

Development of the Guidance Documents for submission to IMO.

EMSA Ballast Water Workshop on Sampling for Enforcement – Research Results
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1

A large, dark blue ocean wave with white foam is breaking, creating a powerful and dramatic background for the lower half of the slide.

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Issues for Guidance:

- what to do when a vessel indicates that they have a problem with their BWTS prior to entering a port;
- how “clear grounds” can be identified;
- for when a pSc office suspects there is something amiss, but needs some form of sampling to prove “clear grounds”;
- management options for the vessel once a discharge has been stopped;
- how to undertake indicative analysis and representative sampling;
- preparations needed before sampling,
- going on board to sample;
- the actual sampling procedures;
- sample handling, transport and chain of custody procedures; and,
- analysis procedures.

Draft guidance on Sampling for Enforcement –

- **Introduction / Application / Definitions;**
- Preparing for Sampling for Enforcement;
 - Indicative/Representative Sampling and Analysis;
- **PSC – Stopping the Discharge;**
- Potential Options for Management following discovery of Clear Grounds that the Ship is not meeting the BWM Convention's Requirements;
- **Indicative Sampling;**
- Boarding the Ship And Sampling;
- **Representative Sampling**
- How to Manage Pre-Identified Problems;
- **Analysis of the Sample;**
- Post Sampling Procedures; and
- **Interpretation of the Results.**

Papers in the new IMO format

Introduction / Application / Definitions;

- Purpose – Port state with general recommendations on
 - Preparations to sample;
 - BWM Options for the ship when discharge been stopped/prohibited;
 - Development and use of sampling and analysis methods;
 - Taking/Handling and storage of a sample.
- Link to Reg A3.1 of the Convention;
- Relationship with FSI Guidelines;
- Application – everyone involved in sampling for enforcement (port State and flag State);
- Definitions.

Preparing for Sampling for Enforcement – Indicative/Representative Sampling and Analysis

- How BWM should link with normal pSc Control preparations;
- Resource provision;
- Decide on sampling measure:
 - evidence needed – thresholds;
 - Practicability;
 - Undue delay; and,
 - Health and safety.
- Need for Risk Assessment;
- How to analyse the sample and laboratory requirements;
- Logistics of sample handling; and,
- Management procedures.

Additional Issues for pSc

- Link to FSI Guidance:
 - Clear Grounds;
 - Maybe Clear Grounds;
- Communication between the pSc officer and the ships master; and
- Advice to the ship when their discharge is stopped re stability, reporting and cargo handling.

Indicative Analysis

- Methods Identified for each D2 size category;
- DNA, RNA, ATP, Chl a, O₂, PAM, Flowcam, Pulse-Amplitude Modulated Fluorometry (PAM), Microscopy, Visual, Holographic Microscopy, Bacterial Methods;
- Pro's and Con's/Practicalities wrt Indicative Sampling;
- Limits identified where appropriate (higher than recommended);
- D2 Standard:
 - Larger size category: Visual (1000 micrometres);
 - Smaller size category: PAM (>20 = > Standard);
 - Bacteria: None
- Method of each sampling method

Boarding the Ship And Sampling;

- Mobilising the sampling team;
- Communication with the ships master;
- Procedures for Sampling team with respect to:
 - Security;
 - Boarding the ship; and
 - Etiquette on the ship.

Representative Sampling

- Statistics – number of samples over set times.
 - Not be able to provide realistic sample numbers for enforcement sampling.
 - Significant development – ICES paper for BLG
 - More data needed
- Look for other ways to prove representativeness
- One sample – miss large spikes
- Continuous drip sample – long time, damage to orgs
- Continuous flow sample - set times (methods identified)
- Can't compare to uptake as residence time
- Compare the different results
- Taking 2 or 3 continuous flow samples over 10 or 15 minutes at the beginning and middle of the discharge

Sample Protocol

- Flow integrated Samples
- Methods Identified for each D2 size category;
- How to sample and in line monitoring system
 - filter for >50 microns, flow meter damage to zooplankton sample sizes
- Sample storage
- Discharge concens

Potential Options for Management following discovery of Clear Grounds that the Ship is not meeting the BWM Convention's Requirements;

- Option A – remain where it is until the deficiency is rectified;
- Option B - move to a safe anchorage if the location of the ship is unsuitable (i.e. the berth is needed by the port) and fix;
- Option C - leave port to rectify the deficiency in another location.
- Option D - arrange for treatment of the ballast water discharge to the D-2 Standard using a mobile [, or another ship's] BWMS. The BWMS used should also comply with the BWM Convention, be type approved and have the appropriate approved documentation;
- Option E - arrange for delivery of the ballast water to a land based treatment facility;
- Option F - arrange for the discharge of ballast water from the ship into another ship, for treatment or delivery onshore [or into another ship that requires ballast water];
- Option G – retain ballast water on the ship and limit further cargo handling,
- Option H – allow the ship to return to the point of origin to discharge its ballast water; or
- [Option J - Exchange their ballast water at least 50nm off the coast in water at least 200m deep, or in a pre-designated ballast water exchange area].

How to Manage Pre-Identified Problems;

- Ship's responsibilities to Report to the port/flag State/RO;
- Port State Assessment;
- Liaison with the port, flag State and RO;
- Options; and,
- Action

Post Sampling Procedures

- How to prepare the samples for transport;
- Provision of duplicate samples;
- Immediate analysis on board the ship;
- Chain of Evidence;
- Training:
 - pSc Admin and Officers
 - Sampling Team

Analysis

- Methods Identified for each D2 size category;
- Similar to indicative analysis - DNA, RNA, ATP, Chl a, O₂, PAM, Flowcam, Epi-fluorescence microscopy, Pulse-Amplitude Modulated Fluorometry (PAM), Microscopy, Visual, Holographic Microscopy, growth tests, Bacterial Methods;
- Pro's and Con's/Practicalities wrt Analysis;
- Methods used for certification testing – worldwide availability
- D2 Standard:
 - Larger size category: Microscopy with stains;
 - Smaller size category: epi-fluorescence microscopy (phyto), microscopy (zoo);
 - Bacteria: ISO/American Standards
- Instantaneous/Average Sampling

Analysis – Interpretation and processing results

- Set up decision rule – if the D-2 Standard falls within the results plus the variation from analysis and sampling then the system is in compliance;
- Set up Null Hypothesis;
- Test depending on distribution of data
- Average testing
 - normal distribution, 1 sample student t test – very unlikely
 - un-normal, 1 sample wilcoxon test
- Instantaneous testing
 - 1 sample Poisson Rate test
- Pro's and con's of each method of handling the results; and,
- Tend towards average sampling regime – provided the tools and advantages/disadvantages of each one.



Thank you



Ballast water sampling with thanks
to Mahle and GoConsult



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