

# NATIONAL SCIENCE FOUNDATION SHIP INSPECTION PROGRAM



**2018 RVTEC MEETING**  
**Ted Colburn**



Naval Architecture  
Marine Engineering  
Marine Surveying  
Salvage Engineering

# Recently Completed

- RV Revelle
- RV Kilo Moana
- RV Thompson
- RVIB Palmer
- RV Rachel Carson
- RV Blue Heron
- RV Endeavor

# Upcoming Inspections

- RV Armstrong
- RV Walton Smith
- RV Sally Ride
- RV Sikuliaq
- RV Oceanus
- RV Savannah
- RV Atlantic Explorer
- RV Sproul
- RV Pelican
- RV Sharp
- RV Langseth

# Observations & Areas for Improvement:

- **Realistic drills**
- **Lithium Batteries and Chemicals**
- **Signage and Control Labeling**
- **Appendix A**
- **Overboard Handling Systems**

# Realistic Drills



# Realistic Drills

- Secure Power
- Secure Ventilation
- Close Fume Hood discharge vents
- Etc.



# Realistic Drills



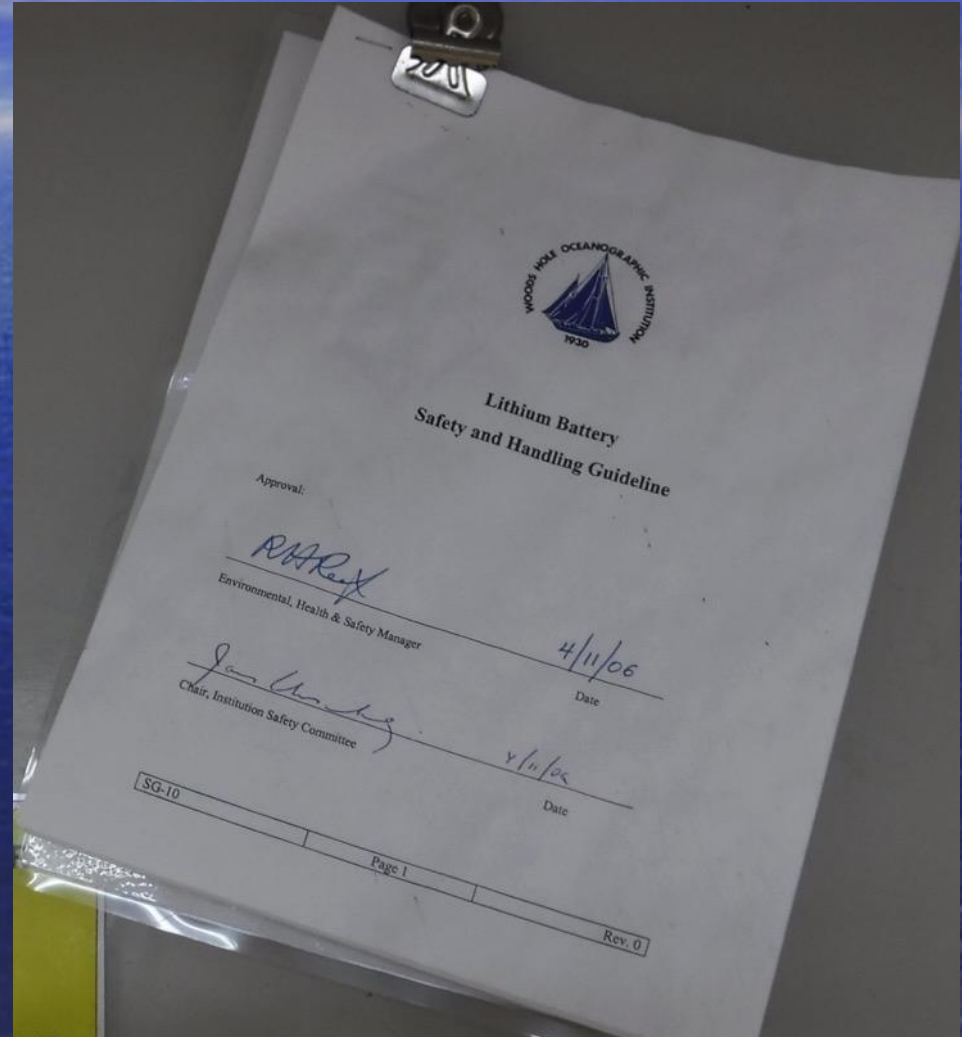
# Lithium batteries

- Develop policy and procedures.
- The procedures should cover
  - usage
  - storage
  - disposal
  - how to respond to emergencies
- Incorporate into the cruise planning process.



# Lithium batteries

- Lithium Battery Safety and Handling Guidelines are posted in the labs.



# Lithium batteries



# Observations around the fleet: Chemical Storage: Atlantis



# Observations around the fleet: Chemical Storage: Pelican



# Control Labeling:

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.

# Labels



# Signage & Controls



# RVSS Appendix A Compliance:

## Appendix A criteria some operators struggle with:

### –Extenuating Circumstances Plan

–Ship operators and their seagoing staff must understand that if, by force of circumstance or by the desire to maintain scientific operations while on a cruise, when they do not meet the operating requirements as described in tables 8.1 through 8.4, they are embarking on a potentially dangerous activity. The consequences of this activity could be loss of valuable equipment, damage to the vessel and its fixed equipment, and, in the worst case, injury to personnel. Operators shall develop a procedure on how, and under what circumstances, the vessel will safely continue operations in the event the operating requirements are not met.



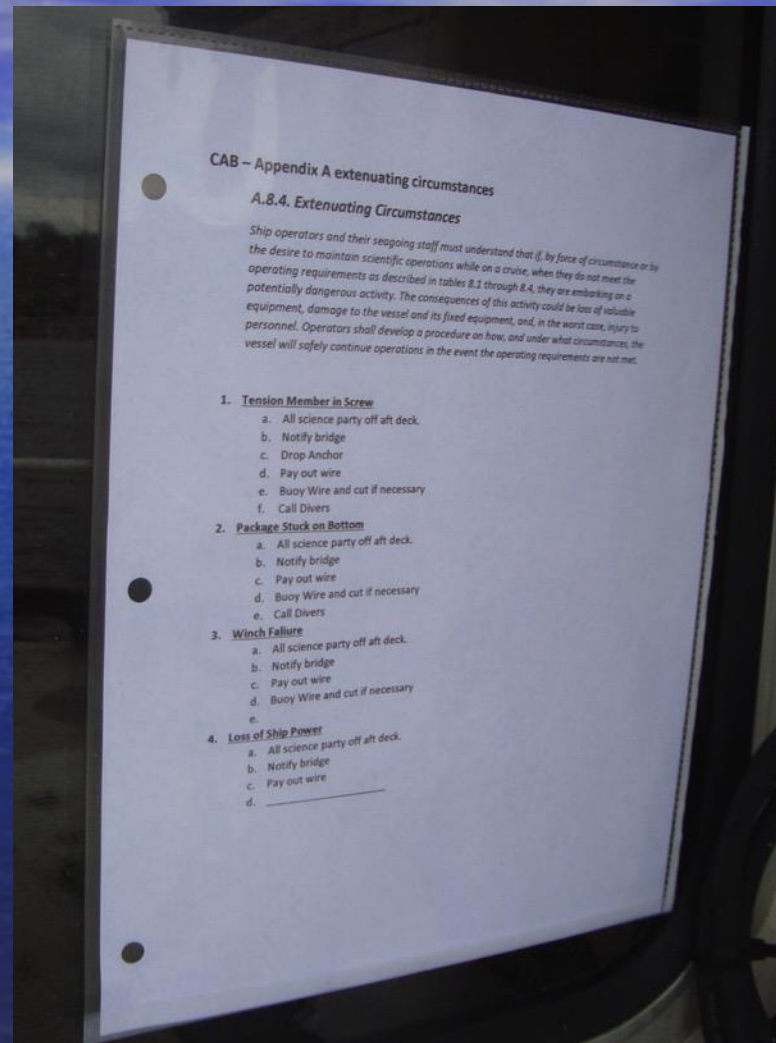
# Appendix A

## Extenuating Circumstance Procedures

- Operators shall develop a procedure on how, and under what circumstances, the vessel will safely continue operations in the event the operating requirements are not met .
- Potential scenarios you may want to consider while overboarding science gear including:
  - Worsening sea state
  - Tension member in propeller
  - Package stuck in or to the bottom
  - Winch failure / electronic control failure
  - Loss of ship's power.

# RVSS Appendix A:

## Extenuating Circumstance Procedure posted



# RVSS Appendix A Compliance:

Appendix A criteria some operators struggle with:

–One element of Tension Monitoring when factor of safety is less than 5.0.

–The tension measuring system must be “maintained” with an accuracy of 4%/3% of the applied load.

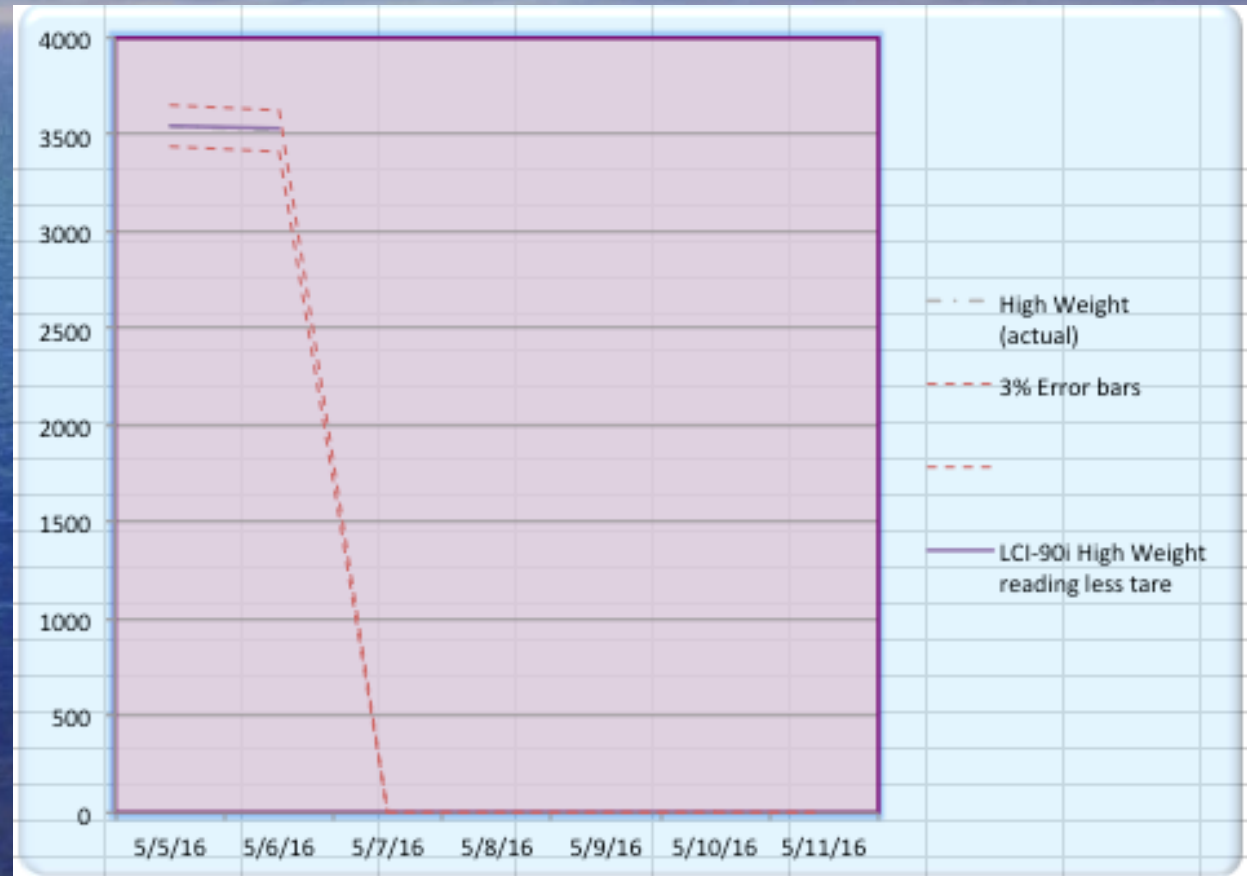
# Maintaining Accuracy

Requirement or Attribute	Select Applicable Column FS			
	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
<b>Tension Monitoring</b>				
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.

# Equipment Requirements: Tension Monitoring

Is the  
monitoring  
system  
staying  
within  
tolerance  
limits?



# RVSS Appendix A Compliance:

## Appendix A criteria some operators struggle with:

- Deck Safety** when factor of safety is less than 5.0
- The Operator should identify “Danger Zones” around ropes and wires under tension.
- To the extent possible, given the nature of operations involved, all personnel shall be excluded from these zones such that a sudden failure cannot result in injury.
- Warning notices should be displayed at points of access indicating the danger.
- Physical and/or visual barriers should be erected as needed.
- Existing doors and accesses to the area should be secured when possible

# RVSS Appendix A Compliance:

## Appendix A criteria some operators struggle with:

–**Winch Operator Qualifications** when factor of safety is less than 5.0

–The Winch Owner must certify that all Winch Operators are competent. By “Certified Competent” it is meant that the Owner must have written documentation in place showing that the operator has been through and successfully passed a formal owner/operator developed training program on the winch, handling apparatus, and monitoring system.

–The system vendor or the Owner, depending on the complexity of the system, may conduct a formal training program.

–The certification must be renewed annually.

–The master shall verify qualifications and designate the approved winch operators.

–If there are configuration changes to controls or to the hardware then the operator qualifications must be refreshed and documented.

# 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)						
Requirement or Attribute	Select Applicable Column FS					Comments
	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=	
Post Cable/Wire SWL in clear view of the winch operator (RVSS 8.6)	Applies	Applies	Applies	Applies	Y/N	
<b>General</b>						
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	
<b>Tension Monitoring</b>						
Have ability to keep load < SWL: May be calculated w/"g" factor at least 0.75 or from Tensionometer	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	
<b>Alarms</b>						
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	
<b>Sheaves and Fairlead Rollers</b>						
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: Grooves as close to d as possible and no more than 1.5d		Applies			Y/N	
Sheaves: Grooves 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	
<b>Deck Safety</b>						
Good safety practices	Applies				Y/N	
Establish danger zones / safety zones		Applies	Applies	Applies	Y/N	
Warning notices posted		Applies	Applies	Applies	Y/N	
Physical or visual barriers			Applies	Applies	Y/N	
Doors and accesses secured			Applies	Applies	Y/N	
<b>Testing</b>						
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	
<b>Logbooks: UNOLS wire identifier: Cable Inventory/History and Running Use</b>						
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	
Maximum load and payout for each cast by calculation or monitoring.	Applies	Applies	Applies	Applies	Y/N	
<b>Winch Operator</b>						
Operator deemed competent 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



Naval Architecture  
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# Overboard Handling Systems:

The BIG picture still applies:

**The Overboard Handling System (OHS) should be designed to withstand and operate in excess of the breaking strength of the strongest section of tension member to be used in any condition of loading with an appropriate factor of safety.**

**Note that 46 CFR 189.35 does not specifically allow for weak links or render capability.**

# Questions?



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# 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.