1972 – Clean Water Act
1990 – NANCPA
2004 – IMO Ballast Convention
2008 – Vessel General Permit
2012 – Coast Guard Final Rule

EPA Low Enforcement Priority
USCG Extension Program

EPA District 2 Finding
Indonesia – 24 November 2015
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

Meet IMO

Meet Port State Control

Meet US Coast Guard

Meet US EPA

Meet States
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

MARINE VESSEL OPERATOR – BALLAST WATER MANAGEMENT COMPLIANCE

Operator Alternatives for Compliance (Glosten’s September 2015 Update)

**IMO Convention Entry-into-Force**
- Adopted in 2004, the convention remains ~1% short of required tonnage to be ratified. It remains a guess as to when entry-into-force will take place. In the meantime, the debate at IMO remains vigorous, with implementation timelines, grandfathering, port state control, and the type approval process in discussion.

**Have/Will you install IMO G8 BWMS?**

- **Compliant in Non-US Ports**
  - YES
  - AND

- **Non-Compliant when (a) IMO Convention is Ratified, and (b) Implementation Timeline applies to Vessel**
  - NO

**Port State Control (PSC) Sampling**
- The IMO Convention includes provisions for PSC to take ballast water discharge samples to verify compliance, in addition to making sure that a type approved system is installed and recordkeeping is compliant. That noted, there is no common agreement on how to do that sampling, or what analysis should be performed on those samples.

**Port State Control (PSC) requires installations to be Approved by the Flag State Administration**
- **Is your recordkeeping adequate?**
  - YES
  - NO

**IMO Convention Implementation Timeline**
- As written, the convention requires new builds to be ready to turn-on their BWMS at entry-into-force, which is one-year from ratification. For existing vessels, the five-year phasing started in 2014 for existing vessels with 1500 to 3000 MT capacity. This phasing extends to all vessels starting in 2016. However, the timeline is likely to see some smoothing out, especially if ratification doesn’t happen before end of this year.

**Port State Control (PSC) Easing In Period**
- IMO has agreed that PSC enforcement will be limited to advisories until operators and technology gain experience. The US, however, has reserved its rights to sample and enforce.
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

Port State Control (PSC) Sampling
The IMO Convention includes provisions for PSC to take ballast water discharge samples to verify compliance, in addition to making sure that a type approved system is installed and recordkeeping is compliant. That noted, there is no common agreement on how to do that sampling, or what analysis should be performed on those samples.

Port State Control (PSC) requires installations to be Approved by the Flag State Administration

Is your recordkeeping adequate?

YES
Sampling at PSC discretion, i.e. concerns of recordkeeping.

Compliant in Non-US Ports

FAIL

Non-Compliant

NO

Discharge Pass Compliance Sampling?

US Coast Guard Type Approvals
The US Coast Guard has not yet issued any type approvals, although at least three applications have been submitted at this time. Clouding the outlook is that the US recognized ETV protocol, different from the IMO G8, does not currently include the most probable number (MPN) method that UV based BWMS rely on to gain approval.

US Coast Guard has Granted >40 “IMO G8” BWMS Alternative Management System (AMS) Status

Port State Control (PSC) Easing In Period
IMO has agreed that PSC enforcement will be limited to advisories until operators and technology gain experience. The US, however, has reserved its rights to sample and enforce.

USCG Extension = EPA Compliance
Vessels that have a US Coast Guard extension, are not exempt from compliance with EPA’s Vessel General Permit. These are two separate requirements, the latter is part of the Clean Water Act.
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

US Coast Guard Type Approvals
The US Coast Guard has not yet issued any type approvals, although at least three applications have been submitted at this time. Clouding the outlook is that the US recognized ETV protocol, different from the IMO G8, does not currently include the most probable number (MPN) method that UV based BWMS rely on to gain approval.

US Coast Guard has Granted >40 “IMO G8” BWMS Alternative Management System (AMS) Status

USCG Extension ≠ EPA Compliance
Vessels that have a US Coast Guard extension, are not exempt from compliance with EPA’s Vessel General Permit. These are two separate requirements, the later is part of the Clean Water Act.

Compliant in US Ports for at least 5 years from first dry-dock following 2014 (1500 – 5000 MT) or 2016 (all others)

Will BWMS Gain US Type Approval?

Compliant in US Ports
If also performing recordkeeping and, if required, sampling

USCG Extension ≠ EPA Compliance

Non-compliant, unless you file for an “extension.” These extensions are typically granted for two years as there are no US Type Approved Systems yet available.

Have you installed an approved AMS?

USCG Extension ≠ EPA Compliance

Non-Compliant in US Ports, unless BWMS installed prior to extension expiration.

Will You Install US Type Appr. BWMS?

Non-Compliant in US Ports, following 5 year period, unless other accommodations are made.

EPA Low Enforcement Priority vs. Citizen Lawsuits
EPA issued an enforcement response policy declaring that enforcement of the 2013 VGP numeric ballast water discharge limits will be a low priority if the vessel receives and complies with a US Coast Guard

EPA’s Vessel General Permit (VGP) includes:
- numerical DISCHARGE limits

Action

10.0×7.00 in

1.00×17.00 in
**COMPLEXITY OF IMO, USCG, EPA, AND US STATES**

**EPA Low Enforcement Priority vs. Citizen Lawsuits**
EPA issued an enforcement response policy declaring that enforcement of the 2013 VGP numeric ballast water discharge limits will be a low priority if the vessel receives and complies with a US Coast Guard extension and complies with all other provisions of the VGP.

However, this EPA policy does not protect against citizen lawsuits. If fact, the EPA limits are the result of a citizen lawsuit as per a Clean Water Act provision. That provision allows citizens to levy law suits against vessel operators that are out of compliance with EPA requirements.

**It's Not Just California**
US States can impose additional requirements, up to 3 nautical miles from shore, through authority granted under the Clean Water Act. Special requirements are listed in the VGP, including California, Connecticut, Michigan, New York, Washington and others.

**US States can have additional requirements** to those by US Coast Guard and EPA. The operator, depending on discharge location, may need to comply with the following:

- Additional Recordkeeping
- Higher Efficacy Standards
- Restrictive Disinfection Byproducts
- Earlier Implementation

**EPA's Vessel General Permit (VGP) includes:**
- numerical DISCHARGE limits
- mandatory SAMPLING

**Will discharge meet numerical limits?**

- **PASS** Compliant in US Ports
- **FAIL** Non-Compliant in US Ports as per EPA implementation schedule. There is no “extension.”

**EPA Timelines and Standards are Minimums**
California is currently considering delaying its implementation of treatment standards that exceed EPA’s. This delay, however, doesn’t relieve the ship operator from still complying with the EPA standard and timeline.

**Non-Compliant with US Regional State Requirements**
Even if compliant with USCG and EPA
BALLAST WATER MANAGEMENT COMPLIANCE
2 DECEMBER 2015
INTERNATIONAL WORKBOAT SHOW 2015
NEW ORLEANS, LA
1972 – Clean Water Act
1990 – NANCPA
2004 – IMO Ballast Convention
2008 – Vessel General Permit
2012 – Coast Guard Final Rule

EPA Low Enforcement Priority
USCG Extension Program

EPA District 2 Finding
Indonesia – 24 November 2015
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

Meet IMO

Meet Port State Control

Meet US Coast Guard

Meet US EPA

Meet States
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

MARINE VESSEL OPERATOR – BALLAST WATER MANAGEMENT COMPLIANCE

Operator Alternatives for Compliance (Glosten’s September 2015 Update)

**IMO Convention Entry-into-Force**

Adopted in 2004, the convention remains ~1% short of required tonnage to be ratified. It remains a guess as to when entry-into-force will take place. In the meantime, the debate at IMO remains vigorous, with implementation timelines, grandfathering, port state control, and the type approval process in discussion.

**PORT STATE CONTROL (PSC) Sampling**

The IMO Convention includes provisions for PSC to take ballast water discharge samples to verify compliance, in addition to making sure that a type approved system is installed and recordkeeping is compliant. That noted, there is no common agreement on how to do that sampling, or what analysis should be performed on those samples.

**IMO Convention Implementation Timeline**

As written, the convention requires new builds to be ready to turn-on their BWMS at entry-into-force, which is one-year from ratification. For existing vessels, the five-year phasing started in 2014 for existing vessels with 1500 to 3000 MT capacity. This phasing extends to all vessels starting in 2016. However, the timeline is likely to see some smoothing out, especially if ratification doesn’t happen before end of this year.

**Port State Control (PSC) Easing In Period**

IMO has agreed that PSC enforcement will be limited to advisories until operators and technology gain experience. The US, however, has reserved its rights to sample and enforce.

---

**Diagram:**

- **Compliant in Non-US Ports**
  - If you are compliant in Non-US Ports, you are compliant.
  - If you are not compliant in Non-US Ports, you are non-compliant.

- **Have/Will you install IMO G8 BWMS?**
  - If you have or will install IMO G8 BWMS, you are compliant.
  - If you do not have or will not install IMO G8 BWMS, you are non-compliant.

- **Port State Control (PSC) requires installations to be Approved by the Flag State Administration**
  - If installations are approved by the Flag State Administration, you are compliant.
  - If installations are not approved, you are non-compliant.

- **Is your recordkeeping adequate?**
  - If recordkeeping is adequate, you are compliant.
  - If recordkeeping is not adequate, you are non-compliant.

---

**Notes:**

- IMO Convention Entry-into-Force
  - Adopted in 2004, the convention remains ~1% short of required tonnage to be ratified.
  - Debate at IMO remains vigorous.

- IMO Convention Implementation Timeline
  - New builds require turn-on at entry-into-force.
  - Existing vessels phase in over five years.

- Port State Control (PSC)
  - Sample ballast water discharge for verification.
  - No common agreement on sampling and analysis.

- Port State Control (PSC) Easing In Period
  - IMO agreed on limitations.
  - US reserves rights to sample and enforce.

---

**Source:**

- Glosten’s September 2015 Update
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

Port State Control (PSC) Sampling
The IMO Convention includes provisions for PSC to take ballast water discharge samples to verify compliance, in addition to ensuring that a type approved system is installed and recordkeeping is compliant. That noted, there is no common agreement on how to do that sampling, or what analysis should be performed on those samples.

Port State Control (PSC) requires installations to be Approved by the Flag State Administration

Is your recordkeeping adequate?

Sampling at PSC discretion, i.e., concerns of recordkeeping.

Compliant in Non-US Ports

IF CALLING IN UNITED STATES

Discharge Pass Compliance Sampling?

Pass

Non-Compliant

PORT STATE CONTROL (PSC) Easing In Period
IMO has agreed that PSC enforcement will be limited to advisories until operators and technology gain experience. The US, however, has reserved its rights to sample and enforce.

US Coast Guard Type Approvals
The US Coast Guard has not yet issued any type approvals, although at least three applications have been submitted at this time. Couding the outlook is that the US recognized ETV protocol, different from the IMO G8, does not currently include the most probable number (MPN) method that UV based BWMS rely on to gain approval.

US Coast Guard has Granted >40 "IMO G8" BWMS Alternative Management System (AMS) Status

USCG Extension = EPA Compliance
Vessels that have a US Coast Guard extension are not exempt from compliance with EPA’s Vessel General Permit. These are two separate requirements, the latter is part of the Clean Water Act.
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

US Coast Guard Type Approvals
The US Coast Guard has not yet issued any type approvals, although at least three applications have been submitted at this time. Clouding the outlook is that the US recognized ETV protocol, different from the IMO G8, does not currently include the most probable number (MPN) method that UV based BWMS rely on to gain approval.

US Coast Guard has Granted >40 “IMO G8” BWMS Alternative Management System (AMS) Status

USCG Extension ≠ EPA Compliance
Vessels that have a US Coast Guard extension, are not exempt from compliance with EPA’s Vessel General Permit. These are two separate requirements, the later is part of the Clean Water Act.

Compliant in US Ports for at least 5 years from first dry-dock following 2014 (1500 – 5000 MT) or 2016 (all others) → YES

Have you installed an approved AMS? → YES

Non-compliant, unless you file for an “extension.” These extensions are typically granted for two years as there are no US Type Approved Systems yet available.

USCG Extension ≠ EPA Compliance
Vessels that have a US Coast Guard extension, are not exempt from compliance with EPA’s Vessel General Permit. These are two separate requirements, the later is part of the Clean Water Act.

USCG Extension ≠ EPA Compliance
Vessels that have a US Coast Guard extension, are not exempt from compliance with EPA’s Vessel General Permit. These are two separate requirements, the later is part of the Clean Water Act.

Compliant in US Ports, following 5 year period, unless other accommodations are made. → Non-Compliant in US Ports, unless BWMS installed prior to extension expiration. → NO

Will BWMS Gain US Type Approval? → NO

Non-Compliant in US Ports, unless BWMS installed prior to extension expiration. → NO

Will You Install US Type Appr. BWMS? → NO

Non-Compliant in US Ports, unless BWMS installed prior to extension expiration. → NO

Non-compliant, unless you file for an “extension.” These extensions are typically granted for two years as there are no US Type Approved Systems yet available.

Compliant in US Ports if also performing recordkeeping and, if required, sampling. → YES

EPA Low Enforcement Priority vs. Citizen Lawsuits
EPA issued an enforcement response policy declaring that enforcement of the 2013 VGP numeric ballast water discharge limits will be a low priority if the vessel receives and complies with a US Coast Guard

EPA’s Vessel General Permit (VGP) includes:
- numerical DISCHARGE limits

AND
COMPLEXITY OF IMO, USCG, EPA, AND US STATES

EPA Low Enforcement Priority vs. Citizen Lawsuits
EPA issued an enforcement response policy declaring that enforcement of the 2013 VGP numeric ballast water discharge limits will be a low priority if the vessel receives and compiles with a US Coast Guard extension and complies with all other provisions of the VGP.

However, this EPA policy does not protect against citizen lawsuits. If fact, the EPA limits are the result of a citizen lawsuit as per a Clean Water Act provision. That provision allows citizens to levy law suits against vessel operators that are out of compliance with EPA requirements.

It's Not Just California
US States can impose additional requirements, up to 3 nautical miles from shore, through authority granted under the Clean Water Act. Special requirements are listed in the VGP, including California, Connecticut, Michigan, New York, Washington and others.

US States can have additional requirements to those by US Coast Guard and EPA. The operator, depending on discharge location, may need to comply with the following:
- Additional Recordkeeping
- Higher Efficacy Standards
- Restrictive Disinfection Byproducts
- Earlier Implementation

EPA’s Vessel General Permit (VGP) includes:
- numerical DISCHARGE limits
- mandatory SAMPLING

Will discharge meet numerical limits?
- PASS Compliant in US Ports
- FAIL Non-Compliant in US Ports as per EPA implementation schedule. There is no “extension.”

EPA Timelines and Standards are Minimums
California is currently considering delaying its implementation of treatment standards that exceed EPAs. This delay, however, does not relieve the ship operator from still complying with the EPA standard and timeline.

Will You Be Compliant?
- YES TO ALL Compliant in US Regional State Requirements If also compliant with USCG and EPA
- NO TO ANY Non-Compliant with US Regional State Requirements Even if compliant with USCG and EPA
OVER 55 YEARS OF INNOVATIVE MARINE SOLUTIONS

- **Vessel & Platform Design**
  - Concept, Contract, and Detailed Design, New Buildings, Modifications

- **Electrical**
  - Electrical Design, Electrical Load Analysis, Hazardous Area Plans, Circuit Breaker Coordination

- **Analysis and Simulation**
  - Finite Element Analysis, Computational Fluid Dynamics, Piping System Modeling, Ship Motions, Climate Modeling, Maneuvering Simulations, Transportation Planning, Mooring Design.
OVER 55 YEARS (WORK BOAT BOOTH #525)

- **Noise Control Engineering**
  - Team of 15 specialty engineers focusing on noise and vibration solutions

- **Project Support**
  - Feasibility Studies, Equipment Trade Studies, Specifications, Shipyard Selection

- **Detail Design**
  - Laser Scanning, Solid Modeling, Structural Lofting, Pipe Spools, Pre-outfitting, Fabrication Planning

- **On-site Support**
  - Construction Support, Tests and Trials, Commissioning, Training
US WORK BOAT APPLICABILITY

- Ocean Going
  Integrated Equipment

- ATBs and Tankers
  Deck Ballast Modules

- Barges, Old Ships, Emergencies
  In-Tank Treatment (Ballast Responder)

- Great Lakes
  Special Projects

- Low Ballast Alternative
OCEAN GOING VESSELS

- Challenging Integrations
- Use of Laser Scanners and Solid Models
- Program Management
- Marine Engineering Know-how
OCEAN GOING VESSELS

- Challenging Integrations
- Use of Laser Scanners and Solid Models
- Program Management
- Marine Engineering Know-how
DECK MODULE APPROACH

- Cold Weather Lay-up
- Laser Scanner Employment
- Repowering
- Factory Testing and Approvals
- Rapid Installation
DECK MODULE APPROACH

- Simple, Standard, Robust
  - Self-contained unit
  - Readily transportable
  - Custom designed & fabricated to ABS & USCG rules

- Self-Sufficient System
  - Contains all systems & outfitting of machinery space
  - Integrates easily with existing systems

- Proven and Capable
  - ABS & USCG approved for installation on US-flagged tank vessel
  - Units come completely assembled & tested
  - Modules include MSI & Glosten support
3D Laser Scanning Capabilities allow us to:

- Scan a vessel with 2-mm accuracy at a range of up to 330m
- Create instantly viewable scan
- Create point cloud for virtual walkthroughs and 3D model validation

✓ By scanning, we can identify space for integrated treatment solutions.
Contingency Measure – In Tank Treatment

Chemical Dosing of NaOCl

Hold Time less than 24 hours, Neutralize and Discharge
IN-TANK TREATMENT - BALLAST RESPONDER, MOBILE
GREAT LAKES CARRIERS – SPECIAL PROJECTS

- Lakers not currently required to install BWMS
- Trials ongoing since 2008, determining feasibility
JULY SHIPBOARD TESTING (CONT.)
# BALLAST WATER – TREATMENT OPTIONS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Summary</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean Going Vessels</td>
<td>Integrated Engineering</td>
<td>Successful integration using complex tools with AMS systems.</td>
</tr>
<tr>
<td>Barges, ATBs, Chemical/Tank Carriers</td>
<td>Deck Modules – Factory Integration with Quick Ship Installations</td>
<td>Successful installation of first vessel series. More deliveries soon.</td>
</tr>
<tr>
<td>Lakers</td>
<td>No Solutions Yet, Typical Systems Don’t Fit</td>
<td>Experimental Use of Caustic Soda with CO2 Neutralization Shows Practicality. Next Steps TBD.</td>
</tr>
<tr>
<td>Barges, Old Ships, Infrequent Discharges</td>
<td>Mobile Treatment Proven Practical. Salt and Fresh Demonstrations</td>
<td>Heading to Approvals, Demonstrations to Continue.</td>
</tr>
<tr>
<td>Low Ballast Water Vessels</td>
<td>Look to Alternative Solutions</td>
<td>Use of ‘public water supply’ is permitted, fresh water makers under review.</td>
</tr>
</tbody>
</table>
## BALLAST WATER – TREATMENT OPTIONS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Summary</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean Going Vessels</td>
<td>Integrated Engineering</td>
<td>Successful integration using complex tools with AMS systems.</td>
</tr>
<tr>
<td>Barges, ATBs, Chemical/Tank Carriers</td>
<td>Deck Modules – Factory Integration with Quick Ship Installations</td>
<td>Successful installation of first vessel series. More deliveries soon.</td>
</tr>
<tr>
<td>Lakers</td>
<td>No Solutions Yet, Typical Systems Don’t Fit</td>
<td>Experimental Use of Caustic Soda with CO2 Neutralization Shows Practicality. Next Steps TBD.</td>
</tr>
<tr>
<td>Barges, Old Ships, Infrequent Discharges</td>
<td>Mobile Practical Demonstration</td>
<td></td>
</tr>
<tr>
<td>Low Ballast Water Vessels</td>
<td>Looe</td>
<td></td>
</tr>
</tbody>
</table>

**Workboat Task List**

- Ballast Management Plan
- Reporting and Recordkeeping
- Compliance Sampling
- Vessel Modifications and Operational Changes
DECK MODULE APPROACH

- Cold Weather Lay-up
- Laser Scanner Employment
- Repowering
- Factory Testing and Approvals
- Rapid Installation
DECK MODULE APPROACH

- **Simple, Standard, Robust**
  - Self-contained unit
  - Readily transportable
  - Custom designed & fabricated to ABS & USCG rules

- **Self-Sufficient System**
  - Contains all systems & outfitting of machinery space
  - Integrates easily with existing systems

- **Proven and Capable**
  - ABS & USCG approved for installation on US-flagged tank vessel
  - Units come completely assembled & tested
  - Modules include MSI & Glosten support
DECK MODULE APPROACH

- 3D Laser Scanning Capabilities allow us to:
  - Scan a vessel with 2-mm accuracy at a range of up to 330m
  - Create instantly viewable scan
  - Create point cloud for virtual walkthroughs and 3D model validation

✓ By scanning, we can identify space for integrated treatment solutions.
IN-TANK TREATMENT - BALLAST RESPONDER, MOBILE

- Contingency Measure – In Tank Treatment
- Chemical Dosing of NaOCl
- Hold Time less than 24 hours, Neutralize and Discharge
IN-TANK TREATMENT - BALLAST RESPONDER, MOBILE
GREAT LAKES CARRIERS – SPECIAL PROJECTS

- Lakers not currently required to install BWMS
- Trials ongoing since 2008, determining feasibility
JULY SHIPBOARD TESTING (CONT.)
### BALLAST WATER – TREATMENT OPTIONS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Summary</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean Going Vessels</td>
<td>Integrated Engineering</td>
<td>Successful integration using complex tools with AMS systems.</td>
</tr>
<tr>
<td>Barges, ATBs, Chemical/Tank Carriers</td>
<td>Deck Modules – Factory Integration with Quick Ship Installations</td>
<td>Successful installation of first vessel series. More deliveries soon.</td>
</tr>
<tr>
<td>Lakers</td>
<td>No Solutions Yet, Typical Systems Don’t Fit</td>
<td>Experimental Use of Caustic Soda with CO2 Neutralization Shows Practicality. Next Steps TBD.</td>
</tr>
<tr>
<td>Barges, Old Ships, Infrequent Discharges</td>
<td>Mobile Treatment Proven Practical. Salt and Fresh Demonstrations</td>
<td>Heading to Approvals, Demonstrations to Continue.</td>
</tr>
<tr>
<td>Low Ballast Water Vessels</td>
<td>Look to Alternative Solutions</td>
<td>Use of ‘public water supply’ is permitted, fresh water makers under review.</td>
</tr>
</tbody>
</table>
# BALLAST WATER – TREATMENT OPTIONS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Summary</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean Going Vessels</td>
<td>Integrated Engineering</td>
<td>Successful integration using complex tools with AMS systems.</td>
</tr>
<tr>
<td>Barges, ATBs, Chemical/Tank Carriers</td>
<td>Deck Modules – Factory Integration with Quick Ship Installations</td>
<td>Successful installation of first vessel series. More deliveries soon.</td>
</tr>
<tr>
<td>Lakers</td>
<td>No Solutions Yet, Typical Systems Don’t Fit</td>
<td>Experimental Use of Caustic Soda with CO2 Neutralization Shows Practicality. Next Steps TBD.</td>
</tr>
<tr>
<td>Barges, Old Ships, Infrequent Discharges</td>
<td>Mobile Prac, Den, Salt and Fresh Demonstrations</td>
<td>Hitting Approvals, Demonstrations to Continue.</td>
</tr>
<tr>
<td>Low Ballast Water Vessels</td>
<td>Look</td>
<td></td>
</tr>
</tbody>
</table>

## Workboat Task List
- **Ballast Management Plan**
- **Reporting and Recordkeeping**
- **Compliance Sampling**
- **Vessel Modifications and Operational Changes**
SPECIAL CONSIDERATIONS FOR THE INSTALLATION OF BWTS IN HAZARDOUS AREAS

By:

Jan Flores, P.E. – NETSCo, Inc.
jflores@netsco.us

John P. Dooley – Choice Ballast Solutions
jdooley@choiceballast.com
NETSCo is a full service Naval Architecture and Marine Engineering firm that provides complete ship, tug, and barge designs of all types; from concept through actual construction.

NETSCo is a leader in marine environmental solutions; such as ballast water treatment systems, exhaust gas scrubbers, and the use of alternative fuels, (LNG, CNG) among others.

NETSCo serves the marine industry with its distinctive competence in self-unloading bulk carriers – for both solid and liquid materials. If you need to upgrade or extend vessel life, comply with new regulations, convert from one bulk material to another, or repower to achieve greater efficiency, you will get a superior solution from our talented technical team.
A Proven Track Record

2001 – Netsco Commissioned by BP
- To Design, Develop and Certify an Ozone BWTS
- Patents Obtained
- Tested to G8 & G9 requirements
- Certified to IMO D2 Requirements
- Installed on Prince William Sound

2008 – Technology licensed / sold – now Blue Ballast

2010 – Commissioned by Chevron
- Feasibility Study
- Integration Engineering
- 3D Scanning, Drawing preparation and submittals
- Installation on
  - Mississippi Voyager
  - Florida Voyager

2013 – Choice was Founded to focus on BWTS
- Independent Analysis & Planning
- Integration Engineering
- Retrofit Installations from Survey to Signoff
Planning and Evaluation
Choice has Fleet Contract with RCCL – 43 Ships
- Planning for Compliance
- BWTS Technology selection
- Integration Engineering
- Compliance Assessment Program
Integration Engineering

- BALPURE® Ballast Water Treatment System
  - 14 AFRAMAX Tankers at STX Shipyard
  - 12 Product Tankers at HMD
- Hazardous Area Installation
- Arrangement Drawings
- Flow Analysis
- Risk Assessment
Agenda

1. Definition of Hazardous Area.
2. Challenges in managing installations of BWTS in hazardous areas.
3. Various Installation Configurations
   - Crude Tanker (pump room) Chlorine Based BWTS in Hazardous Deck.
   - Crude Tanker (pump room) Chlorine Based BWTS in non-haz area
   - Product Tanker (non-pump room) UV BWTS in Hazardous Deck.
   - Product Tanker (non-pump room) Chlorine Based BWTS in Hazardous Deck.
Hazardous areas are defined as areas in which a flammable or explosive gas and air mixtures is, or may normally be expected to be, present in quantities such as to require special precautions for the construction and use of electrical equipment and machinery.  

**IEC 60092-502**
“Tanks and spaces separated from cargo tanks by a single deck or bulkhead may be contaminated by cargo oil or vapor due to possible impairment of the common boundary. These tanks and spaces are therefore, in principle, to be regarded as hazardous spaces. Piping serving or having an opening into these tanks or spaces is likewise to be regarded as contaminated”

ABS SVR 5C.1.7 -1.7.2 Spaces Adjacent to Cargo Tanks (2012)
CARGO PUMP ROOM
TYPICAL DOSING SYSTEM LOOP SEAL INSTALLATION
AS PER ABS BALLAST WATER TREATMENT GUIDE, 2014
REQUIREMENTS FOR DESIGNATING A BWTS SPACE INSTALLED WITHIN A ZONE 1 SPACE AS NON-HAZARDOUS

• No portions of the BWTS’s ballast water piping to be installed within the compartment.

• No sources of release (i.e., cargo piping with flanged connections, valves etc.) within the compartment.

• The compartment arrangements shall be provided with separation from the hazardous space by two gastight self-closing doors without hold back arrangements forming an air-lock capable of maintaining an overpressure.

• All ventilation inlets and outlets are routed such that they are located outside of the hazardous area.

• The relative overpressure or air flow is to be continuously monitored and so arranged that in the event of a ventilation failure (loss of relative overpressure or loss of air flow) an audible and visual alarm is given at a manned control station and the electrical supply of all equipment (not necessarily of the certified safe type) is to be automatically disconnected.

• The mechanical ventilation system is to have at least twenty (20) air changes an hour or as required by the BWMS manufacturer, whichever is greater, that will maintain the separate compartment under a positive pressure relative to the external hazardous area.
PRODUCT TANKER
BWTS ON HAZARDOUS DECK