NATIONAL SCIENCE FOUNDATION
SHIP INSPECTION PROGRAM

2015 RVTEC MEETING

JMS
NAVAL ARCHITECTS

Naval Architecture
Marine Engineering
Marine Surveying
Salvage Engineering

Purpose

The major purposes of the NSF Ship Inspection Program are:

1. To assure that the capabilities of the research vessel and technical support meet accepted scientific community standards and expectations;
2. To assure the seaworthiness and safety of research vessels supported by NSF meet or exceed the standards set forth by the *UNOLS Research Vessel Safety Standards (RVSS)*, and applicable requirements of the International Maritime Organization, American Bureau of Shipping (ABS), the Code of Federal Regulations (CFR), and the U.S. Coast Guard;
3. To ensure NSF-owned ships as capital assets, are being adequately maintained;
4. To ensure NSF-funded science is scheduled on properly outfitted and maintained vessels.

Recently Completed

- RV Falkor
- RV Kilo Moana
- RV Oceanus
- RV Thompson
- RV Blue Heron
- RV Sikuliaq
- RVIB Palmer
- RV Atlantic Explorer
- RV Pelican
- RV Sproul
- RV Revelle
- RV Sharp
- RV Langseth
- RV Atlantis
- RV Barnes
- ARSV Gould

Upcoming Inspections

- RV Kilo Moana
- RV Walton Smith
- RV Savannah
- RV Sikuliaq
- RV Armstrong
- USCGC Healy
- RV Endeavor
- RV Falkor
- RV Oceanus
- RV Blue Heron
- RV Atlantic Explorer

RVSS Appendix A Compliance:

Appendix A compliance appears to be coming along well.

- **Almost all vessels are in compliance at a safety factor of 5.0 based on edition 9 version of RVSS.**
- **However, a factor of safety of 5.0 does not meet mission requirements for many vessels, particularly if the calculation method in the Appendix is used.**
- **Some of the vessels are limited to a factor of safety of 5.0 by sheave diameters and grooving. Also limited by roller diameters.**
- **The logging requirements for each tension member are more comprehensive than historically being maintained.**

RVSS Appendix A Compliance:

Appendix A Assist Summary for Each Wire or Cable

Appendix A Assist Summary for Each Wire or Cable (updated 8_25_2015 JMS/wec)						
Note: This is not all inclusive. See Appendix A RVSS Edition 10 for requirements.	Select Applicable Column FS					
Requirement or Attribute	FS of 5.0 or higher	FS from 2.5 to 4.99	FS from 2.0 to 2.49	FS from 1.5 to 1.99	FS= ___	Comments
Post Cable/Wire SWL in clear view of the winch operator (RVSS 8.6)	Applies	Applies	Applies	Applies	Y/N	
General						
Determine Cable/Wire Safe Working Load (SWL) as: Assigned Breaking Load / Factor of Safety	Applies	Applies	Applies	Applies	Y/N	
Lubricate tension member <12 months (A.5.8)					Y/N	
Fresh Water Wash (lesser of: end of cruise or < 1 month) (A.5.9)					Y/N	
Develop Extenuating Circumstance Procedure (A.8.4)	Applies	Applies	Applies	Applies	Y/N	
Tension Monitoring						
Have ability to keep load < SWL: May be calculated w/"g" factor at least 0.75 or from Tensiometer	Applies				Y/N	
Have ability to keep load < SWL: Actual from monitoring system		Applies	Applies	Applies	Y/N	
Tensionometer display at operator's station with 3 Hz refresh rate		Applies			Y/N	
Tensionometer display at operator's station with 10 Hz refresh rate			Applies	Applies	Y/N	
Tension continuously monitored using a tension trending graph			Applies	Applies	Y/N	
Tensionometer logging at 3 Hz		Applies			Y/N	
Tensionometer logging at 20 Hz			Applies	Applies	Y/N	
Tensionometer Recalibration at least every 6 mo.		Applies	Applies	Applies	Y/N	
Tension measuring system maintained with 4% accuracy		Applies			Y/N	
Tension measuring system maintained with 3% accuracy			Applies	Applies	Y/N	
Alarms						
Audible and visual tension alarms w/data logging Alarm at < ABL/2.8		Applies			Y/N	
Audible and visual tension alarms w/data logging Alarm at <ABL/2.2			Applies		Y/N	
Audible and visual tension alarms w/data logging Alarm at <ABL/1.7				Applies	Y/N	
Alarm conditions automatically logged		Applies	Applies	Applies	Y/N	
Sheaves and Fairlead Rollers						
Sheaves & Rollers: As large as practical	Applies				Y/N	
Sheaves & Rollers: D/d ratio meet 40:1 or 400d1 whichever is greater		Applies	Applies	Applies	Y/N	
Sheaves: Groves as close to d as possible and no more than 1.5d		Applies			Y/N	
Sheaves: Groves per Ref A 1.1 (Groove size relative to nominal diameter of wire rope: 3/16" to 1/4" 3% to 6%; over 1/4" 2.5% to 5%)			Applies	Applies	Y/N	
Deck Safety						
Good safety practices	Applies				Y/N	
Establish danger zones / safety zones		Applies	Applies	Applies	Y/N	
Warning notices posted			Applies	Applies	Y/N	
Physical or visual barriers			Applies	Applies	Y/N	
Doors and accesses secured			Applies	Applies	Y/N	
Testing						
Tension testing up to SWL load every 2 years. Break testing not req'd at FS=5.0	Applies				Y/N	
Break Testing every 2 yrs		Applies			Y/N	
Break Testing every yr if 10% decrease in ABL or cutback		Applies			Y/N	
Break Testing every yrs			Applies	Applies	Y/N	
Break Testing every 6 mo. if 10% decrease in ABL or cutback			Applies	Applies	Y/N	
Logbooks: UNOLS wire identifier: Cable Inventory/History and Running Use						
Logs stay with the wires transfer with the wire	Applies	Applies	Applies	Applies	Y/N	
Log of Tension Testing to SWL	Applies				Y/N	
Log of wire Break Testing		Applies	Applies	Applies	Y/N	
Log Cutbacks	Applies	Applies	Applies	Applies	Y/N	
Log Spooling Operations	Applies	Applies	Applies	Applies	Y/N	
Log of Lubrication	Applies	Applies	Applies	Applies	Y/N	
Wire Train Description	Applies	Applies	Applies	Applies	Y/N	
Maximimum load and payout for each cast by calculation or monitoring.	Applies	Applies	Applies	Applies	Y/N	
Winch Operator						
Operator deemed competant in writing by master and owner	Applies				Y/N	
Operator "Certified Competent" in writing by master and owner renewed annually.		Applies	Applies	Applies	Y/N	
Master verify qualifications and designate approved operators.		Applies	Applies	Applies	Y/N	
Training record for formal operator training program for winch, handling apparatus, and monitoring system.		Applies	Applies	Applies	Y/N	
Suggestions: Please contact Ted@JMSnet.com						

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Changes in the latest version of Appendix A

- Develop Extenuating Circumstance Procedure (A.8.4)
- i.e. RV Barnes developed initial plans for 4 emergency scenarios while overboarding science gear including: tension member in propeller, package stuck on the bottom, winch failure, and loss of ship's power.

Changes in the latest version of Appendix A

- Lubricate tension member <12 months (A. 5.8)
- Fresh Water Wash (lesser of: end of cruise or < 1 month) (A.5.9)

Changes in the latest version of Appendix A

- Log maximum payout and load for each cast by calculation or monitoring
- “payout” was added.

Best Practices: Appendix A

Drop #	Drop Date & Time	*Maximum Tension Per Cast (Lbs)*	Maximum Payout of Each Deployment (Meters)
0	5/5/12 13:45	2987	0
1	5/8/12 2:34	1859	1000
2	5/9/12 2:06	1568	2000
3	5/9/12 22:06	2368	4572
4	5/10/12 2:08	1364	1100
5	5/11/12 2:41	2050	4353
6	5/11/2012 5:14	1502.9	1811.5
7	5/11/2012 19:41	2312.3	4617
8	5/12/2012 3:07	2016.9	4200.3
9	5/12/2012 23:00	1604.7	2000
10	5/13/2012 13:15	2859.1	4614.8

RV ATLANTIC EXPLORER:

Logs both the payout per cast and payout at maximum load

While Logging Maximum Load and Payout for Each Cast

- Consider also recording amount of tension member deployed where the maximum load occurs.
- Consider referencing this as a distance from the drum end.

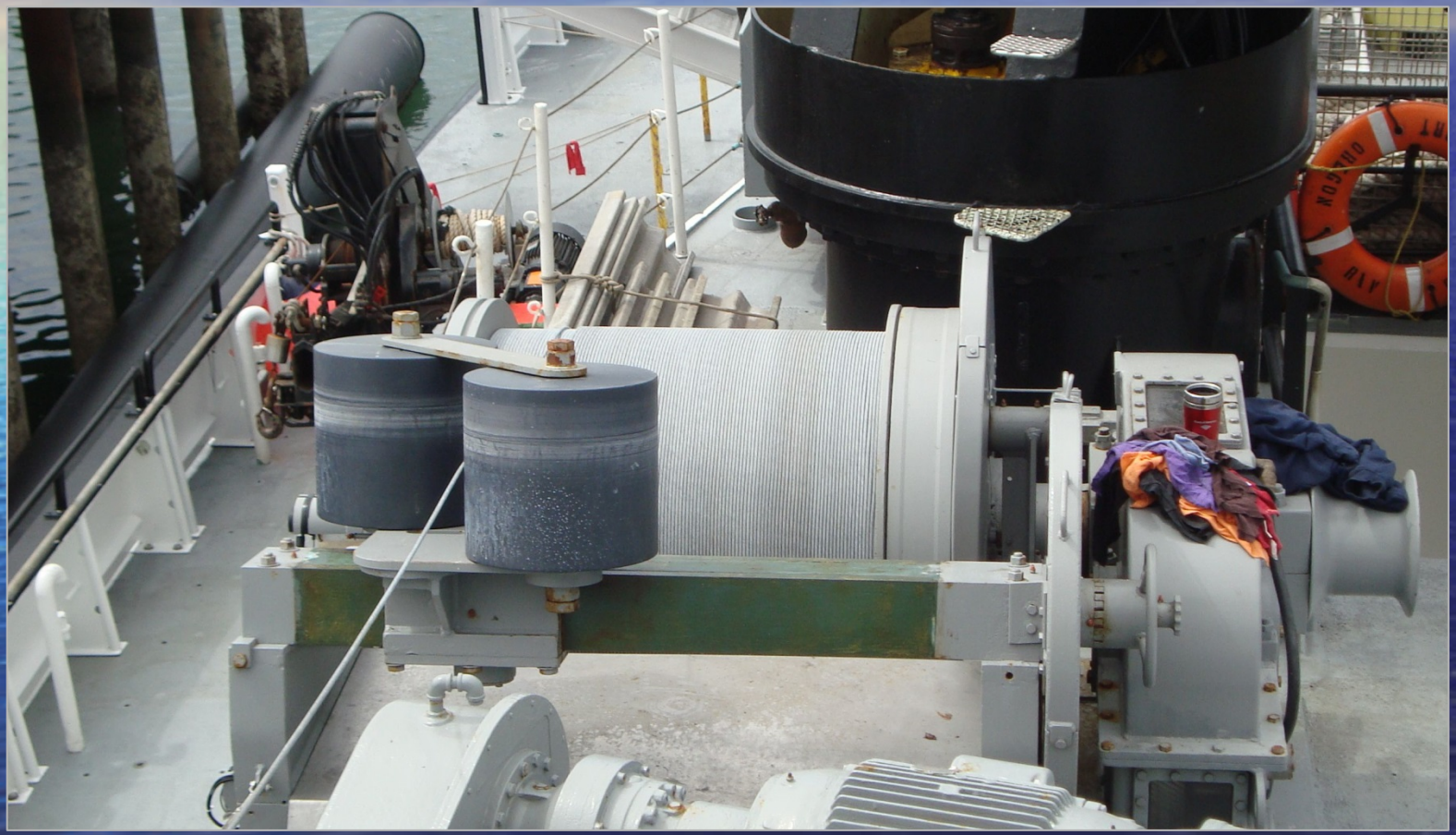
Common Findings: Sheave and Fairlead Roller Diameter

Most Older Levelwinds limit FS to 5.0

	Select Applicable Column FS			
Requirement or Attribute	FS of 5.0 or higher	FS from 2.5 to 4.99	FS from 2.0 to 2.49	FS from 1.5 to 1.99
Sheaves and Fairlead Rollers				
Sheaves & Rollers: As large as practical	Applies			
Sheaves & Rollers: D/d ratio meet 40:1 or 400d1 whichever is greater		Applies	Applies	Applies
Sheaves: Groves as close to d as possible and no more than 1.5d		Applies		
Sheaves: Groves per Ref A 1.1 (Groove size relative to nominal diameter of wire rope: 3/16" to 1/4" 3% to 6%; over 1/4" 2.5% to 5%)			Applies	Applies

Common Findings: Sheave and Fairlead Roller Diameter

Large rollers installed on RV OCEANUS



Common Findings: Maintaining Accuracy

.	Select Applicable Column FS			
Requirement or Attribute	FS of 5.0 or higher	FS from 2.5 to 4.99	FS from 2.0 to 2.49	FS from 1.5 to 1.99
Tension Monitoring				
Tension measuring system maintained with 4% accuracy		Applies		
Tension measuring system maintained with 3% accuracy			Applies	Applies

One common weak area is the concept of "maintaining" calibrations within 4% or 3% depending on the factor of safety selected.

Common Findings: SWT Documentation

WLL or SWL identified on a block is not the same as Safe Working Tension (SWT). These blocks don't indicate if the WLL is for the tension member or for the shackle/block.

Best Practice: Sheaves

Clear indication of SWL expressed in terms of tension.

This predates Safe Working Tension terminology

Best Practices: Sheave Wrap Angle

RV SAVANNAH: Instrument blocks that measure the wrap angle in order to measure the tension in the cable.

RVSS Appendix B Compliance:

- Vessels are making some progress toward compliance with Appendix B, but we have yet to see a complete package for a overboarding handling system.
- Most vessels will have several "Overboard Handling System Operator's Manuals" supported by "Component Booklets" for the components used for the OHS operation.
- An OHS Operator's Manual in needed for each overboarding system (exception for portable systems)
- Assist sheets are available for the system level and component level. Recently updated for RVSS edition 10.

RVSS Appendix B Compliance:

Appendix B contains the following aspects of overboard handling systems (latest version):

- **Responsibilities**
- **Structural Design Criteria**
- **Maximum Capability Document Requirements ***
- **Testing and Test Documentation ***
- **Operations and Safety ****
- **Training ****
- **Labeling ****
- **Preventative maintenance ****
- *** Typically requires original design documentation or expert help**

*** * Typically can be accomplished from shipboard experience and manuals. (No need to wait for experts).**

Appendix B Changes: Edition 10

- Almost all documentation accomplished for the previous version of Appendix B will be useful in the new version. The exception is emergency OHS procedures are not specifically retained in the new version, but extenuating circumstances has now been added in Appendix A.

Appendix B Changes: Edition 10

- Easier to understand what is required
- Appendix A and B work together better
- A MCD can be established by testing for some existing equipment where: SWT<Test load/1.5
- If components are not used as part of a OHS system then Appendix B does not require testing
- Some testing frequencies have been decreased

Appendix B Changes: Edition 10

- OHS manual is not required for OHS systems containing portable components.
- Portable is defined as for temporary use.
- This does not eliminate the need to comply with sections B.5 through B.10

Appendix B System Level Assist Sheets

Appendix B Assist Sheet for Overboard Handling Systems (updated 11_1_15 JMS/wec)
This assist sheet is to access progress toward compliance with RVSS Appendix B by the compliance date of 7/15/2016 per RVSS Edition 10 dated July 2015

Page 1 System Level

Overboard Handling System Operator's Manual (see note 2) For each Overboard Handling System (OHS) Configuration	Reference B.12	Y or N or NA	Comment
System Title/Description		Y / N / NA	
OHS MCD	B.5	Y / N / NA	
List of component MCDs	B.5.2.7	Y / N / NA	
Version of each component MCD	B.5.2.7	Y / N / NA	
DLT and/or SWT	B.5.2.7	Y / N / NA	
Reference to each component booklet	B.12	Y / N / NA	
Identify the deployment type(s)	B.5.2.7	Y / N / NA	
Diagram the applicable range of geometries	B.5.2.7	Y / N / NA	
Description of the OHS Layout including:			
Location of each major component	B.12	Y / N / NA	
Orientation of each major component	B.12	Y / N / NA	
Geometry of the tension member	B.12	Y / N / NA	
Overall dimension of each major component	B.12	Y / N / NA	
Weight of major portable components	B.12	Y / N / NA	
OHS Test Procedures and Records:	B.6		
Twice in 5 yrs. not to exceed 3 yrs. for fixed OHS	B.6.3	Y / N / NA	
Within 3 yrs. for OHS containing portable components	B.6.3	Y / N / NA	
OHS Loaded to 125% OHS SWT	B.6.3	Y / N / NA	
Written Test Procedure including geometries	B.6.7	Y / N / NA	
Specify tension member	B.6.7	Y / N / NA	
Specify safety precautions	B.6.7	Y / N / NA	
Test records for each component if tested singly	B.6.8	Y / N / NA	
Test date, test method, names of testers	B.6.8	Y / N / NA	
Records aboard vessel and operator's office	B.6.8	Y / N / NA	
Procedural Safety Requirements	B.7	Y / N / NA	
For new OHS:	B.7.1.1		
Procedures for rigging and un-rigging	B.7.1.1	Y / N / NA	
Procedure for launch and retrieving payload	B.7.1.1	Y / N / NA	
Test plans	B.7.1.1	Y / N / NA	
Training program	B.7.1.1	Y / N / NA	
For existing OHS:	B.7.1.2		
Procedures for rigging and un-rigging	B.7.1.2	Y / N / NA	
Procedure for launch and retrieving payload	B.7.1.2	Y / N / NA	
General Safety:	B.7.2		
Guards and rail enclosures	B.7.2	Y / N / NA	
Emergency stops at equipment	B.7.2	Y / N / NA	
Emergency stops at all operator's stations	B.7.2	Y / N / NA	
Beacon lights when operating	B.7.2	Y / N / NA	
Physical barrier systems to exclude personnel from tension member paths and snap back	B.7.2	Y / N / NA	
Operator Training Procedures and Records	B.8	Y / N / NA	
Formal training program for each operating station	B.8	Y / N / NA	
Annual demonstration of competency	B.8	Y / N / NA	
Records of initial training and competency checks	B.8	Y / N / NA	
Notes:			
1. When using weak links the link should break less than the lowest component SWT (other than the tension member).	B.10.3 B.4.5.3		
2. A OHS Operators Manual is not required when an OHS is formed by combining portable and fixed equipment. This does not appear to waive the requirements of sections B.3 through B.11.	B.12		
3. The Overboard Handing Data Document (OHDD) is completed by the science party for each cruise (B.3). Consider keeping these with the Operators Manuals.	B.3		
4. The tension member tested breaking load (TBL) almost always exceeds the nominal breaking load (NBL) and assigned breaking load (ABL) and thus the TBL should be considered when determining use of a weak link.			
5. In all cases except the exemptions for uninspected vessels listed in sections B.4.5 the tension member should break before the overboard handling system fails.			
6. The prior version of this appendix required OHS emergency procedures be addressed. Although a requirement in appendix A has been added for tension member extenuating circumstances, consideration should be given to plan OHS emergency procedures.			
7. Consider if the tension member or weak link in an OHS should fail before the vessel has stability difficulty if a payload bottom hang occurs.			

Suggestions: Please contact Ted@JMSnet.com

Appendix B Component Assist Sheets

Appendix B Assist Sheet for Overboard Handling Systems (updated 11_1_2015 JMS/wec)
This assist sheet is to access progress toward compliance with RVSS Appendix B by the compliance date of 7/15/2016 per RVSS Edition 10 dated July 2015

Page 2 Component & Sub-System Level

For each Overboard Handling System (OHS) Component in the OHS System Configuration:	Reference	
Component MCD Booklet including:	B.11	Y / N / NA
Component Maximum Capability Document (MCD) including:	B.5	Y / N / NA
Safe Working Tension (SWT) specified	B.5.2	Y / N / NA
Reaction Forces on adjacent structures	B.5.2	Y / N / NA
Design Line Tension (DLT) specified if new	B.5.2	Y / N / NA
Reaction Forces on Bolts if bolted	B.5.2	Y / N / NA
Diagram of bolt arrangement if bolted	B.5.2	Y / N / NA
Required bolt strength / grade if bolted	B.5.2	Y / N / NA
Design standard used for determining MCD	B.5.2	Y / N / NA
Calculations used to evaluate MCD if feasible	B.5.2	Y / N / NA
If MCD determined by testing in lieu of calculation:		
SWT<test load/1.5	B.6.11	Y / N / NA
Associated MCD shows range of geometries	B.6.11	Y / N / NA
For Standard Deck Hardware referencing Mfg.'s Data:		
Manufacturer's data sheets showing FS>1.5	B.5.2.1	Y / N / NA
Manufacturer's data sheets showing SWT	B.5.2.1	Y / N / NA
For Tension Members:		
Manufacturer's data sheets showing NBL	B.5.2.2	Y / N / NA
Current ABL	B.5.2.2 RVSS Appendix A	Y / N / NA
SWT for each applicable FS range	B.5.2.2 RVSS Appendix A	Y / N / NA
For Custom Components:		
DLT and/or SWT for each deployment type	B.5.2.3 B.2	Y / N / NA
Diagram of range of tension member geometries	B.5.2.3	Y / N / NA
For each Deck Socket used as a OHS component:		Y / N / NA
DLT and/or SWT for each component rigging configuration	B.5.2.4	Y / N / NA
Diagram of range of geometries	B.5.2.4	Y / N / NA
For Winches:		
Maximum Line Pull	B.5.2.5	Y / N / NA
For Tension Mitigation Devices and Systems:		Y / N / NA
For Render & Render Recover		Y / N / NA
Description of Capabilities meeting B.10.2	B.5.2.6 B.10.2	Y / N / NA
For Weak Links:		Y / N / NA
Calibration and Test documents	B.5.2.6 B.10.3	Y / N / NA
Test to fail < lowest OHS component SWT	B.5.2.6 B.10.3	Y / N / NA
If used where DLT<NBL exception (B.4.5.3) then Design Details and failure load	B.5.2.6 B.10.3	Y / N / NA
Dimensions in all configurations	B.11	Y / N / NA
Test Procedures and Records	B.6	Y / N / NA
Calibrated instrument or certified test weight	B.6.1	Y / N / NA
For Deck Sockets and Foundations if part of OHS		Y / N / NA
Test records including description, test date, tensions, test method, and names	B.6.2.2 B.6.8	Y / N / NA
For Other Components:		Y / N / NA
Tested to 125% SWT	B.6.2.4	Y / N / NA
Frequency:		Y / N / NA
Auxiliary padeyes every 3 years	B.6.2.5	Y / N / NA
Deck Sockets every 3 years	B.6.2.5	Y / N / NA
All other components Twice every 5 yrs. not to exceed 3 years	B.6.2.5	Y / N / NA
Portable Systems 3 years in specific configuration	B.6.4	Y / N / NA
Loaded to 125% OHS SWT	B.6.3	Y / N / NA
Written Test Procedure including geometries	B.6.7	Y / N / NA
Specify tension member	B.6.7	Y / N / NA
Specify safety precautions	B.6.7	Y / N / NA
Test records for each component if tested singly	B.6.8	Y / N / NA
Test date, test method, names of testers	B.6.8	Y / N / NA
Records aboard vessel and operator's office	B.6.8	Y / N / NA
Procedural Safety Requirements	B.7	Y / N / NA
For new component:	B.7.1.1	Y / N / NA
Procedures for rigging and un-rigging	B.7.1.1	Y / N / NA
Procedure for launch and retrieving payload	B.7.1.1	Y / N / NA
Test plans	B.7.1.1	Y / N / NA
Training program	B.7.1.1	Y / N / NA
For existing component:	B.7.1.2	
Procedures for rigging and un-rigging	B.7.1.2	Y / N / NA
Procedure for launch and retrieving payload	B.7.1.2	Y / N / NA
General Safety:	B.7.2	Y / N / NA
Guards and rail enclosures	B.7.2	Y / N / NA
Emergency stops at equipment	B.7.2	Y / N / NA
Emergency stops at all operator's stations	B.7.2	Y / N / NA
Beacon lights when operating	B.7.2	Y / N / NA
Physical barrier systems to exclude personnel from tension member paths and snap back	B.7.2	Y / N / NA
Operator Training and Records	B.8	Y / N / NA
Component operators/uses receive training	B.8	Y / N / NA
Prove operational and safety competency	B.8	Y / N / NA
Preventative Maintenance Procedures and Frequency	B.11	Y / N / NA
If a Portable Component:		Y / N / NA
Weight	B.11	Y / N / NA
Ship Service and Interface Requirements	B.11	Y / N / NA
Inventory of Spares	B.11	Y / N / NA
		Y / N / NA
Other requirements not required in component booklet		Y / N / NA
Structural Design Criteria:	B.4	Y / N / NA
Design Line Tension (DLT) < Ultimate Design Tension divided by 1.5	B.4.5	Y / N / NA
Safe Working Tension (SWT) < DLT	B.4.4	Y / N / NA
Labeling:	B.9	Y / N / NA
All components labeled	B.9.1	Y / N / NA
Include SWT	B.9.1	Y / N / NA
Most recent test date	B.9.1	Y / N / NA
SWT diagram/geometries	B.9.1	Y / N / NA
Reference to MCD or other docs.	B.9.1	Y / N / NA
For Standard Deck Hardware	B.9.2	Y / N / NA
Color coded	B.9.2	Y / N / NA
Conspicuously marked referencing test cycle	B.9.2	Y / N / NA
For Deck Sockets:	B.9.3	Y / N / NA
Marked referencing specific use	B.9.3	Y / N / NA
Exceptions and Exemptions:		
Special cases for uninspected vessels:	B.4.5	Y / N / NA
Deployments is the water column	B.4.5.1	Y / N / NA
Render and Render Recover	B.4.5.2	Y / N / NA
Weak Links	B.4.5.3	Y / N / NA
Underpowered Vessel	B.4.5.4	Y / N / NA
USCG special case with granted permission	B.4.5.5	Y / N / NA
Deck Bolts don't need MCD	B.5.1 B.6.2.1	Y / N / NA
Testing exemptions:		
OHS test can satisfy general purpose component testing (to 125% OHS SWT) for specified configurations	B.6.2.1	Y / N / NA
Auxiliary padeye require testing if part of OHS. If not part of an OHS then this appendix does not require auxiliary padeye testing.	B.6.2.1	Y / N / NA
Deck Sockets require testing if part of OHS. If not part of an OHS then this appendix does not require Deck Socket testing.	B.6.2.1 B.6.2.2	Y / N / NA
Deck bolts do not need testing if made to a specification and marked with grade. Deck bolts is not tested require periodic inspection.	B.6.2.1	Y / N / NA
Alternative Testing Methods	B.6.6.1	Y / N / NA
Laboratory and Piecewise Testing	B.6.6.2 B.6.6.3	Y / N / NA

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Common Findings: Appendix B Test Plans:

RV SIKULIAQ: Testing in the towing position

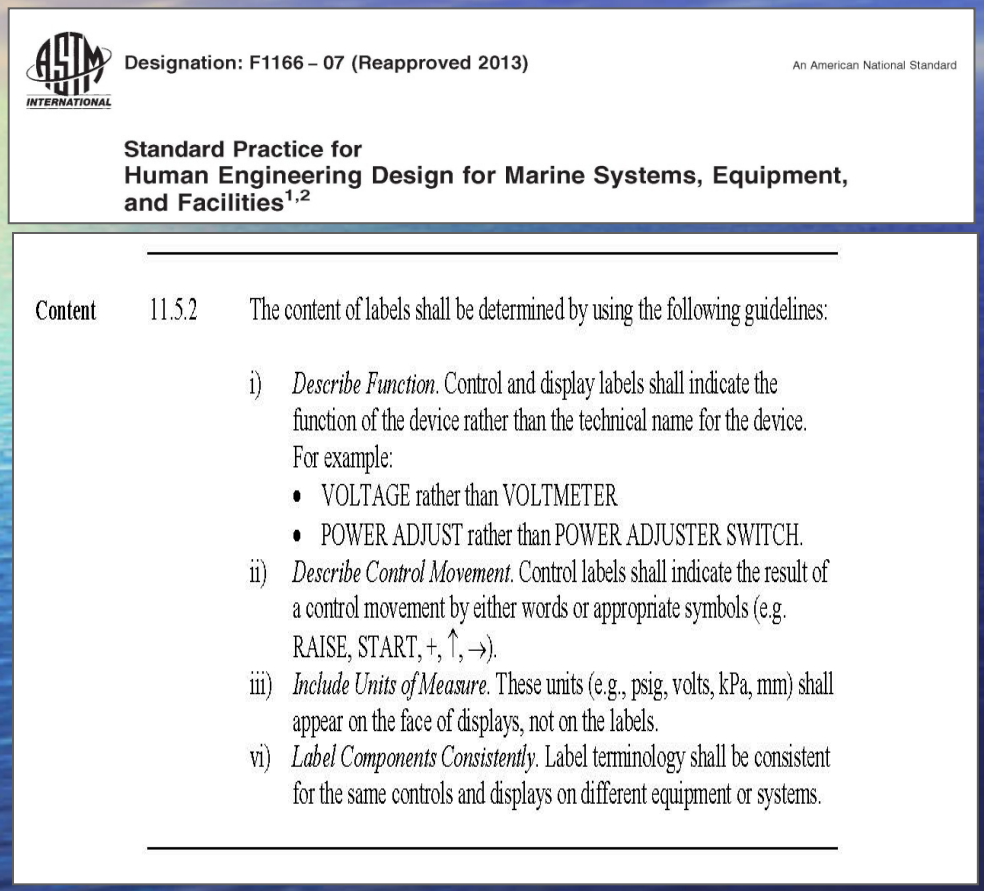
Develop a test plan/ procedure

Include a diagram

Test the system (all components) as it is intended to be used

Alternate test methods allowed. (B.6.6)

Common Findings: Human Factors



Designation: F1166 – 07 (Reapproved 2013)

An American National Standard

Standard Practice for
Human Engineering Design for Marine Systems, Equipment, and Facilities[1,2]

Content 11.5.2 The content of labels shall be determined by using the following guidelines:

i) *Describe Function.* Control and display labels shall indicate the function of the device rather than the technical name for the device. For example:
- VOLTAGE rather than VOLTMETER
- POWER ADJUST rather than POWER ADJUSTER SWITCH.

ii) *Describe Control Movement.* Control labels shall indicate the result of a control movement by either words or appropriate symbols (e.g. RAISE, START, +, ↑, →).

iii) *Include Units of Measure.* These units (e.g., psig, volts, kPa, mm) shall appear on the face of displays, not on the labels.

vi) *Label Components Consistently.* Label terminology shall be consistent for the same controls and displays on different equipment or systems.

Each control and control setting should be labeled. The label should describe the control function and the result of the control movement in words and/or symbols. All deck equipment controls should be labeled consistently and be clearly visible by the operator with adequate lighting and a conspicuous format.

Common Findings: Human Factors

Independent Two-block safety devices are important

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Common Findings: Lithium batteries

- Develop policy and procedures on how to handle lithium batteries.
- The procedures should cover
  - usage
  - storage
  - disposal
  - how to respond to emergencies
- Incorporate into the cruise planning process.
- Note: Lithium batteries should not be treated the same as lithium ion batteries. Typical portable extinguishers can be used to extinguish a lithium ion fire.

Common Findings: Environmentally Acceptable Lubricants [EAL]

- All vessels (not only new vessels) must use environmentally acceptable lubricants (EALs) in all oil-to-sea interfaces, unless technically not feasible.
- EPA defines EALs as lubricants that are “biodegradable” and “minimally-toxic” and are “not bioaccumulative”.
- EALs are only mandated for use in specific oil-to-sea interfaces.
- Vessels are not required to change to an EAL for above deck equipment, but EPA strongly encourages the use.

Oil-to-Sea Interfaces include:

- Controllable pitch propeller
- Thrusters
- Stern tubes
- Thruster bearings
- Stabilizers
- Rudder bearings (excluding head bearing)
- Azimuth thrusters
- Wire rope
- Mechanical equipment subject to immersion (including dredges and grabs)

Common Findings: Science Safety

More than just a preunderway safety brief is needed!

- Welcome aboard
- Safety Brief
  - Pre underway is best
- Shipboard policies
  - Sexual harassment, drug & alcohol, environmental, etc.
- General safety training information
  - RVOC Safety Training Manual & video
- Ship specific safety items
  - Use ship photos, PowerPoint or videos
- Reinforce in the Cruise Planning Manual, ship's web site, in labs and in staterooms

Common Findings: ADA

- In order to be more ADA capable vessels could make improvements in the following areas:
  - Incorporate more ADA awareness and requirements into the pre-cruise planning process.
  - Improve access to science berthing from the main deck.
  - Improve markings to access the main deck from the science berthing area.
  - Improve lighting, handrails, and retro-reflective tape in stairwells and egress routes.
  - Install visual alarms to augment audible alarms.
  - Remove obstacles in the passageways.

Best Practice: Hydraulic Hoses

- Tag provides the serial number of the item for cross reference in a Hose Log and installation date.
- The following information should be provided on the tag and/or log:
  - Hose serial number
  - Hydrostatic Test Pressure and Test Date
  - Installation or Replacement Date

Best Practices: Wet Lab Gas Detector

RV FALKOR: Installed gas sensor system that measures the level of multiple gases in the Wet Lab where the fume hood is located.

Best Practices: Realistic Drills

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Best Practices: Muster List

F1270 – 97 (2013)

MUSTER LIST

GENERAL INSTRUCTIONS

1) Each crew member shall familiarize himself/herself with the location of his/her respective station and assigned duties immediately upon reporting aboard.

2) All persons reporting to emergency stations shall be fully dressed, including a hat and shoes, and shall carry a flashlight, if possible.

3) Immediately upon sounding of an alarm, contact shall be made by the Department Heads with the Master. Channel 1 is the designated Emergency Channel on the Handi-Talkies. After initial contact, persons with radios shall LISTEN ONLY unless requested to supply specific information.

4) A person discovering a fire shall immediately notify the bridge! He shall then fight the fire with any available means.

5) Upon seeing a "Man Overboard", immediately throw a life-ring into the water and pass the word to the bridge *"Man Overboard Port/Starboard Side!"*. If at night the lifering should have a waterlight attached and regardless of whether it be day or night, keep the man in sight.

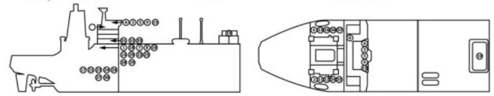
6) In an emergency and for all drills, extra persons will muster at the hospital/treatment room.

FIRE AND EMERGENCY STATIONS

FIRE AND EMERGENCY SIGNAL (________)
Continuous sounding of the ship's whistle for a period of not less than ten (10) seconds supplemented by the same signal on the General Alarm Bells.

DISMISSAL SIGNAL (• • •)
Three (3) short blasts of the ship's whistle supplemented by the same signal on the General Alarm Bells.

MAN OVERBOARD SIGNAL (— — —)
Sounding of the Letter "O" on the ship's whistle several times (not less than 4) supplemented by the same signal on the general alarm bells



NOTE: EXTRA PERSONS WILL MUSTER AT THE HOSPITAL/TREATMENT ROOM

ASTM INTERNATIONAL

Designation: F1270 – 97 (Reapproved 2013)

An American Nation

Standard Practice for Preparing and Locating Emergency Muster Lists[1]

This standard is issued under the fixed designation F1270; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Title 33 and Title 46 of the Code of Federal Regulations (CFR) and the Safety of Life at Sea Convention (SOLAS) contain requirements for muster lists. Emergency muster lists are required to be on board tank vessels, passenger vessels, cargo vessels, oceanographic research vessels, nautical school ships, mobile offshore drilling units (MODUs), and outer continental shelf (OCS) facilities other than MODUs. This practice is a consolidated source for muster list requirements, combining requirements from all of the subparts of the Code of Federal Regulations listed above and SOLAS 1974 as amended through 1996.

Emergency Muster Plan

Alarm Dismissal	Fire Alarm	Man Overboard	Flooding	Abandon Ship
3 short signals on ship's whistle followed by the same signal as general alarm.	Continuous signal for 10 seconds on ship's whistle followed by continuous signal on general alarm.	3 long signals 4 times on ship's whistle followed by the same signal on general alarm.	Continuous signal for 10 seconds on the ship's whistle followed by continuous signal on general alarm.	7 short signals and one long on ship's whistle followed by the same signal on general alarm.
Crew Position				
Master	In charge on the bridge	In charge on the bridge	In charge on the bridge	In charge starboard raft
First Mate	In charge on the scene	Winch operator	In charge of damage control team	In charge port raft, distress signals
Second Mate	Nozzle man	First aid, ladder	Damage control team	EPIRB, radio starboard raft
Engineer	Shut vents	Pointer recovery	Damage control team	Deploy starboard raft
Marine Technician	Hose man	Rescue swimmer	Damage control team	Release RHIB, deploy port raft
Chief Scientist	Muster science crew, assist engineer	Muster science crew, bring blanket	Muster science crew	Muster science crew aft deck, port raft
Scientists Cabins 1, 3 and 5	Muster aft deck, starboard side.	Muster aft deck, starboard side	Muster aft deck, starboard side	Muster aft deck, starboard raft
Scientists Cabins 2 and 4	Muster aft deck, port side	Muster aft deck, port side	Muster aft deck, port side	Muster aft deck, port raft

Emergency Station Assignments

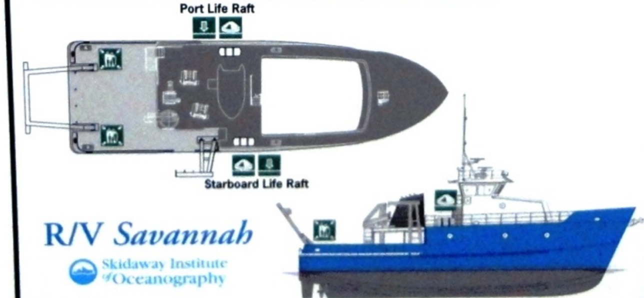
- Life Raft Embarkation - Aft deck, starboard and port sides
- Immersion Suit Locations - In the dry lab and wheel house
- Life Jacket Locations - In each cabin and on the Aft deck to your right when exiting the dry lab.
- Debarkation Ladder

When alarm sounds, report immediately to your assigned assembly station, fully dressed with life jacket on.

STB side cabins muster on STB side. P side cabins muster on P side.

In case of abandon ship alarm, you should also bring an immersion suit in hand.

Muster Station Locations



R/V Savannah

Skidaway Institute of Oceanography

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Best Practices: Battle Lanterns

- LED bulbs
- Rechargeable batteries
- Refit kits available

Marine Safety Alert

UNITED STATES COAST GUARD
U.S. Department of Homeland Security

MARINE SAFETY ALERT

Inspections and Compliance Directorate

November 12, 2014
Washington, DC

Safety Alert 15-14

ACCIDENTAL RELEASE OF CO_2 SYSTEM!
IMPORTANCE OF DESIGN AND TESTING OF EMERGENCY SYSTEM CONTROLS

This safety alert serves to remind shoreside and vessel personnel of the importance of 1) designing and maintaining emergency systems to be logical and easily operated in high stress situations, 2) maintaining a high level of crew familiarity with emergency systems, and 3) exercising safeguards during testing to mitigate the risk of human error or system malfunction. Although regulations prescribe standards for safety systems aboard vessels, installations particularly those onboard uninspected vessels, can vary dramatically.

During a recent Uninspected Towing Vessel (UTV) exam, a vessel crewmember intending to test the fuel oil shut-off cables instead pulled the CO_2 system release cables. As seen in photos directly below and at the end of this safety alert, the emergency control panel used during the incident contained pull cables for both the CO_2 system and fuel oil shut-offs.

Accidental releases are not uncommon and vessel crewmember and Coast Guard inspector fatalities have occurred in the past. Fortunately, in this instance the audible alarm system and release time delay functioned as intended, allowing all personnel to safely evacuate the machinery spaces prior to discharge.

Poor design characteristics:

Similar activation pulls were collocated for fuel and CO_2 systems. Fuel oil shut down signage was located on the left, but fuel oil pulls were located on the far right with three CO_2 pulls in between.

System design, proper human engineering, labeling, and detailed training will substantially reduce the risk of human error:

The Coast Guard **strongly reminds** all maritime operators of the importance:

- Designing and maintaining emergency systems to be logical and easily operated in high stress situations,
- Maintaining a high level of crew familiarity with emergency systems, and
- Exercising safeguards during testing to mitigate the risk of human error or system malfunction

Marine Safety Alert

UNITED STATES COAST GUARD
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MARINE SAFETY ALERT

Assistant Commandant for Prevention Policy

June 20, 2012
Washington, DC

Alert 02-12

OVERLOADED LIFTING GEAR ON FISHING VESSELS

Recently, several catastrophic failures of masts, booms, and lift cables have occurred on purse seine fishing vessels that have resulted in loss of life and severe injuries. Over the years many casualties have occurred onboard all types of fishing vessels attempting to haul in catches that exceeded the capacity of their winches, hoists, and associated equipment. These types of casualties are not unusual. This alert serves to remind all purse seine fishing vessel owners/operators and other fishing segments to ensure safe use of the haul equipment particularly matching the size and the capacity of the nets to the rated size and capacity of the winch/haul/hoist equipment, taking into account safety factors for various species, and other concerns such as the variable platform that a rolling fishing vessel and variable catch presents.

Owners / operators, and vessel *Insurers* must ensure that vessel winch, haul and hoist systems are not modified by crew members to increase the lifting capacity beyond the rated design which in some cases can be done very easily. Such boosting of hydraulic systems must be prohibited and certain components should be protected with special seals. The machinery should be properly maintained and records kept in a historical log. It is imperative that owners / operators ensure every load bearing structure and its associated components are maintained in original condition, that they will be operated as designed using all appropriate safety margins for anticipated working conditions. All such equipment will experience fatigue over time and as result must be inspected and monitored routinely. Bearings, limit switches, brakes, safety devices, sheaves, cables and other components, should be routinely inspected by certified organizations.

Overloaded Lifting Gear:

Several catastrophic failures of masts, booms, and lift cables have occurred on vessels that have resulted in loss of life and severe injuries.

The Coast Guard strongly recommends:

* Know the design limits of load bearing structures and winches, hoist, and haul components;
* Ensure they are inspected and tested on a regular basis;
* Evaluate and revise operational procedures as needed.

Appendix B!

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U.S. Department of Homeland Security

MARINE SAFETY ALERT

Inspections and Compliance Directorate

April 30, 2013
Washington, DC

03-13b

Surge Protective Devices Onboard Vessels
(correction with additional information)

We've all seen them and used them. Surge protective devices (SPDs), more commonly known as surge protectors or power strips help protect our expensive electronic devices from being damaged from excessive currents and allow us to simultaneously deliver power to multiple devices. This safety alert addresses the use of certain electrical protection devices onboard vessels and the inherent risks they may cause. Most commercially available SPDs are designed for use ashore and will interrupt *only* the hot conductor when a surge occurs. What does that mean for the ship owner/operator? It means that while these devices may provide protection in our homes and offices, these same devices may be a fire risk onboard vessels.

A marine casualty investigation of two separate stateroom fires onboard a U.S. Flag Container ship revealed that the sources of the fires were attributed to the use of SPDs plugged into a lighting circuit. It was discovered that a ground had developed on another circuit that was connected to the same distribution panel providing power to the staterooms. This ground created an imbalance of voltage between the two power conductors supplying the SPDs which caused excessive currents, overheating, and subsequently, a fire. In this instance, even if the SPDs automatically tripped as designed, only one power conductor would have been secured while the other would continue to provide power, possibly shorting to the device's ground wire and the structure of the vessel.

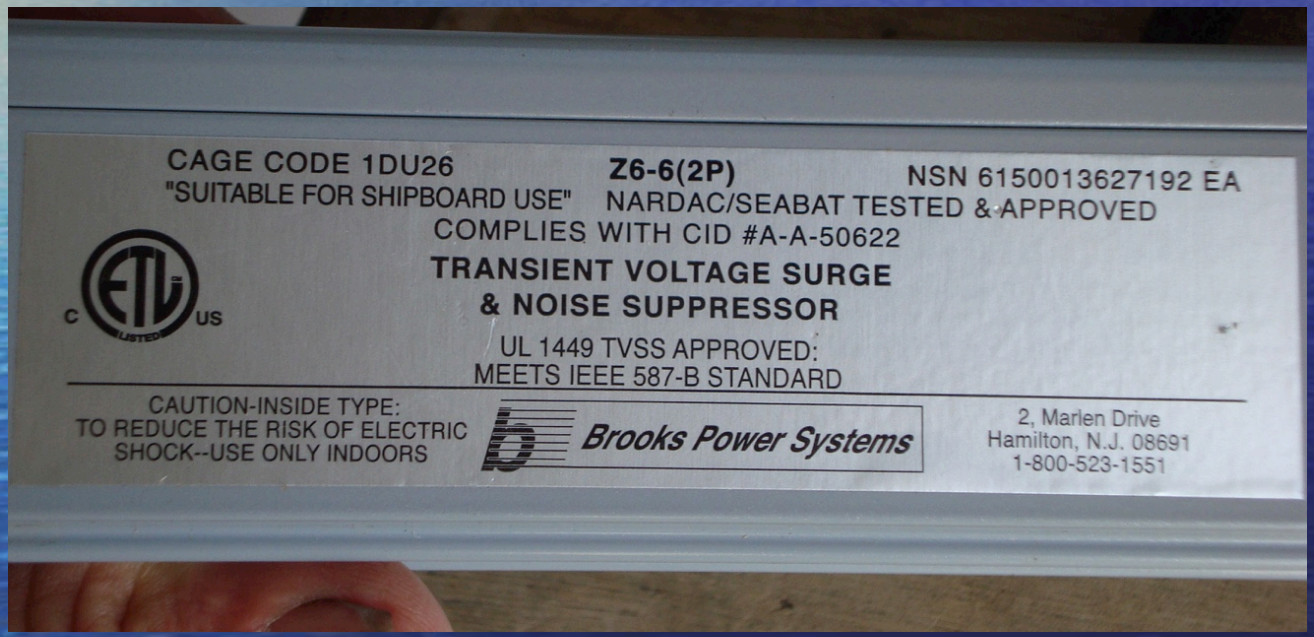
Surge "Protective" Devices:

Most surge protects are designed for use ashore and will interrupt only the hot conductor.

A Delta wired circuit has two hot leads one at +/-60 VAC, the other at +/- 60 VAC, simultaneously to provide the 120 VAC potential. Here lies the problem with inexpensive and older SPDs that only disconnect one "hot" terminal lead. The other "hot" terminal remains hot if the circuit breaker supplying the receptacle and SPD does not trip.

It should be noted that related issues (mismatches between Delta or WYE systems) have been reported with 120 VAC Uninterrupted Power Supplies purchased ashore and used onboard vessels. Such devices should be selected to match the power supply configuration.

Best Practice: RV Barnes Power Strip / Surge Protector "suitable for shipboard use"



Marine Safety Alert

UNITED STATES COAST GUARD
U.S. Department of Homeland Security

MARINE SAFETY ALERT

Inspections and Compliance Directorate

August 30, 2013
Washington, DC

Alert 08-13

CONFINED SPACE ENTRY DANGERS
Understanding Hazards

This Safety Alert serves as a reminder to Coast Guard personnel and the maritime community of the potential dangers of confined space entries. During two recent inspections, Coast Guard Inspectors' gas meters alarmed, preventing a potential loss of life or serious injury.[1]

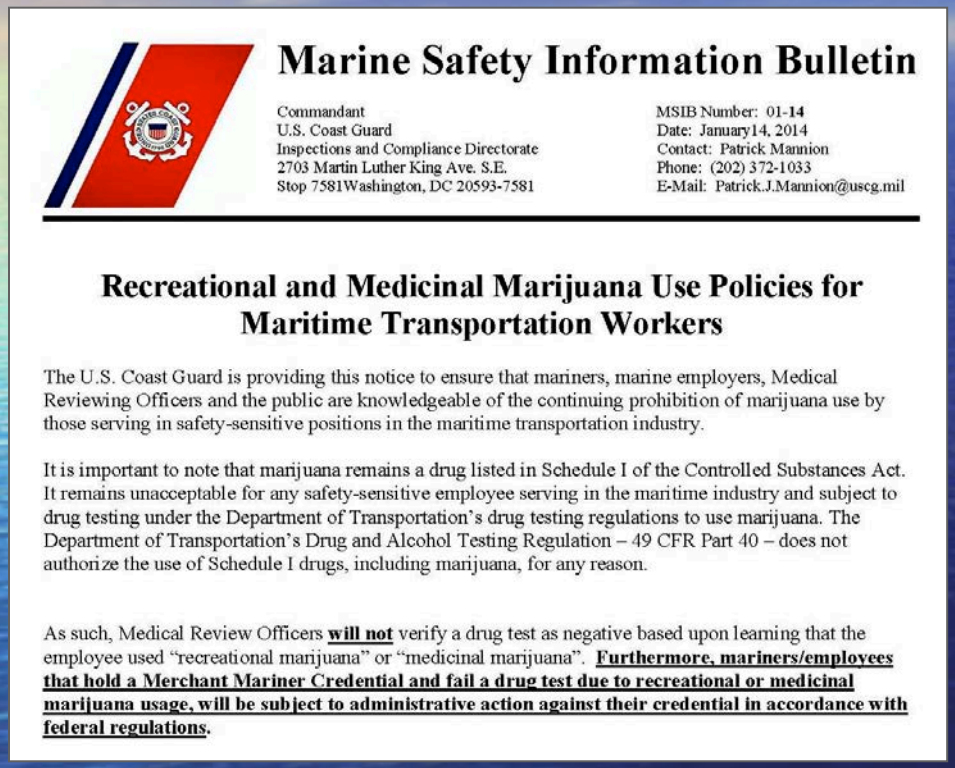
In the first case, an inspector was on board a tank vessel to conduct a Port State Control Examination. In anticipation of the examination, the crew opened the hatch to the Freefall Lifeboat to let it air out. As the Inspector entered the lifeboat his gas meter alarmed and he quickly exited. Upon investigation, it was confirmed with ship's equipment that Carbon Monoxide had collected in the lifeboat. Wind conditions had been blowing exhaust from the main stack into the lifeboat. Although not a confined space by OSHA or Coast Guard standards, the risks were the same.

In the second instance, while inspecting the #1 deep ballast tank on a deep draft container ship, an experienced marine inspector was going to climb through a box-like structure formed by floors and longitudinals in the #1 bay, just aft of the collision bulkhead. The "box" had only two lightening holes. Prior to entering the first lightening hole the inspector put his 4-gas meter through. It immediately alarmed for low O2. The inspector exited the ballast tank. While the ballast tank had been ventilated and was safe, the inspector failed to recognize that the "box" formed a confined space within a confined space and had not been cleared by the shipyard competent person.

Confined Space Entry Dangers:

The Coast Guard **strongly reminds** all shipboard personnel and those associated with inspections, surveys or audits of vessels worldwide, that hazardous atmospheres are frequently present onboard vessels and pose a great risk to personal safety. Besides the use of a personal gas meter for immediate protection, all organizations should have policies and procedures in place that address accessing these areas and make available the appropriate safety equipment for personnel.

Marine Safety Information Bulletin



Marine Safety Information Bulletin

Commandant
U.S. Coast Guard
Inspections and Compliance Directorate
2703 Martin Luther King Ave. S.E.
Stop 7581Washington, DC 20593-7581

MSIB Number: 01-14
Date: January14, 2014
Contact: Patrick Mannion
Phone: (202) 372-1033
E-Mail: Patrick.J.Mannion@uscg.mil

Recreational and Medicinal Marijuana Use Policies for Maritime Transportation Workers

The U.S. Coast Guard is providing this notice to ensure that mariners, marine employers, Medical Reviewing Officers and the public are knowledgeable of the continuing prohibition of marijuana use by those serving in safety-sensitive positions in the maritime transportation industry.

It is important to note that marijuana remains a drug listed in Schedule I of the Controlled Substances Act. It remains unacceptable for any safety-sensitive employee serving in the maritime industry and subject to drug testing under the Department of Transportation's drug testing regulations to use marijuana. The Department of Transportation's Drug and Alcohol Testing Regulation – 49 CFR Part 40 – does not authorize the use of Schedule I drugs, including marijuana, for any reason.

As such, Medical Review Officers **will not** verify a drug test as negative based upon learning that the employee used "recreational marijuana" or "medicinal marijuana". **Furthermore, mariners/employees that hold a Merchant Mariner Credential and fail a drug test due to recreational or medicinal marijuana usage, will be subject to administrative action against their credential in accordance with federal regulations.**

Recreational and Medicinal Marijuana Use Policies for Maritime Transportation Workers:

The Department of Transportation's Drug and Alcohol Testing Regulation – 49 CFR Part 40 – does not authorize the use of Schedule I drugs, including marijuana, for any reason.

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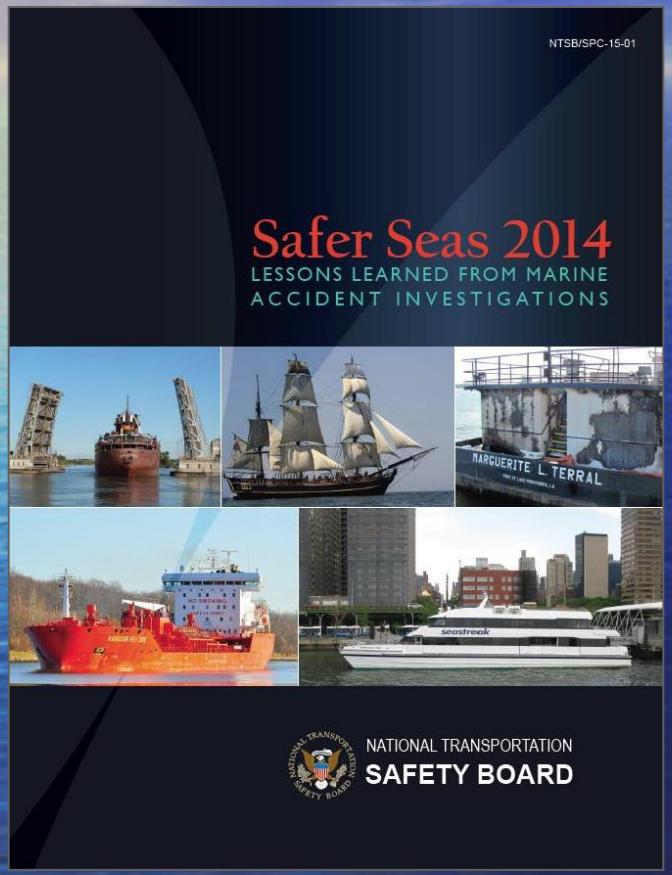
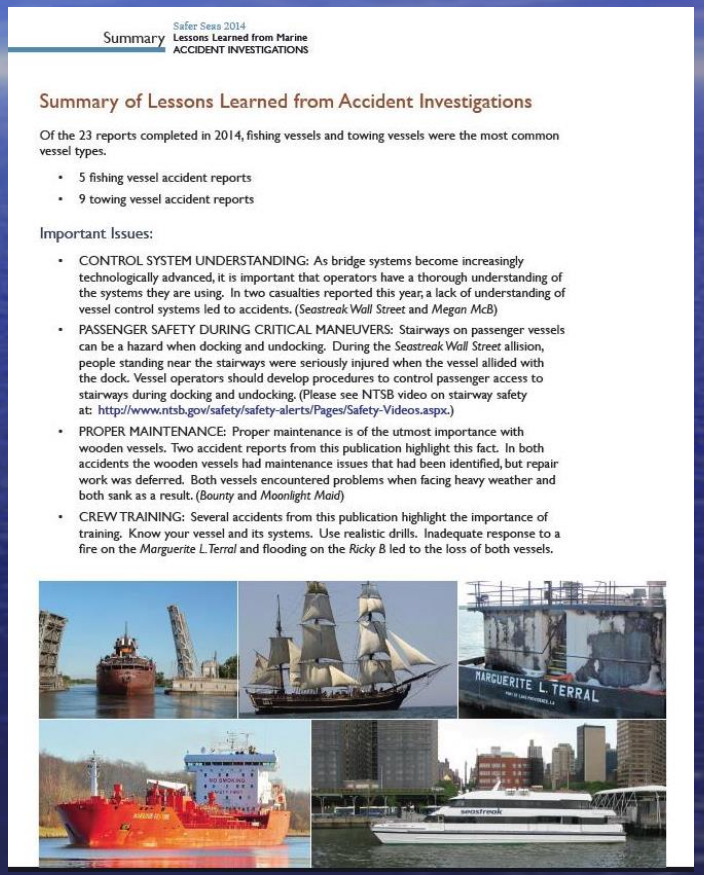
NTSB Lessons Learned





Summary — Safer Seas 2014 Lessons Learned from Marine ACCIDENT INVESTIGATIONS

Summary of Lessons Learned from Accident Investigations

Of the 23 reports completed in 2014, fishing vessels and towing vessels were the most common vessel types.

- 5 fishing vessel accident reports
- 9 towing vessel accident reports

Important Issues:

- CONTROL SYSTEM UNDERSTANDING: As bridge systems become increasingly technologically advanced, it is important that operators have a thorough understanding of the systems they are using. In two casualties reported this year, a lack of understanding of vessel control systems led to accidents. (*Seastreak Wall Street* and *Megan McB*)
- PASSENGER SAFETY DURING CRITICAL MANEUVERS: Stairways on passenger vessels can be a hazard when docking and undocking. During the *Seastreak Wall Street* allision, people standing near the stairways were seriously injured when the vessel allided with the dock. Vessel operators should develop procedures to control passenger access to stairways during docking and undocking. (Please see NTSB video on stairway safety at: http://www.ntsb.gov/safety/safety-alerts/Pages/Safety-Videos.aspx.)
- PROPER MAINTENANCE: Proper maintenance is of the utmost importance with wooden vessels. Two accident reports from this publication highlight this fact. In both accidents the wooden vessels had maintenance issues that had been identified, but repair work was deferred. Both vessels encountered problems when facing heavy weather and both sank as a result. (*Bounty* and *Moonlight Maid*)
- CREW TRAINING: Several accidents from this publication highlight the importance of training. Know your vessel and its systems. Use realistic drills. Inadequate response to a fire on the *Marguerite L.Terral* and flooding on the *Ricky B* led to the loss of both vessels.

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Questions?

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