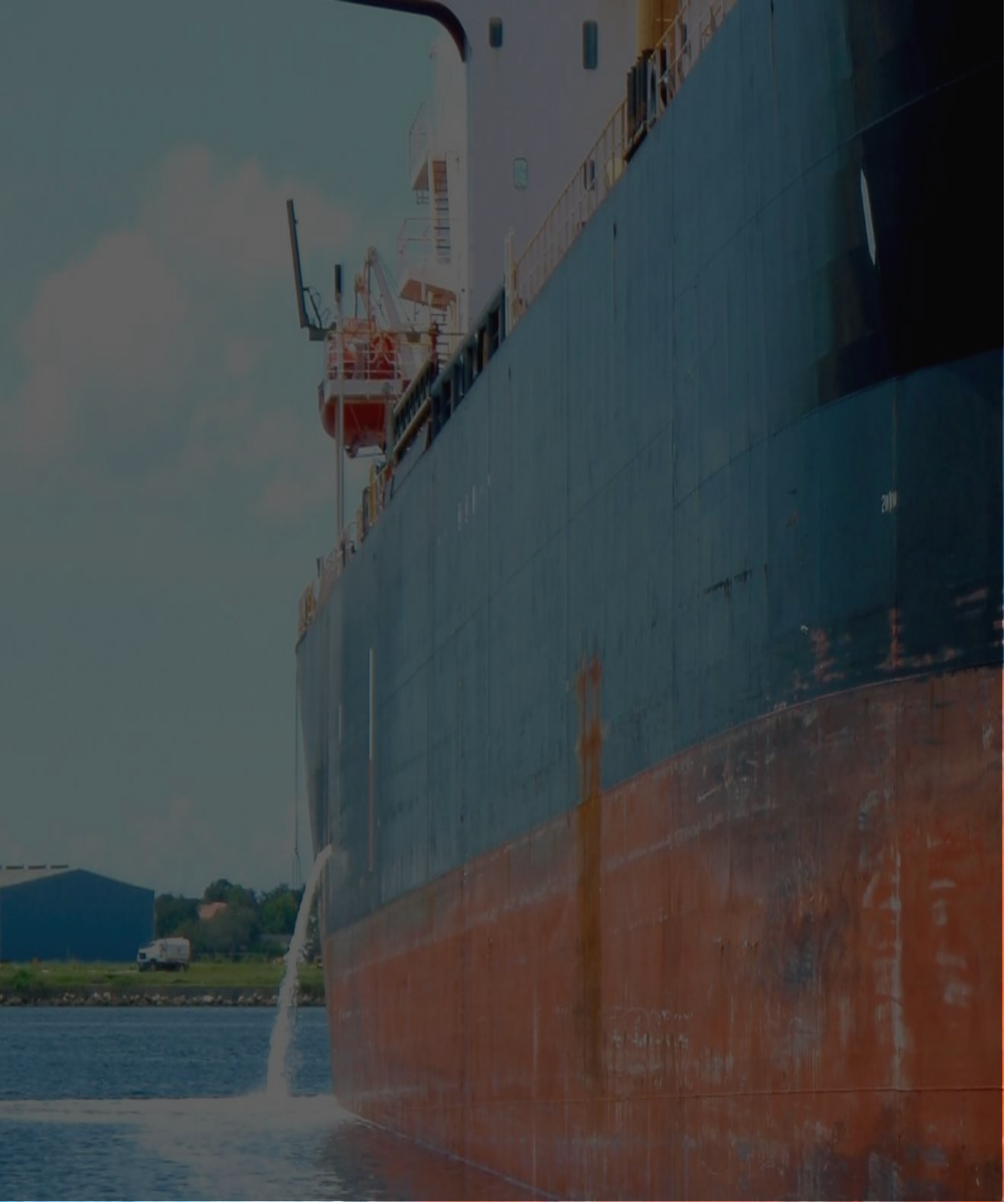
Golden Bear Research Center
Commissioning Testing & Shipboard Sampling

Pacific Ballast Water Group Meeting | 2022

Stephen Loiacono, Scientific Program Manager
Golden Bear Research Center



IMO REQUIREMENT: 06 . 01 . 2022

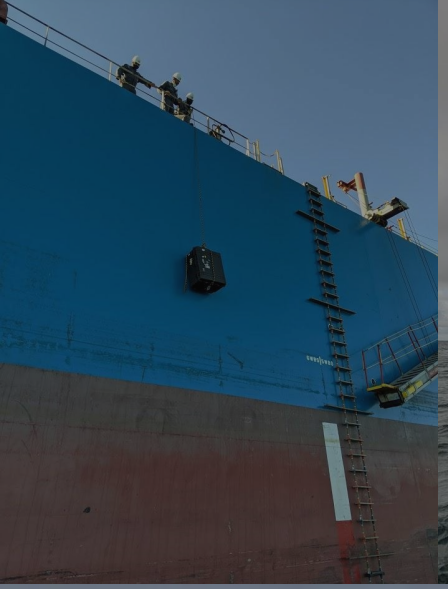
Commissioning Testing - a mandatory requirement that forms part of the installation and commissioning survey of ballast water treatment systems, prior to certification.

IMO

The Maritime Executive
INTELLECTUAL CAPITAL FOR LEADERS

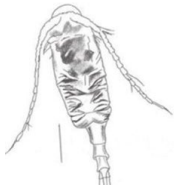
As of October 2019, close to 10,000 vessels— nearly 10 percent of the global vessel fleet—have been fitted with a ballast water management (BWM) system. According to Clarkson's World Fleet Register, the most common technologies for BWM are ultraviolet (UV)-based systems and electrochlorination (EC) systems. Figure 1 shows the different technologies installed on vessels.

Having a full understanding of the different BWM technologies, their benefits and limitations, sets the foundation for making the right decision when selecting a BWM system. Specifically, it's important to understand how the BWM system impacts a vessel's operations, as the ballast water being pumped on board the vessel can vary considerably, and different BWM systems handle the various

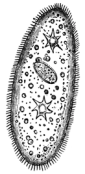


GOLDEN BEAR RESEARCH CENTER: COMMISSIONING TESTING

Mobile Laboratory allows for detailed and indicative analysis.

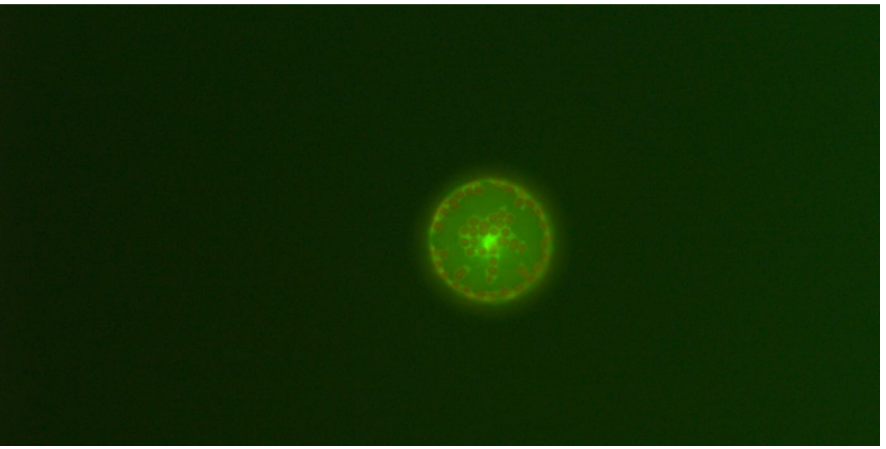


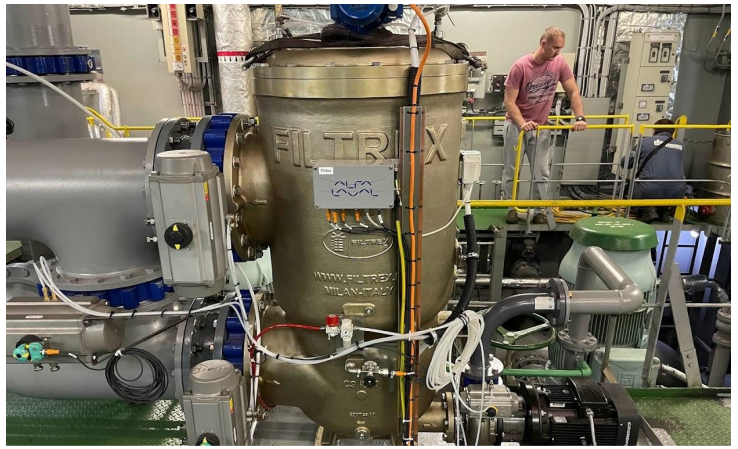
ZOOPLANKTON
(≥50 µm)



PROTISTS
(≥10 µM AND <50 µm)

GBRC - RESULTS



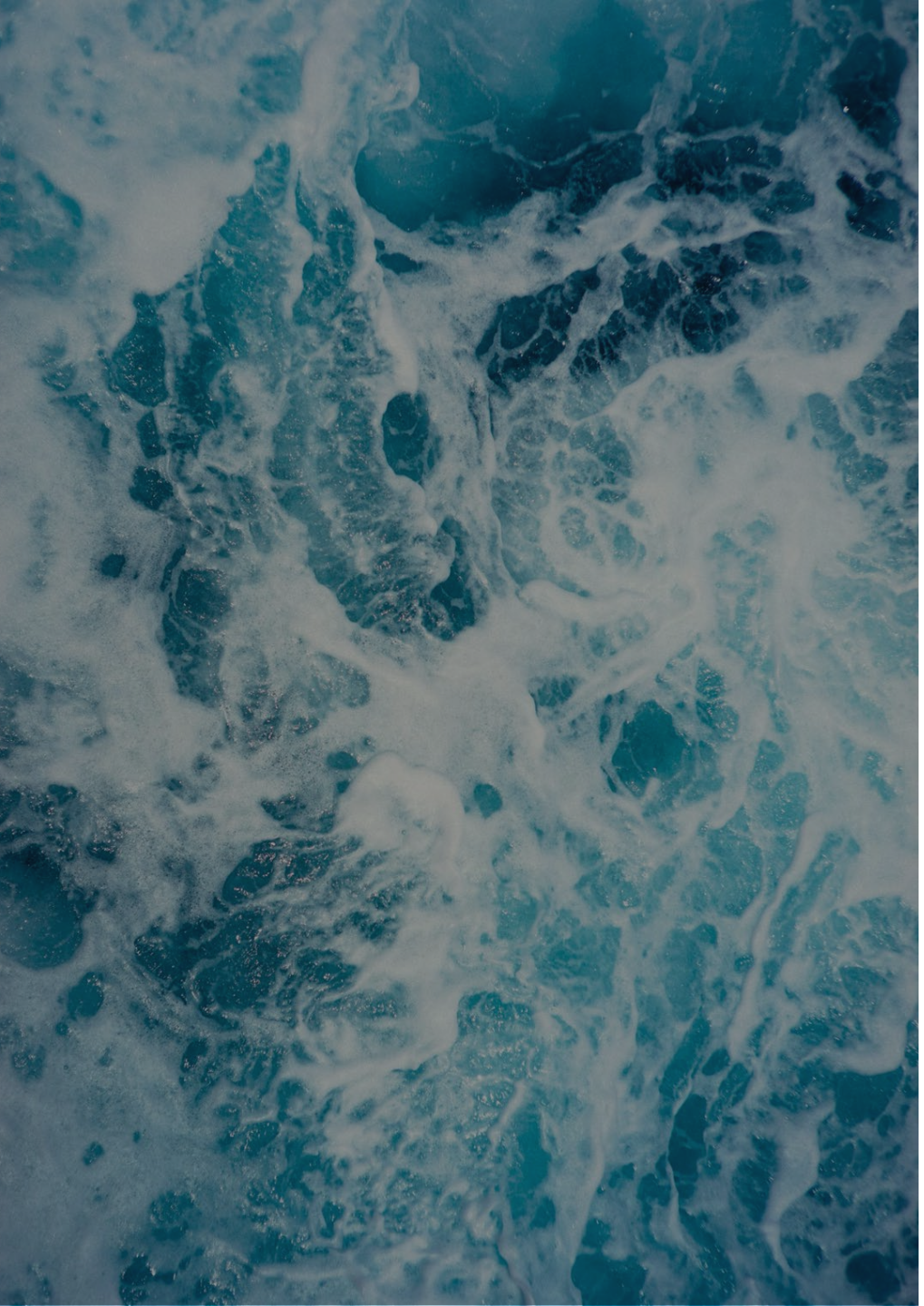


SINCE 2019

15 commissioning/compliance tests

11 Successfully met D-2

4 Failed to meet D-2 (2 ships)



GLOBAL TESTNET

- Recently awarded NGO status
- 19 international members comprised of Test Facilities and Laboratories
- Objective: Open sharing of information to standardize methods and advance the science of BWMS testing

Discussion Topics:

- Duration of Sample Collection: Continuous vs. Sequence
- Preferred Indicative tools
- Total Volume Sampled: 1 m^3 – 3 m^3
- Organism Enumeration: Detailed vs. Indicative
- Sample Analysis Time

GLOBAL TESTNET - RESULTS

- **2017** - Marine Environmental Protection Committee (MEPC) establishes the experience-building phase (EBP) associated with the Ballast Water Management (BWM) Convention
- Over 800 tests compiled since 2017 to the Data Collection stage of EBP

Parameter	Type of Testing	
	Commissioning	Compliance
Total number of tests	704	134
Percentage of discharges failing to meet the D-2 Standard	20%	22%
Percentage of discharge exceeding TRO limits as set by GESAMP (G9 Guidelines)	6%	34%
Percentage of failed tests involving exceedance in the ≥50 µm size class	81%	93%
Percentage of failed tests involving exceedance in the ≥10 µm and <50 µm size class	8%	14%
Percentage of failed tests involving exceedance for *E. coli*	7%	0%
Percentage of failed tests involving exceedance for *Enterococci*	6%	0%
Percentage of failed tests involving exceedance for *V. cholerae*	0%	0%

GLOBAL TESTNET - RESULTS

- Over **800 tests compiled** since 2017
- **~20%** of all tests failed to meet the D-2 Standard

Parameter	Type of Testing	
	Commissioning	Compliance
Total number of tests	704	134
Percentage of discharges failing to meet the D-2 Standard	20%	22%
Percentage of discharge exceeding TRO limits as set by GESAMP (G9 Guidelines)	6%	34%
Percentage of failed tests involving exceedance in the ≥50 µm size class	81%	93%
Percentage of failed tests involving exceedance in the ≥10 µm and <50 µm size class	8%	14%
Percentage of failed tests involving exceedance for *E. coli*	7%	0%
Percentage of failed tests involving exceedance for *Enterococci*	6%	0%
Percentage of failed tests involving exceedance for *V. cholerae*	0%	0%

GLOBAL TESTNET - RESULTS

- Over 800 tests compiled since 2017
- ~20% of all tests failed to meet the D-2 Standard
- Highest cause of failure:

  ≥50 µm size class organisms

Parameter	Type of Testing	
	Commissioning	Compliance
Total number of tests	704	134
Percentage of discharges failing to meet the D-2 Standard	20%	22%
Percentage of discharge exceeding TRO limits as set by GESAMP (G9 Guidelines)	6%	34%
Percentage of failed tests involving exceedance in the ≥50 µm size class	81%	93%
Percentage of failed tests involving exceedance in the ≥10 µm and <50 µm size class	8%	14%
Percentage of failed tests involving exceedance for *E. coli*	7%	0%
Percentage of failed tests involving exceedance for *Enterococci*	6%	0%
Percentage of failed tests involving exceedance for *V. cholerae*	0%	0%

IF THE BWMS WORKS, WHY ARE THESE TESTS FAILING?

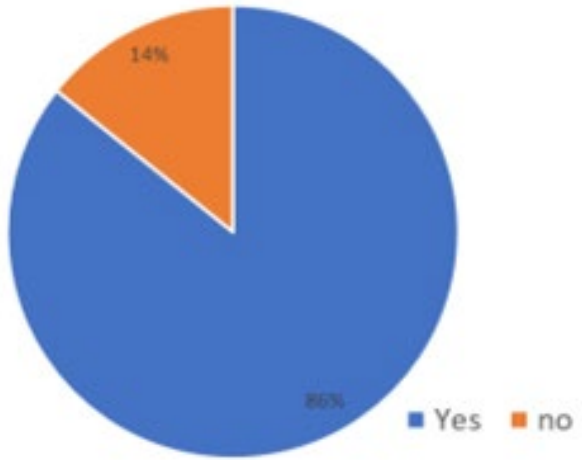
- Short Answer: **Human Error**
  - Crew forgot to close the sea chest
  - Pipes were not flushed properly
  - Crew discharged before Maximum Allowable Discharge Concentration was met (Bulk Chemical)
  - Contamination from leaky valves

IF THE BWMS WORKS, WHY ARE THESE TESTS FAILING?

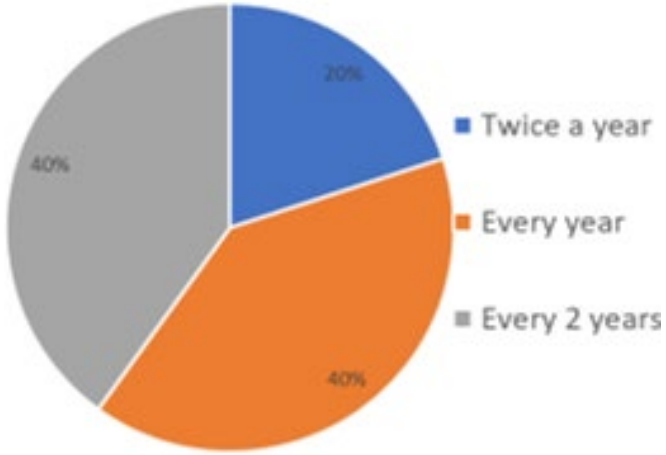
- Conclusion: **A BWMS working perfectly will fail if the ship's crew make mistakes or ship has compromised equipment.**

PERIODIC COMPLIANCE TESTING

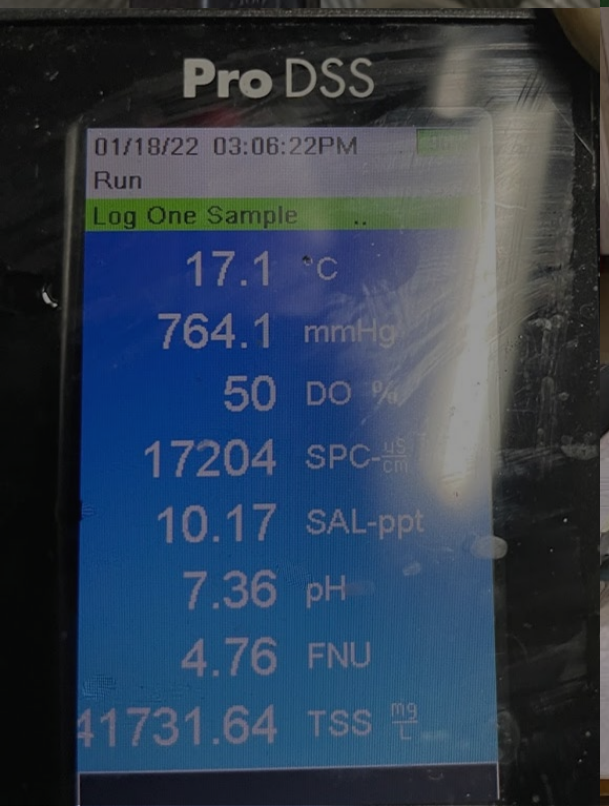
DO YOU THINK IT IS IMPORTANT TO DO REGULAR TESTS OF THE DISCHARGE AGAINST D-2 ON ALL SHIPS?



HOW OFTEN SHOULD THIS BE DONE TO ENSURE SUCCESS OF THE CONVENTION



Poll taken from Global TestNet members



WHO IS COLLECTING AND ANALYZING THE SAMPLE?

Sample Collection

≥1 m^3 of treated water

Continuous sampling

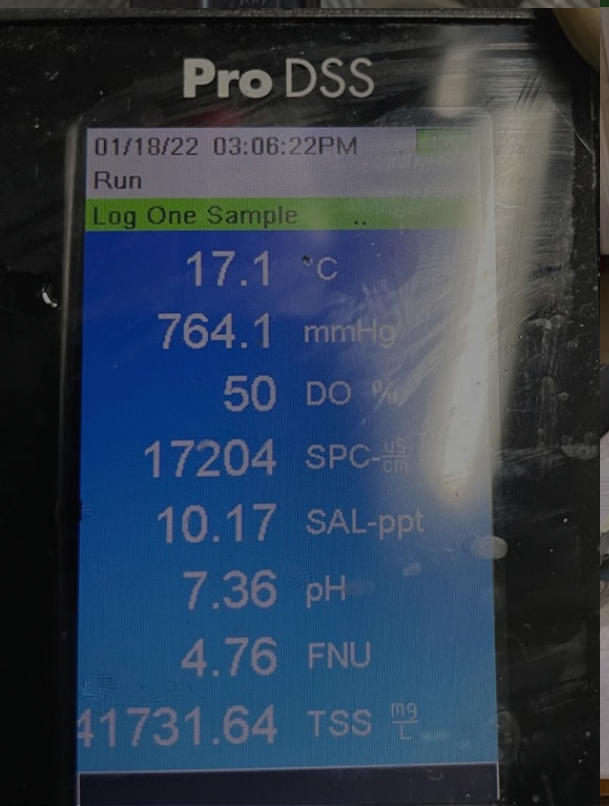
Sample Enumeration

Analysis time after collection

Are verified tools/methods being used?

Are instruments calibrated?

Traceability?



WHO IS COLLECTING AND ANALYZING THE SAMPLE?

Class Societies are currently discussing accreditations needed by organizations to conduct valid Commissioning Testing.

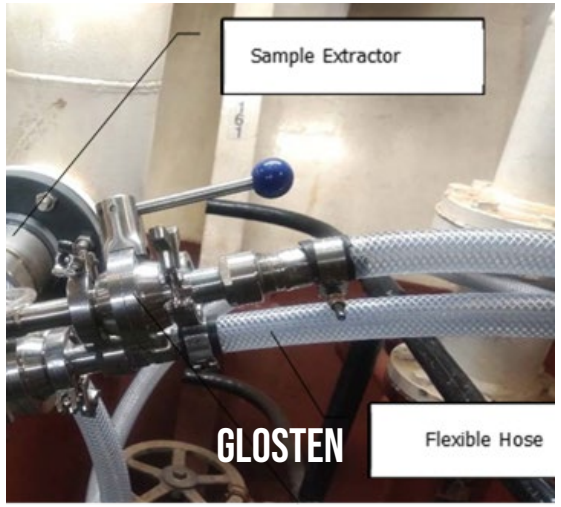
Most common accreditation being discussed:

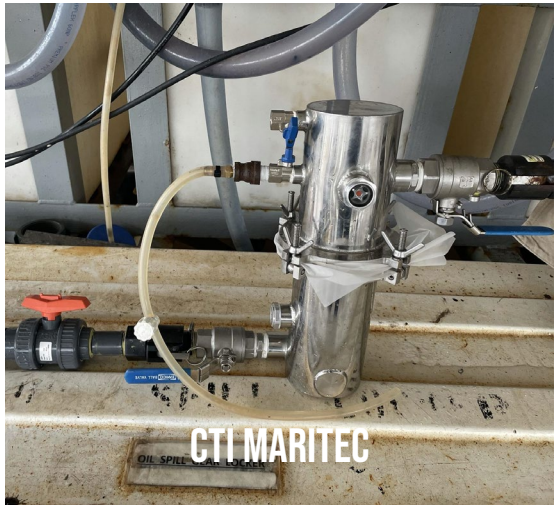
ISO

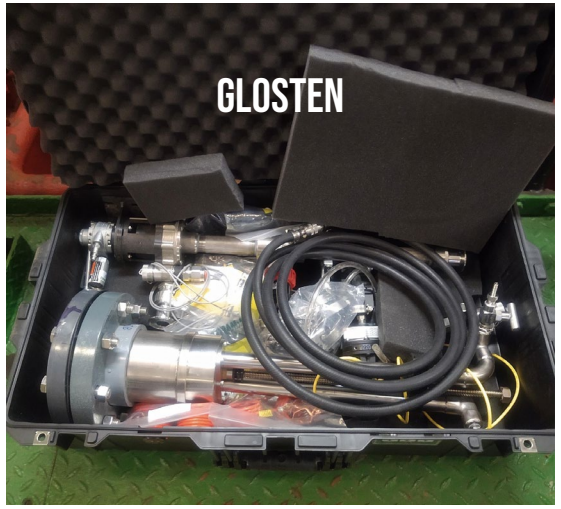
ICS › 03 › 03.120 › 03.120.20

ISO/IEC 17025:2017

General requirements for the competence of testing and calibration laboratories







SAMPLING TOOLS

Thank you

Pacific Ballast Water Group Meeting | 2022

Stephen Loiacono, Scientific Program Manager
Golden Bear Research Center