



大连船舶重工集团有限公司
DALIAN SHIPBUILDING INDUSTRY CO., LTD.

YARD EXPERIENCE OF COPING WITH IMO BWM CONVENTION 2004

船厂应对压载水公约的经验介绍

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Update of the Ballast Water Treatment Legislation- IMO CONVENTION

压载水法规的新发展-IMO公约

Reasons for Managing Ballast Water

管理压载水的理由

- Transferring unwanted aquatic organisms via ships' ballast water is an internationally recognised problem
通过船舶上的压载水来传播水中生物与病毒，已是国际认同的一大问题
- Seriously affecting human health, cause damage to local aquatic life and local economies
严重地影响人类健康，破坏当地水中生物，环境生态，与地区经济
- The effects costs millions of dollars to deal with each year
从而带来每年千万美元以上的损失



Escherichia
Coli
大肠杆菌



Mitten Crab
中华绒螯蟹



Mnemiopsis
Leidy
水母



Northern
Pacific
Starfish
北太平洋海星



Zebra
Mussel
斑马贻贝



Vibrio
Cholerae
霍乱弧菌



Asian Kelp
亚洲海带

Update of the Ballast Water Treatment Legislation- IMO CONVENTION

压载水法规的新发展-IMO公约

Scale of Spreading Invasive Species via Ballast Water

通过压载水传播外来入侵性物种的程度

Every 9 weeks a new species is introduced somewhere in the world

每九个星期就有一个新物种传播到世界某地

Every day, 7000+ species of plants and animals are transported in ballast

每天就有超过七千种动植物被压载水运送

Every year the world's fleet moves 3 - 5 billion tonnes of ballast around the world

每年全球船队运载三十到五十亿吨压载水



Update of the Ballast Water Treatment Legislation- IMO CONVENTION

压载水法规的新发展-IMO公约

Conditions of enter into force- Require 30 States (35% world GT)

强制执行的条件-要求30个国家签署 (占世界35%总吨船舶)


Latest status , 36 States Signed up, approx. 29.07% world GT (6.93% short)

最近的情况 有36个国家签署 约占29.07%总吨 (还差6.93%)

FLAG OF REGISTRY	GT	Percentage of World Total	BWMC 2004
Panama	256,318,669	20.46%	
Liberia	147,511,737	11.77%	signed
Hong Kong	97,000,545	7.74%	
Marshall Islands	93,962,035	7.50%	signed
Singapore	74,341,089	5.93%	
Bahamas	61,041,531	4.87%	
Malta	55,084,001	4.40%	
China	49,059,226	3.92%	
Greece	48,523,738	3.87%	
Cyprus	24,712,733	1.97%	

Update of the Ballast Water Treatment Legislation- IMO CONVENTION

压载水法规的新发展-IMO公约

Signatory Sates			Total GT %	Signatory Sates			Total GT %
1		Maldives		19		Antigua and Barbuda	15.36
2		St. Kitts & Nevis		20		Marshall Islands	20.99
3		Syria		21		R.O. Korea	22.63
4		Spain		22		Cook Islands	22.65
5		Nigeria		23		Canada	23.01
6		Tuvalu		24		Brazil	23.29
7		Kiribati		25		Netherlands	24.28
8		Norway		26		Croatia	24.44
9		Barbados		27		Malaysia	25.32
10		Egypt	3.42	28		Iran	26.37
11		Sierra Leone		29		Mongolia	
12		Kenya	3.46	30		Palau	26.44
13		Mexico	3.62	31		Montenegro	26.44
14		South Africa	3.55	32		Lebanon	26.46
15		France		33		Trinidad & Tobago	26.46
16		Liberia	14.24	34		Russia Federation	
17		Sweden	15.79	35		Niue	27.95%
18		Albania		36		Denmark	29.07%

Update of the Ballast Water Treatment Legislation- IMO CONVENTION 压载水法规的新发展-IMO公约

Sufficient ratification would likely be reached before mid 2013!
在2013年中很可能得到足够的签署!



Update of the Ballast Water Treatment Legislation- USCG

压载水法规的新发展-美国海岸警卫队

USCG **Final** BW Management Regulations on Discharge Standards - **effective from 21 June 2012**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
1 Dec 2013 BWDS = IMO D-2 1 Jan 2014													
		KL >= 1 December 2013, all oceangoing ships, and coastwise ships of >1600 GT											

Update of the Ballast Water Treatment Legislation- USCG

压载水法规的新发展-美国海岸警卫队

- Extension of compliance is possible, but under strict conditions:
满足时限是有机制容许推迟，但要符合严格条件：
 - Document that compliance is not possible despite all effort made
要提交书面申请，而申请书要表明经过所有努力下仍然不可能按时满足
 - Application must be at least 12 months before deadline
最后期限的12个月前提出申请
- USCG type-approved BWTS (as per 46 CFR 162) installed and operated
基本要求是安装与操作 由USCG 按 46CFR162 作出型式认可的压载水处理系统
- AMS installed and used in-lieu prior to deadline is allowed for ≤ 5 years
最后期限前安装与使用“替代管理系统”(AMS)是可容许的，但不能超过 5年
- AMS must have obtained USCG acceptance for use
“替代管理系统”(AMS)是需要预先得到 USCG 接受
- AMS must be operated and maintained conforming to the system specification
“替代管理系统”(AMS)需要按照系统规格来操作与维护



Update of the Ballast Water Treatment Legislation- USCG

压载水法规的新发展-美国海岸警卫队

- Additional (operational) requirements in reducing invasive species:
减少入侵性物种的附加要求 (操作上):
 - Avoid discharge or uptake BW at specific areas (e.g. coral reef)
在某些地区(如珊瑚礁)避免排放或添加压载水
 - Avoid uptake of BW in area where invasive species are abundant
避免在含有大量入侵性物种的地区添加压载水
 - Regularly clean WBT and rinse anchor to remove sediments
定期的清洗压载舱, 冲洗锚和链, 除掉淤泥沉淀物
 - Remove fouling organisms from the hull, piping, niche areas, etc.
定期除掉附在船底、管道、压载舱内, 小众范围 等 的污损生物
 - Maintain and implement BWMP (see next slide)
维护与应用“压载水管理计划”
 - Train Master, crew, etc. on use of BWTS
对船长, 船员 等 提供压载水处理和管理方面的操作培训
 - Reporting procedures
遵从报告程序, 向港口队长(负责人) COTP 提交报告
 - Recordkeeping requirements
纪录保存的要求

Update of the Ballast Water Treatment Legislation- USCG

压载水法规的新发展-美国海岸警卫队

- BWMP is to include: “压载水管理计划” 应包含:
 - Detailed safety procedures
详细安全操作程序
 - List of actions in implementing BWM practices
实践压载水管理操作的行动清单
 - Detailed fouling maintenance and sediment removal procedures (e.g. BFMP and BFRB as per MEPC.207(62))
详细的污底维护和清除沉积物程序 (如 生物污底管理计划、纪录本)
 - USCG coordination procedures
美国海岸防卫队的协调程序
 - Identification of designated officer in charge
标注指定的主管人员
 - Reporting requirements and procedures
提供报告的要求和程序
 - With English or French or Spanish translation
如使用语文并非英、法、西语，则要翻译成这三种语言之一

Update of the Ballast Water Treatment Legislation- USCG

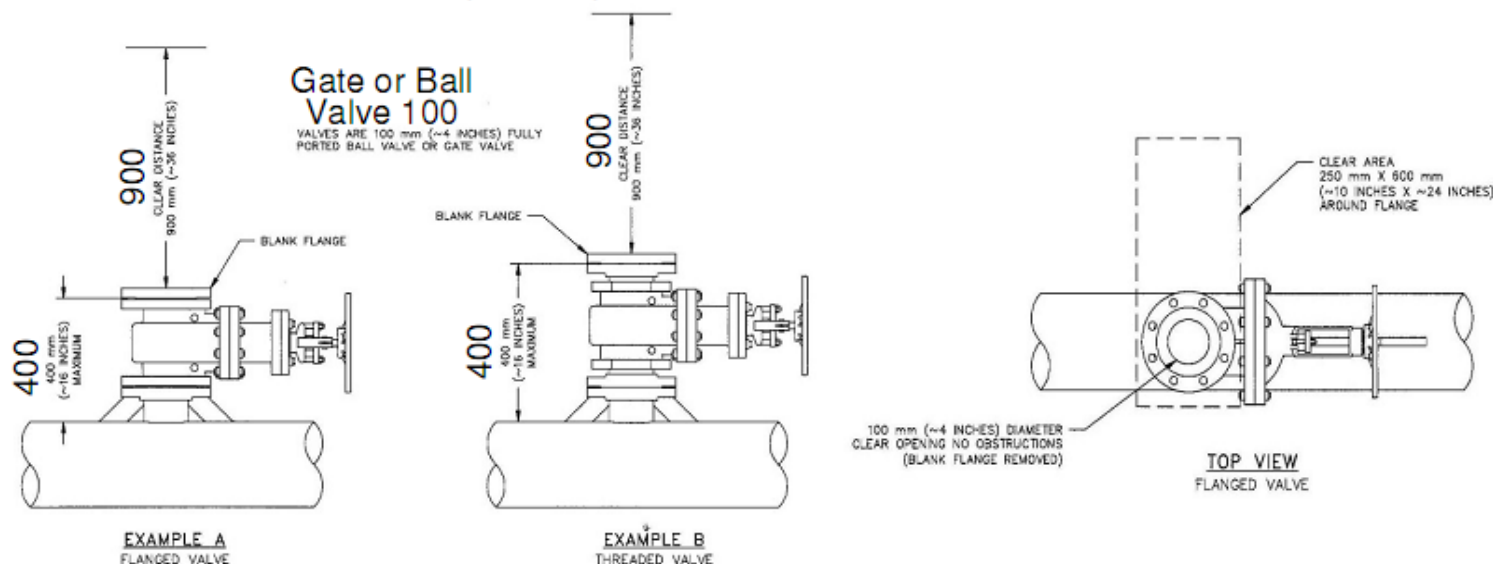
压载水法规的新发展-美国海岸警卫队

- Enforcement and compliance carry out by Captain of The Port (COTP):
由港口队长(负责人) 执行法规, 促进符合法例
 - o Inspections of equipment and sampling facilities onboard
检验设备与取样设施
 - o BW and sediments sampling, checking document and records, etc.
抽取压载水与淤泥沉淀物的样品, 检查文件、证书、纪录
- Sampling ports must be located:
取样口的位置需要:
 - o As close as practicable to the BWMS prior to treatment – assessing quality of BW at uptake
尽可能靠近压载水管理系统, 在处理压载水前的地方 – 监测处理前的水质
 - o As close as practicable to the BWMS overboard outlet prior to discharge – assessing quality of treated BW just before discharged
尽可能靠近压载水管理系统, 在处理压载水后的地方 – 监测处理后排放前的水质

Update of the Ballast Water Treatment Legislation- USCG

压载水法规的新发展-美国海岸警卫队

- Sampling ports **proposed** by California State Lands Commission (CSLC):
加利福尼亚州土地委员会 (CSCL) **建议**中的取样口的布置/安排:



- Provide 2 sq. m. work area, 2 m. headroom, for 2 persons to take samples
提供 2 平方米工作空间, 2 米净空高度, 能容立两人取样
- Allow all Water Ballast Tanks at discharge line to be sampled
样品可于每个压载舱的排放管道提取

BW Treatment System performance standards 压载水处理系统的性能标准

Organism Size Class	BWM 2004 Reg. D-2	USCG Final Rule 33 CFR 151.2030	California Interim Standards 2 CCR 2293
Organisms size ≥ 50 micrometers in minimum dimension	< 10 per m ³	< 10 per m ³	No detectable living organisms
$10 \leq$ Organisms size < 50 micrometers in minimum dimension	< 10 per ml	< 10 per ml	< 0.01 living organisms per ml
Organisms < 10 micrometers in minimum dimension	n/a	n/a	< 1000 bacteria/100 ml < 10,000 viruses/100 ml
<i>Escherichia coli</i>	< 250 cfu/100 ml	< 250 cfu/100 ml	< 126 cfu/100 ml
Intestinal enterococci	< 100 cfu/100 ml	< 100 cfu/100 ml	< 33 cfu/100 ml
Toxicogenic <i>Vibrio cholerae</i> (serotypes O1 & O139)	< 1 cfu/100 ml or < 1 cfu/gram of wet weight zoological samples	< 1 cfu/100 ml or < 1 cfu/gram of wet weight zoological samples	< 1 cfu/100 ml or < 1 cfu/gram of wet weight zoological samples

BW Treatment System performance standards 压载水处理系统的性能标准

- Other US States have their own ballast water discharge standards, regulated via EPA's VGP program such as New York

其他美国州政府也有其压载水排放标准，与 环保局EPA的VGP并存，如纽约

- All vessels operating in New York waters should comply with Condition 2 from 1 January 2012

所有在纽约州水域的船舶需要在2012年1月1日后满足“条件2”的要求

2. By not later than January 1, 2012, each vessel covered under the VGP that operates in New York waters, shall have a ballast water treatment system that meets the following standards, subject to the exceptions listed below.

- All new vessels constructed \geq 1 January 2013 should comply with Condition 3 if operating in New York waters

所有在纽约州水域使用的新造船船舶 (在2013年1月1日后上船台) 需要满足“条件3”的要求

3. Each vessel constructed on or after January 1, 2013 that is covered under the VGP and operates in New York waters, shall have a ballast water treatment system that meets the following standards, subject to the exceptions listed below.

BW Treatment System performance standards 压载水处理系统的性能标准

- New York extended implementation dates – first for Condition 2 until 1 August 2013, then for Conditions 2 and 3 until 19 December 2013
纽约已发出通告延迟执行 – 第一次延迟“条件2”到2013年8月1日，第二次延迟“条件2”和“条件3”到2013年12月19日
- USCG Standards may be more stringent, with studies to be done before 1 Jan 2016
USCG 将来的排放标准可能更严格，在 2016 年前完成研调
- New York will push for higher USCG standards:
纽约将会全力推动 USCG 的研调，达到以下标准：
 - o Mandatory standards of 100 times of IMO – by 1 Jun 2016
在2016年6月1日后，强制性达到比IMO D-2 标准高100倍
 - o Voluntary standards of 10 times of IMO – by 1 Jun 2014
在2014年6月1日后，自愿性达到比IMO D-2 标准高10倍

BW Treatment System performance standards 压载水处理系统的性能标准

Organism Size Class	New York's Condition 2 in VGP Sec. 6.22	New York's Condition 3 in VGP Sec. 6.22
Organisms size ≥ 50 micrometers in minimum dimension	< 1 per 10 m ³	No detectable living organisms
$10 \leq$ Organisms size < 50 micrometers in minimum dimension	< 1 per 10 ml	< 0.01 living organisms per ml
Organisms < 10 micrometers in minimum dimension	n/a	n/a
<i>Escherichia coli</i>	< 126 cfu/100 ml	< 126 cfu/100 ml
Intestinal enterococci	< 33 cfu/100 ml	< 33 cfu/100 ml
Toxicogenic <i>Vibrio cholerae</i> (serotypes O1 & O139)	< 1 cfu/100 ml or < 1 cfu/gram of wet weight zoological samples	< 1 cfu/100 ml or < 1 cfu/gram of wet weight zoological samples
Standard for bacteria	n/a	< 1,000 bacteria per 100 ml
Standard for Viruses	n/a	< 10,000 bacteria per 100 ml

BW Treatment System performance standards 压载水处理系统的性能标准

美国已出台三套压载水排放标准及实施时间

- ◆ USCG标准
- ◆ 加州标准
- ◆ 纽约州标准

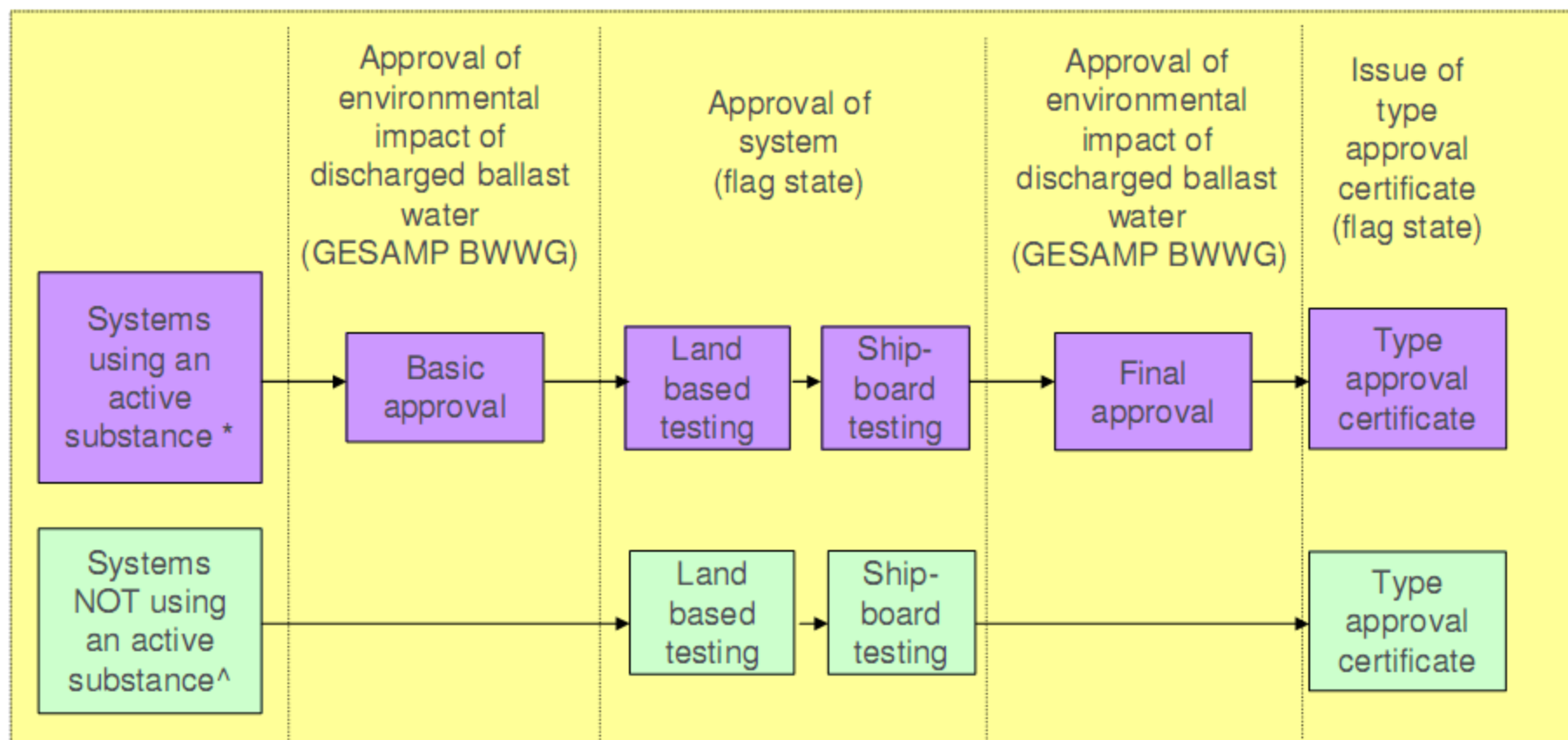
单边行动带来的影响：

- ☆使用物力方法的设备难以达到其标准；
- ☆使用活性物资的设备可能需要提高计量，导致毒性试验、相关化学物资检测、生物有效性试验以及评估重新进行。

Type Approved BW Treatment Systems 已得到型式认可的处理系统

Approval Process – G8 and G9

认可程序 – G8 和 G9



* Includes chemical disinfectants e.g. chlorine, ozone, etc.

^ Includes techniques not employing chemicals, e.g. deoxygenation, ultrasound

Type Approved BW Treatment Systems

已得到型式认可的处理系统

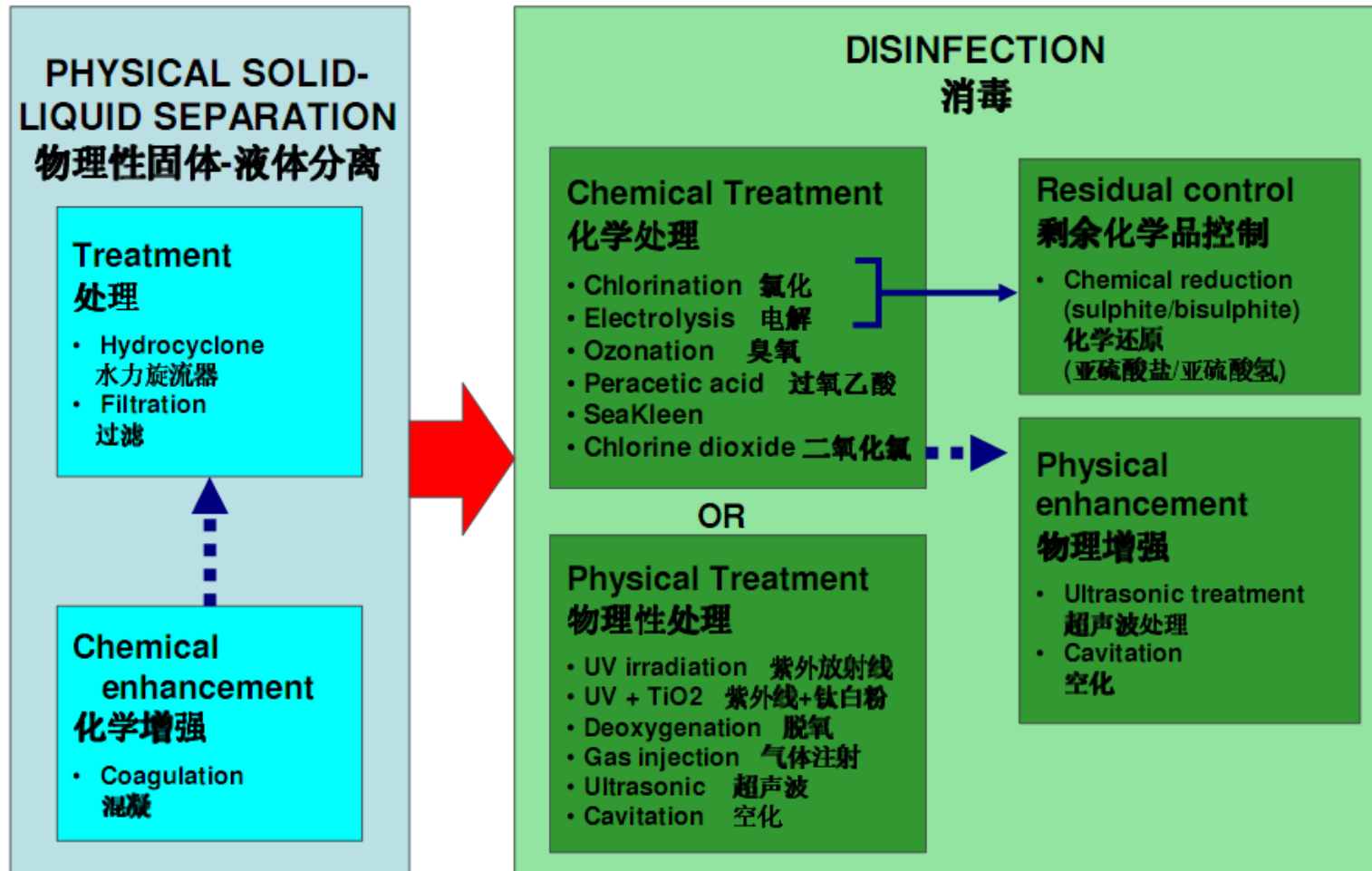
	Name of System	Country of origin	Approval Status	Approved at	Approval date
1	NEI's, Venturi Oxygen Stripping VOS-2500	USA	Type-approved	By Liberia thro' G8	17-Oct-07
2	PureBallast	Norway	Type-approved	By DnV for Norway (250 m3/h)	27-Jun-08
	PureBallast 2.0 / PureBallast 2.0 Ex	Norway	Type-approved	By DnV for Norway (250 m3/h)	10-Mar-11
3	SEDNA® 250 using active substance PERACLEAN® Ocean	Germany	Type-approved	By Germany	10-Jun-08
4	Electro Clean System (ECS)	Korea, R.O.	Type-approved	By Republic of Korea	31-Dec-08
5	OceanSaver® BWMS	Norway	Type-approved	By DnV for Norway	17-Apr-09
6	Hyde Marine's Hyde Guardian	USA	Type-approved	By LR for UK-MCA thro' G8	29-Apr-09
7	OptiMarin Ballast System	Norway	Type-approved	By DnV for Norway thro' G8	12-Nov-09
8	NK-O3 BlueBallast System (ex-NK BWTS)	Korea, R.O.	Type-approved	By Republic of Korea	24-Nov-09
9	PANASIA's GloEn-Patrol™	Korea, R.O.	Type-approved	By Republic of Korea thro' G8	04-Dec-09
10	ClearBallast (Hitachi)	Japan	Type-approved	By Japan	05-Mar-10
11	JFE-BallastAce (TG Ballastcleaner & TG Environmentalguard) (1050 m3/h)	Japan	Type-approved	By Japan	26-May-10
	JFE-BallastAce (TG Ballastcleaner & TG Environmentalguard) (17.5~4500 m3/h)	Japan	Type-approved	By Japan	25-Mar-11
12	Resource Ballast Technologies System / Wilhelmsen-Unitor	South Africa / Norway	Type-approved	By South Africa	31-Aug-10, 19-Apr-11
13	EcoBallast (HHI) (600, 700, 1000 m3/hr)	Korea, R. O.	Type-approved	By Republic of Korea	16-Mar-11
14	Blue Ocean Shield	China	Type-approved	By CCS for China	16-Feb-11
15	BalClor™ (ex-Sunrui)	China	Type-approved	By CCS for China & DNV	28-Jan-11
16	Wuxi Brightsky's BSKY™	China	Type-approved	By CCS for China thro' G8	28-Mar-11
17	RWO's CleanBallast using EctoSys™	Sweden & Germany	Type-approved	By Germany	01-Sep-10
18	FineBallast OZ (ex-Special Pipe Hybrid BWMS)	Japan	Type-approved	By Japan	06-Jun-11
19	Headway's OceanGuard	China	Type-approved	By DnV for Norway	07-Nov-11
20	Purimar™ (by Samsung)	Korea, R.O.	Type-approved	By Republic of Korea	31-Oct-11
21	HHI's HiBallast (Filter Version)	Korea, R.O.	Type-approved	By Republic of Korea	11-Nov-11
22	BalPure® (Severn Trent DeNora)	Germany	Type-approved	By Germany	27-Jul-11
23	Ecochlor® BWTS	Germany	Type-approved	By Germany	Nov 2011

Type Approved BW Treatment Systems 已得到型式认可的处理系统

Name of System		Country of origin	Approval Status	Approved at	Approval date
24	Greenship Sedinox BWMS	Netherlands	Final	MEPC 59	01-Jul-09
25	ARA Ballast (ex-Blue Ocean Guardian)	Korea, R.O.	Final	MEPC 61	01-Oct-10
26	Special Pipe Hybrid BWMS (PERACLEAN®)	Japan	Final	Rejected by MEPC 62	
27	AquaStar™ BWMS	Korea, R.O.	Final	MEPC 63	02-Mar-12
28	Siemens SiCURE™	Germany	Final	MEPC 63	02-Mar-12
29	ERMA FIRST BWMS	Greece	Final	MEPC 63	02-Mar-12
30	MICROFADE™ Ballast Water Management System (Kuraray)	Japan	Final	MEPC 63	02-Mar-12
31	Neo-Purimar™ (Samsung HI)	Korea, R.O.	Final	MEPC 63	02-Mar-12
32	DESMI	Denmark	Final	To be considered at MEPC 64	
33	JFE BallastAce using NEO-CHLOR MARINE™	Japan	Final	To be considered at MEPC 64	
34	Smart Ballast (STX)	Japan	Final	To be considered at MEPC 64	
Name of System		Country of origin	Approval Status	Approved at	Approval date
35	AquaTriComb™	Germany	Basic	MEPC 59	01-Jul-09
36	En-Ballast	Korea, R.O.	Basic	MEPC 60	01-Mar-10
37	FineBallast MF (by Mitsui)	Japan	Basic	MEPC 61 conclude Flag to approve	
38	BlueSeas BWMS	Singapore	Basic	MEPC 62	15-Jul-11
39	PERACLEAN® OCEAN (SKY-SYSTEM®) - Katayama	Japan	Basic	MEPC 62	15-Jul-11
40	BallastMaster by GEA Westfalia	Germany	Basic	MEPC 62	15-Jul-11
41	BlueWorld	Singapore	Basic	MEPC 62	15-Jul-11
42	SEI-Ballast system	Japan	Basic	MEPC 63 conclude Flag to approve	
43	DMU -OH Ballast Water Management System	China	Basic	MEPC 63	02-Mar-12
44	EcoGuardian™ Ballast Water Management System	Korea, R.O.	Basic	MEPC 63	02-Mar-12
45	HS-BALLAST Ballast Water Management System	Korea, R.O.	Basic	To be considered at MEPC 64	
46	KTM-BWMS by KT Marine	Korea, R.O.	Basic	To be considered at MEPC 64	
47	HAMWORTHY AQUARIUS™-EC BWMS	Netherlands	Basic	To be considered at MEPC 64	
48	GloEn-Saver™ BWMS	Korea, R.O.	Basic	To be considered at MEPC 64	
49	Dow-Pinnacle BWMS	Singapore	Basic	To be considered at MEPC 64	
50	OceanDoctor BWMS	China	Basic	To be considered at MEPC 64	
51	Atlas-Denmark using Anolyte	Denmark	Basic	Rejected by MEPC 60	

BW Treatment Processes

压载水处理的流程



BW Treatment Processes

压载水处理的流程

PHYSICAL SOLID-LIQUID SEPARATION

物理性固体-液体分离

PROCESS 处理方法	PROS 优点		CONS 弊端	
Filtration 过滤	Simple to install, maintain	安装、维护简便	Risk of cross contamination	交叉污染的风险
	Environmentally friendly	环保	Consume more energy	耗能
	Modular or integral unit	独立或组装单元	Flow rate / pressure reduction	减低流速/压力
	Flexible in installation	灵活性安装	Back pressure	回压
			Mesh replacement	网格的更换
Hydrocyclone 水力旋流器	Environmental friendly	环保	Risk of cross contamination	交叉污染的风险
	No pressure drop	不会减压	Space requirement	空间的要求
	Minimal maintenance	低维护要求	Dependent on particle density	取决于颗粒密度
	Better water clarity	水清澈度偏高	Only for large particles	只对大颗粒有效
Coagulation 混凝	Improve separation efficiency	提高分离效率	Coagulant/additives needed	混凝剂/添加物
	Reduce sedimentation	减低沉积物	Storage of additives	添加物的存储
			Storage of flocs	絮凝体的存储
			Need to consider voyage duration	航程长短的考虑

BW Treatment Processes

压载水处理的流程

DISINFECTION - CHEMICAL & PHYSICAL TREATMENT

消毒 - 化学性与物理性处理办法

PROCESS 处理办法	PROS 优点		CONS 弊端	
Chemical disinfection 化学性消毒	Can do the job effectively	有效地工作	Less environmentally friendly	较不环保
			Tank coatings may be affected	影响舱内涂层
			Water quality dependent (salinity)	取决于水质(咸度)
			Temperature sensitive	容易受温度影响
			Water pH sensitive	容易受酸碱度影响
			Storage of extra chemicals	存储额外化学品
			Higher safety risk (chemicals)	较高安全风险
UV radiation 紫外线	Can do the job effectively	有效地工作	Water turbidity dependent	受浑浊度影响
	Environmentally friendly	环保	High energy consumption	高能耗
	For water of various salinity	可用于各种咸度	Frequent maintenance needed	需要频密维护
	For wide range of organisms	能杀多种微生物	High capital & maintenance costs	高成本(购买/维护)
De-oxygenation 脱氧	Environmentally friendly	环保	Sensitive to voyage duration	敏感于航程长短
	Reduce corrosion in WBT	减低舱内腐蚀	Extra space may be needed	需要额外空间
	For water of various salinity	可用于各种咸度		
	Simple if IG plant available	惰气设备则简单		

Consideration of BW Treatment Systems

压载水处理系统的考量

SELECTION CONSIDERATIONS – Ships/Fleet

选择的考虑 – 船舶 / 船队

- Ship type / Characteristics / Trade Route
船舶 的种类 / 特性 / 航行路线
- Ballast capacity / Amount of ballast typically taken or discharged / Flow Rate
压载容量 / 压载操作量 / 压载流速
- Time ballast retained on board
压载水存放船上的时间
- Type of ballast taken – clean / turbid / fresh water / salt water
压载水的种类 – 干净 / 浑浊 / 淡水 / 海水
- Ballast system layout / pressure
压载系统 的布置 / 压力
- Type of ballast tank coating / ballast piping
压载舱和管道的涂层种类

Consideration of BW Treatment Systems

压载水处理系统的考量

- Space availability – modular / package type
空间的限制 – 独立 / 组装
- Location – Hazardous / Non Hazardous
安装位置 – 危险区 / 非危险区
- Power availability
电力
- Feasibility of Integration with existing systems
与现有系统集成的可行性
- Crew Competence
船员的能力
- Sampling arrangement
取样布置

Consideration of BW Treatment Systems

压载水处理系统的考量

SELECTION CONSIDERATIONS – Treatment System

选择的考虑 – 处理系统

- | | |
|--|-------------------|
| • Type Approved with documents | 型式认可与有关证书、文件 |
| • Foot print and physical size | 处理系统所占用空间 (平面/高度) |
| • Ballast capacity / flow rate | 压载系统的容量、流量与速度 |
| • Treatment technology | 处理技术 |
| • Power Requirement | 耗电量 |
| • Time for Treatment | 处理所需时间 |
| • Flexibility of location of system components | 系统配件安装位置的弹性 |
| • Effects of pressure drop | 失压的影响 |
| • Integration with existing systems | 与现有系统一体化 |

Consideration of BW Treatment Systems

压载水处理系统的考量

SELECTION CONSIDERATIONS – Treatment System

选择的考虑 – 处理系统

- | | |
|--|----------------|
| • Hazardous Area Installation | 安装于危险区域 |
| • Health and Safety | 健康与安全的考虑 |
| • Chemical storage space | 存储船上用于处理系统的化学品 |
| • Effects on tank structure/coatings | 对压载水舱涂层和结构的影响 |
| • Additional crew workload | 船员的附加工作量 |
| • Crew training | 船员的培训 |
| • Capital and Operating Cost | 资本與操作成本 |
| • System availability – delivery time / Vendor | 处理系统的供应 – 准时付运 |
| • Availability of consumables, spares, support | 消耗品、备件、支援的供应 |

Yard Experience of Coping with IMO BWM Convention 船厂对于压载水管理公约的应对经验

Four BWTS for VLCC

在VLCC上应用的2个压载水处理系统的案例

OceanSaver® **BWMS**

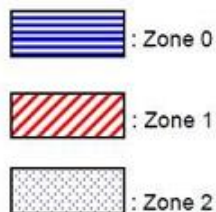
Norway

BalClor™ System

China

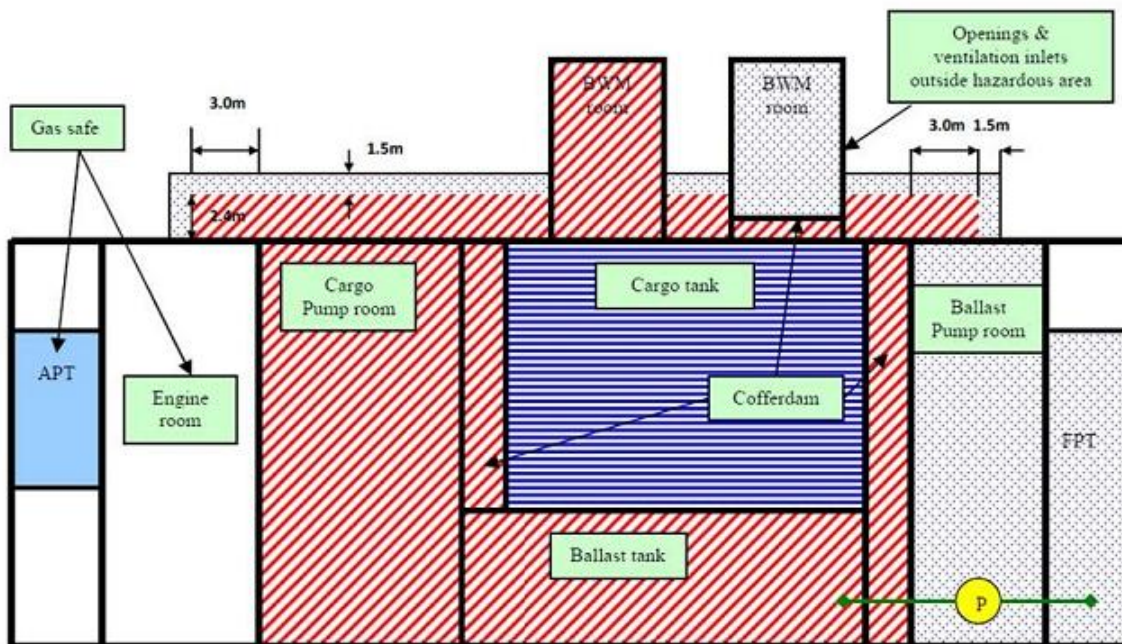


Case Study for VLCC 针对VLCC的研究



Notes

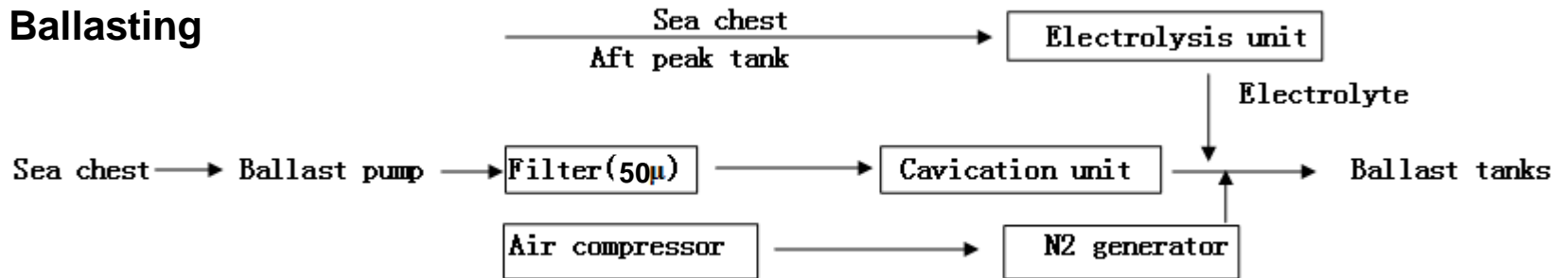
1. Zone 1 on an open deck is only applicable when the girders are on open deck. When the girders are inside the cargo tank, then the open deck is zone 2 and the 1.5m zone around zone 1 in the drawing is no longer applicable.
2. The BWM room is zone 2 if the ventilation and openings are in the safe area; otherwise, it will have the same zone classification as the area it has an opening to.
3. A BWM room without a cofferdam separating it from the deck of the cargo tanks is classified as being in zone 1.



Case Study for VLCC 针对VLCC的研究

OceanSaver

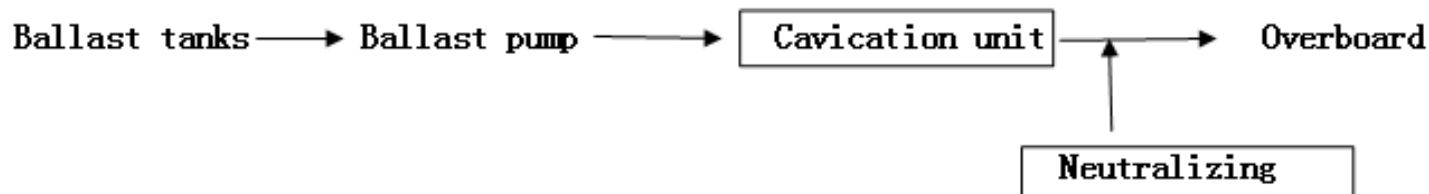
Ballasting



Voyage

Ballast tank inerting with N2 gas

Deballasting

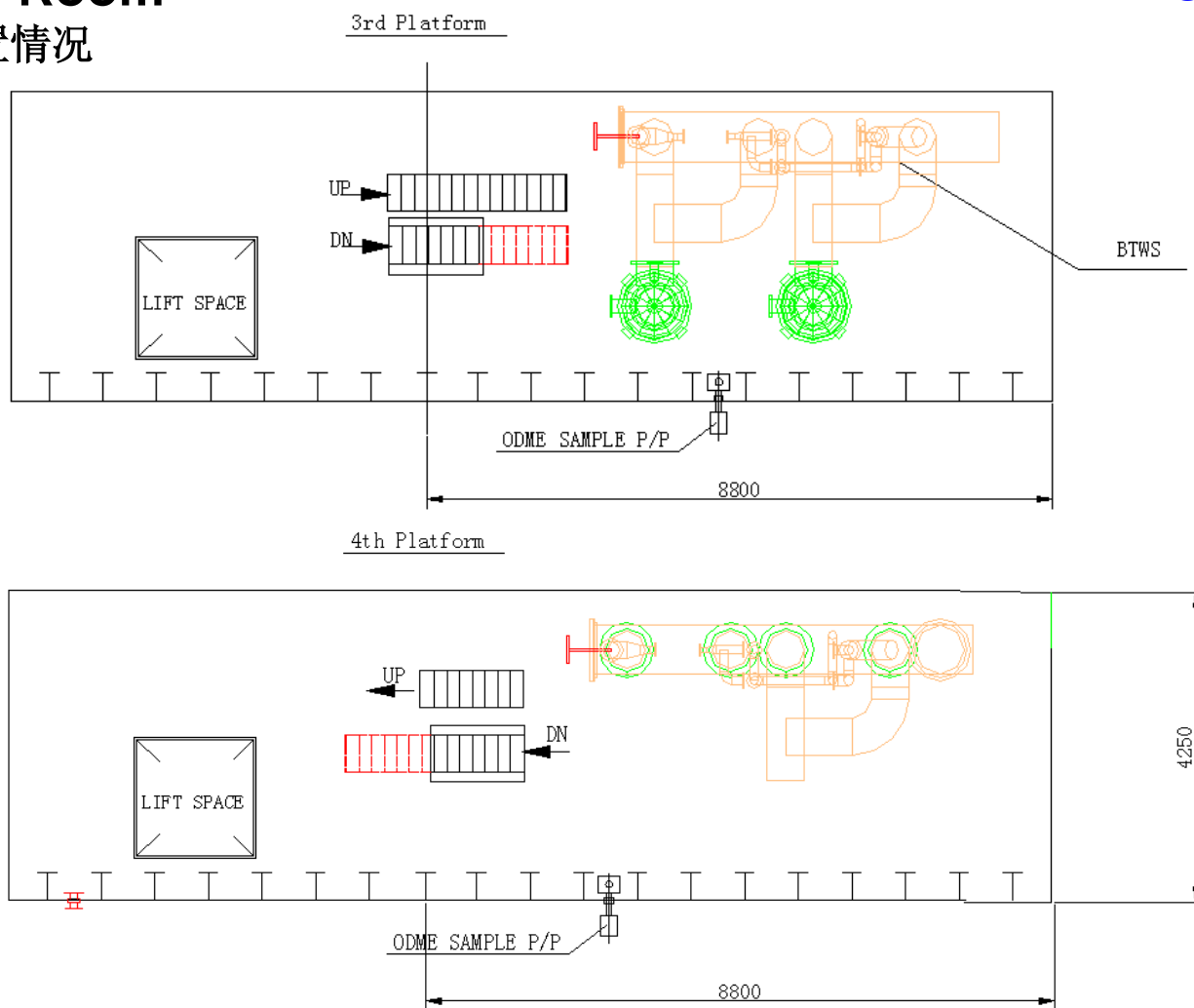


Case Study for VLCC 针对VLCC的研究

In Pump Room

泵舱内布置情况

OceanSaver



Case Study for VLCC 针对VLCC的研究

3rd platform

OceanSaver

4th platform

Filter

Cavitation unit

N2 injection

Overboard

Flowmeter

Ballast pump

Sea chest



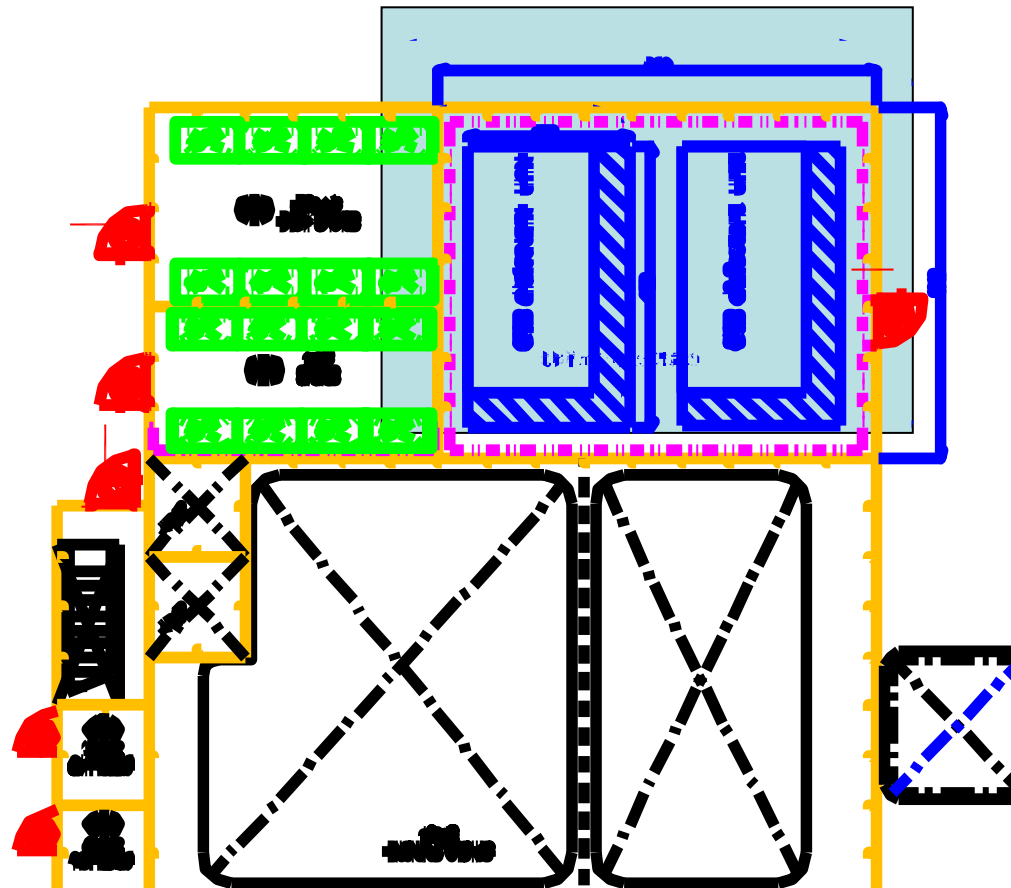
大连船舶重工集团有限公司
DALIAN SHIPBUILDING INDUSTRY CO., LTD.

Case Study for VLCC 针对VLCC的研究

Electrolysis unit is arranged on the side of the poop room

电解单元布置在主甲板上艙楼房间内

OceanSaver

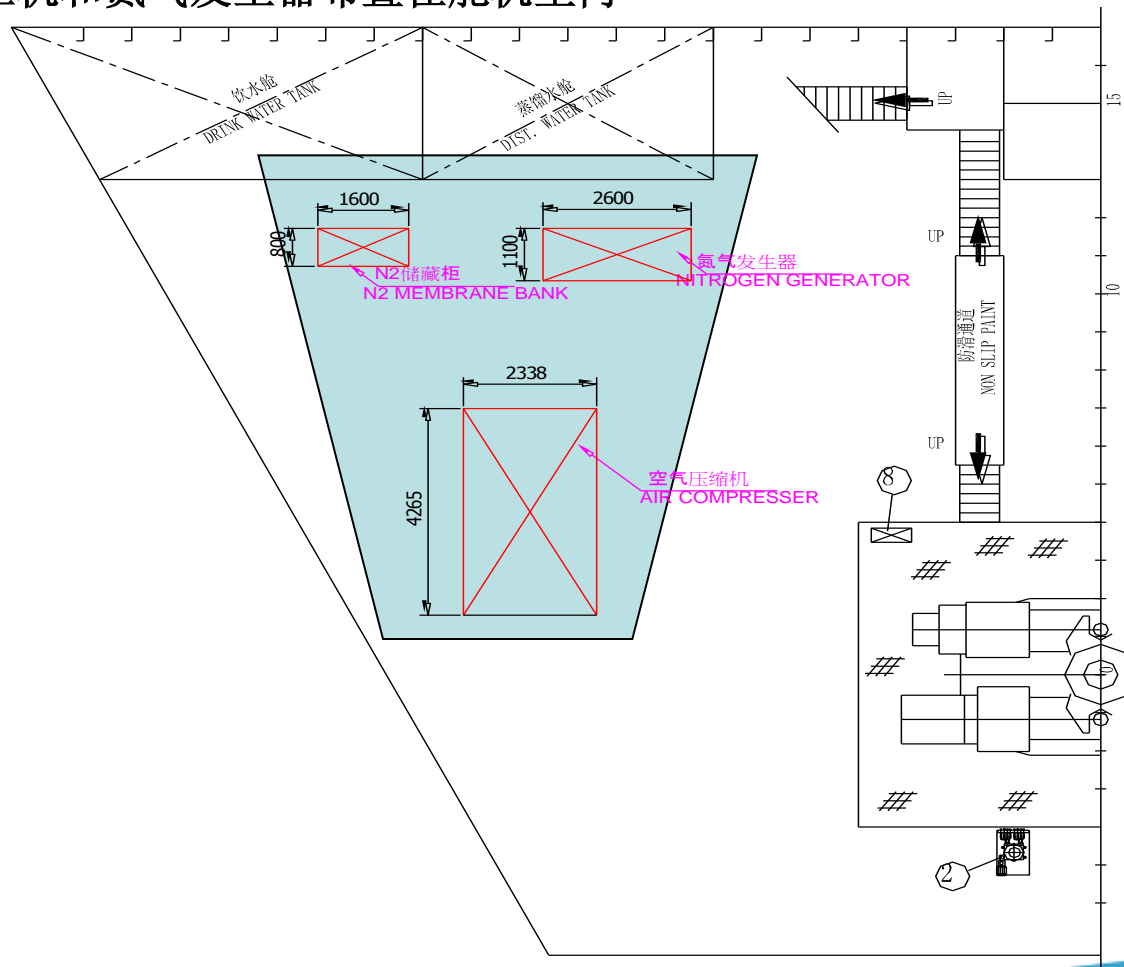


Case Study for VLCC 针对VLCC的研究

Compressor and N2 generator in the steering gear room

OceanSaver

空压机和氮气发生器布置在舵机室内



Case Study for VLCC 针对VLCC的研究

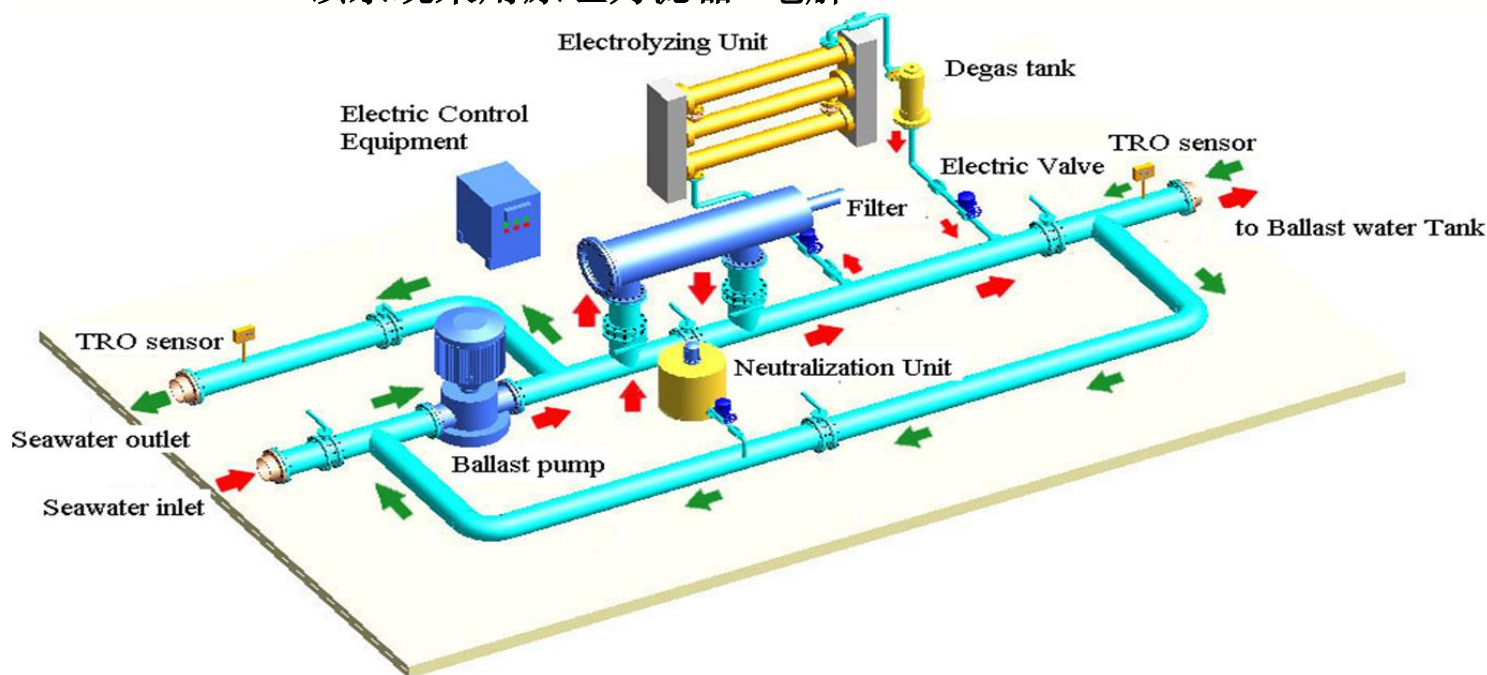
BalClor™ System

BalClor

Manufacturer: Qingdao Sunrui Corrosion and Fouling Control Co., China

Approval Status: Final Approval for Active Substances, October 2010
Type Approval, CCS & DNV

Method: Filtration + electrolysis (sodium hypochlorite)
该系统采用原理为滤器+电解



Case Study for VLCC 针对VLCC的研究

The main components of BalClor™ BWMS

主要设备

BalClor



Self-cleaning filter
自清滤器



Electrolyzing unit
电解单元



Rectifier and Controller
整流器和控制箱



TRO sensor
余氯传感器



Neutralization unit
中和单元

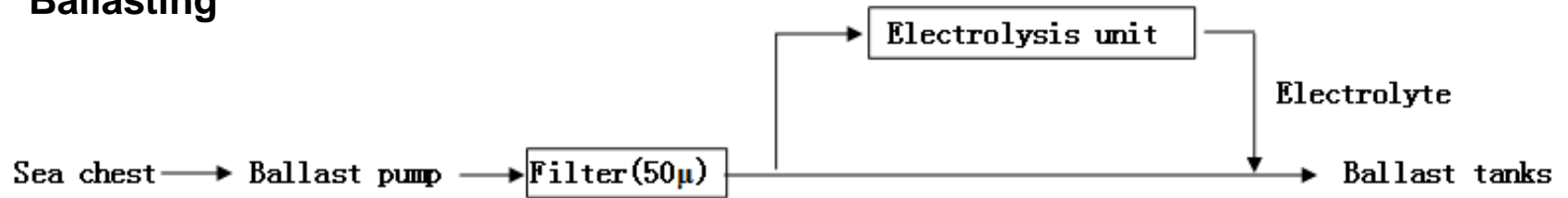


Sampling unit
取样单元

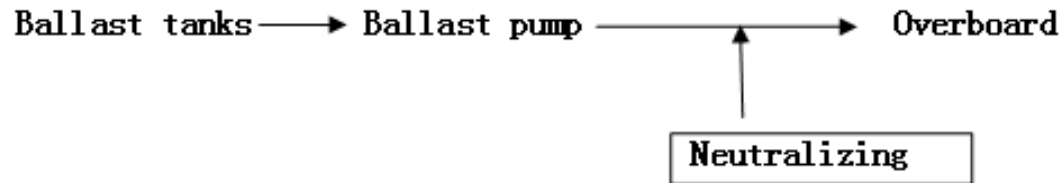
Case Study for VLCC 针对VLCC的研究

BalClor

Ballasting



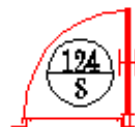
Deballasting



Case Study for VLCC 针对VLCC的研究

BalClor

UPPER DECK



NEUTRALIZING UNIT

ELECTROLYTIC UNIT

RECTIFIER FOR EDU

FLUSHING DEVICE FOR EDU

INJECTION PUMPS

NO. 2

NO. 1



大连船舶重工集团有限公司
DALIAN SHIPBUILDING INDUSTRY CO., LTD.

Case Study for VLCC 针对VLCC的研究

Ballast system 3000m³ x 2sets

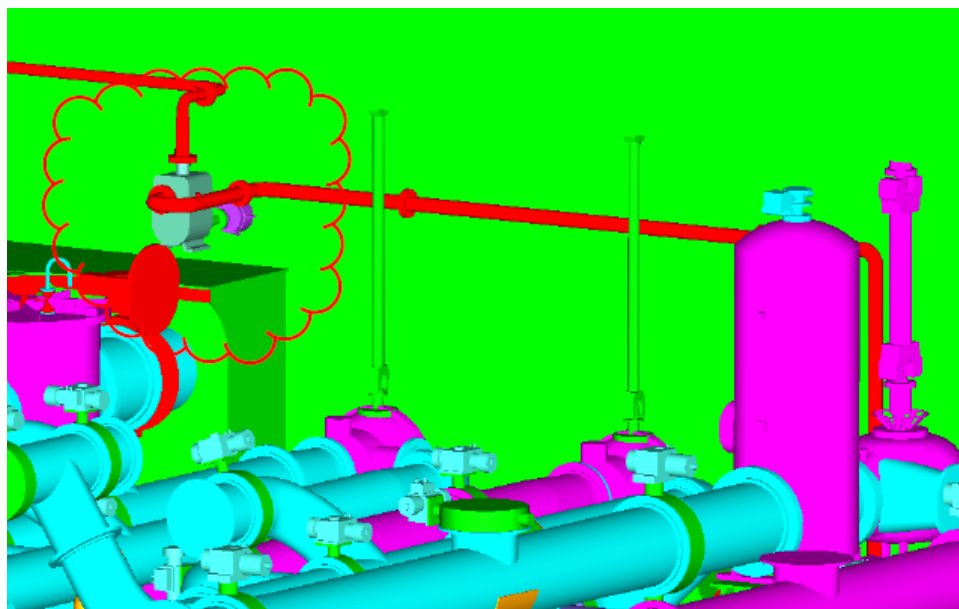
System Name 系统名称	Pressure Loss 压力损失	Power Consumption 电能消耗	Arrangement 布置情况	Remark 其他
OceanSaver 1 st generation	3.5bar	1000 kW	Difficult 难度大	Ballast Pump all steam driven 压载泵由蒸汽驱动
BalClor	0.5bar	Max. 470 kW	Easy 简单	

Case Study for VLCC 针对VLCC的研究

① Electrolysis unit is arranged on the side of the poop room

电解单元布置在主甲板上艏楼房间内

②、motor is installed in E/R through the coupling






压载水反冲洗排污泵。对于此泵我们采取隔舱安装的形式，即泵体安装在泵舱，电机安装在机舱，这样的设计方案很好的解决了设备与规范要求矛盾的问题。

Market Demand 市场需求

IMO BALLAST WATER MANAGEMENT CONVENTION 2004

Implementation Schedule BWM 2004

 : BW Exchange or BW Treatment (D-1 or D-2)
 : BW Treatment (D-2)
 : See *

USCG Reg.

Reg	Year of Ship Construction	Ballast Capacity (m3)	Ship Type / Approx. DWT (for reference only)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
B-3, 1.2 *	< 2009	BW < 1500 or BW > 5000	Tanker / DWT < 3400 Bulkier / DWT < 4200 Gen Cargo / DWT < 4100												
B-3, 1.1 *	(~ 2008)	1500 ≤ BW ≤ 5000	Tanker / 3400 < DWT < 15000 Bulkier / 4200 < DWT < 14200 Gen Cargo / 4100 < DWT < 14000												
B-3, 3	≥ 2009 and < 2012	BW < 5000	Tanker / DWT < 15000 Bulkier / DWT < 14200 Gen Cargo / DWT < 14000												
B-3, 4	(2009 ~ 2011)	BW ≥ 5000	Tanker / DWT > 15000 Bulkier / DWT > 14200 Gen Cargo / DWT > 14000												
B-3, 3 B-3, 5	≥ 2012 (2012 ~)	All	All												

* shall comply not later than the 1st intermediate or renewal survey (whichever is earlier), after the ship delivery anniversary date in 2014/2016

Regulations are retroactively applicable
法规是有追溯性

Market Demand 市场需求

2015~2016: Appr. *6000* Vessels each year
预计每年有6000艘船舶需要安

装

In 2017: Appr. *18000* Vessels
预计有18000艘船舶需要安装

In 2019: Appr. *10000* Vessels
预计有10000艘船舶需要安装

2009~2020: Appr. *57000* Vessels in total
预计总共有57000艘船舶
需要安装



Thanks for your attention !

