

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

1. 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, approximately 5 times the volume of the ballast tank (at least 1.66 times the volume specified by regulation D-1.2, i.e. 4.98 times the volume of the ballast tank), if required by the receiving port State; and
2. 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.

Record the ballast water exchange and flushing operations in the BWRB.



(8) Communication

Procedure for informing the port State(s) that will receive any ballast water discharge impacted by reactive bypass of the BWMS, before arrival of the ship in such State(s).

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. Any deviation from the procedures in this Guidance or the BWMP should be noted in the communication.

(9) Record-keeping

How to record CWQ situations in the Ballast Water Record Book (BWRB), in line with the Guidance on ballast water record-keeping and reporting (BWM.2/Circ.80, as amended). The BWRB should provide a detailed description of the ballast water management method(s) used, as well as location and affected tanks (tank ID).

The ship's BWRB should include a description of:

1. the reason why normal ballasting operations were stopped;
2. any steps taken to optimize the treatment process and resolve BWMS technical malfunctions;
3. the operational demands that were not met and/or operational limitations encountered (see paragraphs 17 and 18);
4. the steps that were taken prior to a bypass being initiated (as relevant);
5. the tanks which have received bypassed ballast water (tank ID);
6. the date, time and location where the bypass took place; and
7. 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.

3. The BWMP should provide that, when a ship encounters CWQ, an evaluation of ship safety should be conducted prior to the application of any steps to manage CWQ as included in this Guidance. Any safety risks identified should be evaluated to determine mitigating actions.

3. Guidance for Administrations with respect to BWMP and CWQ

1. Administrations should ensure that ships are fully prepared to encounter CWQ. Approved BWMPs should be ship-specific, reflect the OMSM of the BWMS, and include at least: equipment maintenance procedures and intervals, predetermined mitigating measures that may preserve and optimize the treatment process in marginal conditions, a table of critical alarms that justify CWQ action, ship-specific alternatives to bypassing the BWMS, safe bypass procedures that minimize the exposure of tanks/piping to unmanaged water, and a decontamination procedure that reflects this Guidance and is safe for the ship and crew.

Administrations should also ensure that crew familiarization includes relevant aspects of this Guidance, BWMS operating instructions and the environmental risks of bypassing BWMS and steps to avoid/minimize them.
2. Reactive bypasses may be undertaken by the ship without consulting the Administration or the current and next port State. Port States receiving water from affected tanks should be notified before arrival.
3. Pre-emptive bypass should be discouraged. However, in cases where pre-emptive bypass may be appropriate, the Administration should ensure this will not impair or damage the environment, human health, property or resources of other States. In bilaterally agreeing to the pre-emptive bypass between the Administration and the receiving port State, the Administration of the ship and the receiving port State should ensure that the pre-emptive bypass will not impair or damage the environment, human health, property or resources of any State. Pre-emptive bypass arrangements should be specific to voyages between specified ports or locations and should be documented in the ship's approved BWMP and the BWRB.

4. Guidance for port State Control officers with respect to Ships that have encountered Challenging Water Quality

1. When determining compliance with the Convention by a ship that has encountered CWQ, a port State control officer should consult the BWMP, BWRB and crew. In determining that the ship has done all it can to meet the D-2 standard, the officer should use professional judgement in considering:
 1. the nature and degree of the challenge;
 2. whether challenges arose despite proper BWMS operation and maintenance;
 3. whether steps were taken to avoid or limit the bypass of a BWMS, such as efforts to mitigate challenges while continuing to use the BWMS;
 4. whether the ship and crew followed the procedures in the BWMP and recorded this in the BWRB; and
 5. whether decontamination was properly undertaken following any bypass.
2. Port States should consider that a ship fully applying this Guidance is minimizing its risk of non-compliance with the D-2 standard at subsequent discharge locations.

5. Guidance for BWMS manufacturers with respect to participation in pre-planning

1. Manufacturers of BWMS should ensure that the self-monitoring system of the BWMS records and provides clear indications to the crew on the degree of challenge being experienced by the BWMS. Specific CWQ instructions and procedures should be included in the OMSM to assist the ship and Administrations in developing and approving BWMPs, which should include specific, realistic actions the crew can follow to optimize the efficiency and performance of the BWMS. The OMSM should also include a table of unambiguous triggers necessitating actions in CWQ that could compromise the treatment process.
2. Manufacturers of BWMS should support providing appropriate technical information and possible actions to be taken in CWQ scenarios that are appropriate for the installed BWMS for inclusion in the ship-specific BWMP. This may include, but is not limited to:

1. simple, easy to use operating instructions for the crew to allow prompt identification of BWMS operational issues and an understanding of BWMS alarms and relevant actions to be taken by crew when an alarm arises;
 2. clearly identifying critical alarms in the OMSM and BWMP;
 3. providing clear troubleshooting and mitigation instructions in the OMSM and BWMP for crews to use when CWQ is encountered; and
 4. actions that can be taken pre-emptively to support the BWMS in successfully operating even in CWQ conditions
3. Manufacturers of BWMS are encouraged to take efforts to collect relevant information and/or data from ship operators, as available, about BWMS operation in CWQ (including in specific water qualities, and/or at specific ports and locations, if appropriate) for the purposes of informing and guiding relevant stakeholders (e.g. ships, Administrations, port States, IMO) with a view to optimizing the operation of BWMS in CWQ. Ship crews are encouraged to cooperate with BWMS manufacturers to support collection of information and/or data regarding BWMS operations in CWQ.

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