Co-evolution in BWMS

Sampling and Analysis/ G8 and G9/ Compliance and PSC

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Harmonized Communication First



Terminology – The Life is...





 $\alpha = 1 - \beta$ $\beta = 1 - \alpha$

The ' α + β ' can be...

- Day + Night
- Unity + Variety
- Positive + Negative
- G8 + G9
- Administration + IMO
- Ship Owner + Administration
- Developer + Ship Owner
- Developer + Vendor
- Compliance + PSC
- You + I ?!

the matter of the laws of thermodynamics...

The fact is...

Numbers of Warm Heart or Cold Brain









| Items for Document | Ready Yet? |
|--|------------|
| | |
| System description - working principles | |
| | |
| Test facility description, sampling arrangements | |
| Maximum dose of the Active Substance(s) | |
| QA/QC documentation | |
| | |
| | |

| Items for Document – Definitions | Ready Yet? |
|-------------------------------------|------------|
| Description of Active Substance(s) | |
| Description of Relevant Chemical(s) | |
| Description of Other Chemicals | |
| Estimated discharge concentration | |
| [[Material]] Safety Data Sheets | |
| Proposed MADC | |
| | |

| Items for Document – General Requirment. Rea | idy Yet? |
|--|----------|
| Acute ecotoxicity for each Active Substance and Relevant Chemicals | |
| Chronic ecotoxicity for each Active Substance and Relevant Chemicals | |
| Endocrine disruption | |
| Mammalian toxicity | |
| Sediment toxicity | |
| Environmental fate and effect under aerobic and anaerobic c onditions, degradation route and rate (biotic, abiotic) | |
| Physical and chemical properties of Active Substance(s), preparations and treated ballast water | |

| Ready Yet? |
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| ltems for Document – Risk A. | Ready Yet? |
|---|------------|
| MAM-PEC | |
| Prediction of environ-mental concentrations | |
| PEC/PNEC | |
| Corrosion | |
| Fire and explosion | |
| Storage and handling | |
| Noise of BWTS/ Vibration of BWTS | |

| Items for Document – Risk A. | Ready Yet? |
|--|------------|
| Possible reaction with organic matter | |
| Neutralization step or determination of minimum holding time before discharge | |
| | |
| | |
| | |
| | |
| | |
| | |

The Perfect BWMS?

| Developer | BWMS | Flag State | System Description | Active Substance/ MD | MADC | Energy Consumpti on (kw/100㎡) | cost | Maintan ance Fee (m³/hr) |
|--------------------------------|--|--------------------|--|-------------------------------|-------------------------|--|-----------------------------------|--------------------------------|
| Techcross | Electro−Cleen [™] System | ROK | Electrolysis | 10mg/L | 0.02mg/L | 6~10 | \$180,000/ 200m³ | 0.3 cent |
| Resource Ballast Technology | Resource Ballast Technologies System | South Africa | Cavitation+Ozone +Electrolysis+Filtration | 1mg/L | 0.1~0.2mg/L | 1.3 | \$200,000/ 200m ³ | _ |
| Hamworthy Greenship | Sedinox | UK, Netherlands | Hydrocyclone + Electrolysis/ Electrolytic Chlorination | FAC as Cl2 (1mg/kg) | 0.01~ 0.20 mg/kg | 3 | \$300,000/ 200m ³ | _ |
| Alfa Laval Tumba AB | PureBallast | Norway | 50µm Filter + UV (AOT) | Free radicals | _ | 24 | \$700,000/ 1,000m ³ | 18 cent |
| Panasia Co Ltd Korea | GloEn-Patrol™ | ROK | 50µm Filter+ UV (MPUV) | Photon | - | 16 | \$500,000/ 1,000m ³ | - |
| NK Co., Ltd. | BlueBallast | ROK/USA | Ozone | Ozone 2.2mg/L | 0.02mg/L | >7 | \$250,000/ 200m³ | 0.7 cent |
| Hitachi | ClearBallast | Japan | Filtration + Pre-Coagulant | Al, Fe, PASA (Acryl Amide) | Acryl Amide 0.2 mg/L | 5.6~8.5 | \$400,000/ 2000m ³ | - |

Ballast water treatment technology by Lloyd's Register, 2010/2

The Perfect BWMS? - before

Reliability

Ensure the Installation Space (additional piping work)

Minimize Re-Arrangement of Machinery and Piping

Minimize Additional Material / Structure

Flexibility as regards Arrangement/Application

Low Installation Price

Low Operation and Maintenance Cost

Easy Maintenance

A/S Network

The Perfect BWMS? - during

Procedures for BWC Implementation Post BWMS - Promoting BWC; Robust technique(s) tool(s); to effectively monitor compliance to support enforcement of the BWC Port-based in-situ treatment of BW; to meet the needs of non-compliant ship R&D Challenge related to Compliance Monitoring and Enforcement.

The Perfect BWMS?

Examples Electrolysis by side stream injection for fresh water? Various water qualities due to geo-industrial factors on the Ports include TSS, Water Temperature, Organic Contents, Salinity, Solution Reliability – Law, Sciences, technology and diplomatic

Objective/ Subjective

- Total Residual Oxidants
- A 1.0 to 15 mg/L (as Cl2)
- With or Without Filter
- With or Without 2nd Modification
- With or Without Neutralization
- Etc.
- Standardization needed?

| TRO (mg/L as Cl2) Dose | Administrations G8 | IMO G9 |
|---------------------------|--|-----------------------|
| 1.0 Filter | Control of Type | Develop and maintain |
| 2.0 Filter | Approval to maintain | Monitoring |
| 3.0 Filter | Administration | Environmental KISKS |
| 5.0 | Satisfy D2 Std of IMO Port Inspection by each Administration | |
| 5.0 Filter | | Needed to |
| 10.0 | | Administrations/ Test |
| 10.0 Filter | | Facilities |
| 15.0 | | |
| 15.0 Filter | | |

| TRO (mg/L as Cl2) Dose | Developer | Ship Owner |
|---------------------------|---|------------|
| 1.0 Filter | Need to Develop | |
| 2.0 Filter | Reliable Data for | |
| 3.0 Filter | Optimum use of TRO and Neutralizer, The use of TRO should be lower than that of IMO Approval | |
| 5.0 | | |
| 5.0 Filter | | |
| 10.0 | | |
| 10.0 Filter | | |
| 15.0 | | |
| 15.0 Filter | | |

| Administrations | IMO |
|-----------------------|--|
| | |
| Control of Type | Develop and maintain |
| Approval to maintain | Monitoring |
| Administration to | LINITOIIIITEITTAI KISKS |
| Environment | |
| | Needed to |
| Port Inspection by | Harmonization of |
| each Administration A | Administrations/ lest |
| | Tachines |
| | Administrations Control of Type Approval to maintain reliability of the Administration to Environment Port Inspection by each Administration |



| Domains | The Administrations | The IMO |
|--------------------|---------------------|---------|
| Use of AS | | |
| Basic | | |
| Final | | |
| App. Of BWMS | | |
| D2 | | |
| G8 | | |
| G2 | | |
| Permit to Port | | |
| by each regulation | | |



| Domains | Developer | Ship Owner |
|--------------------|-----------|------------|
| Use of AS | | |
| Basic | | |
| Final | | |
| App. Of BWMS | | |
| D2 | | |
| G8 | | |
| G2 | | |
| Permit to Port | | |
| by each regulation | | |

- Again the Reliability !
- Administration
- Globalization
- Harmonization
- Specialization
- Standardization
- A pinch of probably is worth more than a pound of perhaps to increase reliability.

Post Approvals – GloBallast

- Testing of technologies for compliance
- Port State Control issues and experiences
- Risk assessments and related tools in the CME framework
- Sampling and monitoring, including latest developments in rapid diagnostic tools
- Performance of current technologies in meeting the compliance criteria
- Developing country perspectives on CME
- Compliance for alternative technologies

GESAMP_BWWG

- BWM Convention
- Guideline G8 and Procedure G9
- GESAMP-BWWG <u>Group of Experts on the Scientific Aspects of</u> <u>Marine environmental Protection (UN-body)</u>
- Methodology living document, potentially adjusted after each meeting
- Reports of GESAMP-BWWG advisory documents to MEPC
- MEPC decides on Basic Approval and Final Approval

The Perfect BWMS? - after

Prospects on BWC_2004

Unification of BWMS with reliable technologies and tools Monitoring Neutralization Enforcement w/ or w/o BWMS Compliances otherwise Port-Based BWMS/ Facility **IMO** - Administration **Indicative Samplings** Efficacy Safety to the port **Preparation Option Training Experts** Unification of Procedures for Port-based BWMS/ Facility

Port State Control

- Science & Technology Reliability **Test Facility** Politics Efficacy Toxicity
- Ecology

Test Facility

Netherlands, NIOZ Norway, NIVA USA, GSI/ MERC/ NRL/ Golden Bear Program Denmark, DHI, Singapore Korea, KORDI/ KOMERI/ TP Etc.....

North Sea Ballast Water Project Opportunity (NSBWPO)

THANK YOU FOR YOUR KIND ATTENTION