NSF SHIP INSPECTION PROGRAM

2002 RVOC MEETING

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Background

- JMS has been inspecting UNOLS vessels since 1997.
- Similar inspections have been conducted for ONR, Univ Hawaii, Antarctic Support Associates, GLSC.
- JMS philosophy is to transfer lessons learned between operators and facilitate continuous improvement throughout the fleet.

Goals

The major purposes of the NSF Ship Inspection Program are:

1. To assure that the scientific 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*, and applicable requirements of the International Maritime Organization, American Bureau of Shipping, the Code of Federal Regulations, and the U.S. Coast Guard.

3. To ensure that the NSF-owned ships as capital assets, are being adequately maintained.

Standards

- It is not a regulatory inspection.
- Recommendations are made to facilitate continuous improvement, not to cite the bare minimum requirement.
- As stated in the goals …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*, and applicable requirements of the International Maritime Organization, American Bureau of Shipping, the Code of Federal Regulations, and the U.S. Coast Guard.

Safety and Operations: Improvements Noted

- Pre-underway and arrival procedures.
- Waste management plans/records.
- Oil spill contingency plans.
- Voluntary compliance with GMDSS.
- Medical locker organization.

Safety and Operations: Areas for Improvement

- Policies, Procedures, and Plans
  - Emergency procedures.
  - Training.
  - Preventative maintenance
- Fire & Safety Plans
- Firefighting Equipment
- Lifesaving Equipment

Emergency Procedures

- Need more detailed written plans and procedures for potential shipboard casualties anywhere on board.
- For each space or general area (i.e. main deck, forward of BHD 7), identify:
  - Where to muster the fire party and science personnel.
  - Which hose station, portable extinguishers, etc. to use.
  - Electrical circuits to isolate.
  - Ventilation and de-smoking controls.
  - Etc.

Training

- Establish a master training plan with a schedule of drills and training.
- Conduct drills for each scenario in the Emergency Procedures Manual. Drills should also be used to verify the effectiveness of the emergency procedures. Make changes as necessary.
- Keep drills realistic. Minimize simulations.
  - Secure power, charge hoses, etc.
- Orientation training for new crew members.

Training

Preventative Maintenance

- Is there an overall maintenance policy applicable to all shipboard systems?
- Clearly identify who is responsible.
- Define specific procedures for inspection and maintenance.
- Establish a schedule.
- A computer program is an important tool for managing and recording maintenance but an overall preventative maintenance policy needs to be in place first.

Fire & Safety Plans

- Accuracy
  - Does it accurately reflect the ship's configuration?
  - Is the location and type of equipment listed accurate?
- Effectiveness
  - Has a comprehensive review been conducted to verify that equipment is located where it will be the most useful?
  - Use the plan to develop emergency procedures.
- Display
  - Is it easy to read: size, format, symbols, too much information?
  - Is it posted where it will be viewed by scientists as well as crew?
  - Is it stored in a watertight enclosure outside of the deck house?

Firefighting Equipment

- Service certificates are often missing for portable fire extinguishers.
- Fireman's outfits should be stored in separate locations.
- Heat/smoke detection system:
  - Batteries are often inop or missing.
  - Centralized alarm with a panel on the bridge recommended.
  - Review the location of sensors - are high risk areas covered?

Lifesaving Equipment

- Can life rafts be easily launched and boarded?
  - Are lifelines/rails in the way?
  - Are launching instructions posted?
  - Has the procedure been practiced?
  - Is a jacob's ladder available?
- Are extra life jackets stowed at muster station?
- Is workboat / rescue boat marked with vessel name, retroreflective tape, properly equipped w/ lights, radio, safety gear?
- Is there a designated rescue swimmer? Trained? Outfitted?

General Safety and Operations Items

- Calculate stability and confirm with observed drafts prior to getting underway.
- Keep electronic charts updated similar to paper charts.
- Backup power for navigation lights and communications equipment: Is an electrical line diagram available or are circuits clearly labeled?
- Battery storage: ventilated, labeled, no smoking.
- Display of day shapes.
- Voluntary compliance with Ballast Water Mgmt.
- "NO SMOKING" policy defined and signs posted in the vicinity of battery storage boxes, gasoline storage, pyro tech lockers, paint lockers, acetylene bottles, fuel tank vent/fills, HAZMAT lockers, etc.

Oceanographic: Improvements Noted

- SWL Testing and Labeling
- Running Wire Logs

Oceanographic: Areas for Improvement

- Preventative Maintenance
- Maintenance Logs
- Design Capacity
- Wire Inventory Logs
- Instrument Procedures / Calibrations
- Lab Habitability Standards

Oceanographic: Preventative Maintenance

- Winch failure continues to be major problem in fleet.
- There is often no clear ownership of winches for preventative maintenance purposes.
- Lack of policies, procedures and records pertaining to inspection and maintenance on winches, cranes and frames.
- Assumed that preventative maintenance has NOT been conducted if not logged.

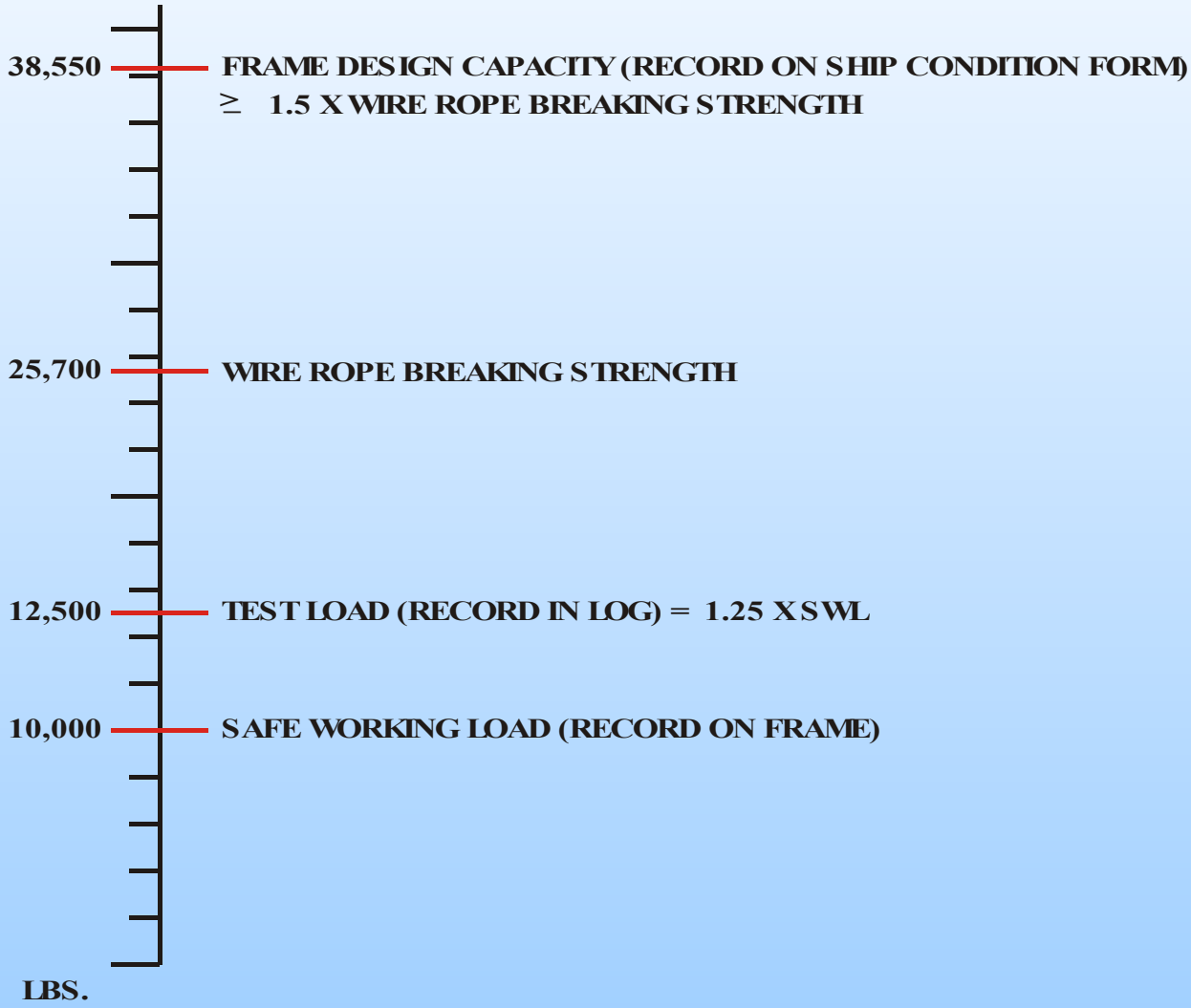
Oceanographic: Maintenance Logs

- Logs for general maintenance of winches, cranes and frames are required (46 CFR 189.35-13).
- Since overstresses may degrade the long-term safety factor, records should be maintained of weight tests, excessive loading, maintenance, alterations, and other factors.
- Important for tracking trends.
- Coupled with the preventative maintenance system.

Design Capacity

- Required for frames and booms (46 CFR 189.35-9).
- Design capacity is the ultimate structural capacity of the frame or boom.
- Design capacity must be able to support a load equal or greater than 1.5 times the breaking strength of the strongest wire or cable to be used.
- Design capacity is not equal to SWL (design capacity is much greater).
- Design capacity must be recorded on the NSF Ship Condition Form.

Design Capacity



Wire Inventory Logs

- History of wire:
  - date and length at acquisition
  - date and length of each cut
  - current length, etc.
- Winch / spool specific:
  - Should go with winch / spool when removed from ship.
- See examples in Handbook of Oceanographic Winch, Wire and Cable Technology, 3rd Edition, Bash, 1999.

Instrument Procedures and Calibrations

- Written procedures should be developed for all scientific instruments.
- Can be simple … reference instrument's manual for troubleshooting.
- Should include calibration schedule as part of a preventative maintenance system.
- Calibration records should be kept aboard the vessel for PI's reference.

Lab Habitability Standards

- Under development, see: Guidelines for Laboratory Design, 3rd Edition, DiBerardinis, Baun, First, Gatwood and Seth, 2001.
- In general, ships should strive to meet shoreside standards.
- High priority topics:
  - HVAC
  - Lighting
  - Noise levels
- RVSS too general. Provides no specific guidance or references.

Hull, Mechanical, Electrical: Improvements Noted

- Watertight integrity.
- System labeling / color coding.
- Lube oil analysis.
- Maintenance records / history

Hull, Mechanical, Electrical: Areas for Improvement

- Procedures.
- Hull systems.
  - Tank inspection records.
  - NDT readings & analysis.
- Machinery.
- Electrical.

Procedures

- Confined space entry.
- System start-up, shut-down, emergency operating procedures.
- Watch qualification standards.
- Preventative maintenance.
  - Comprehensive policy.
  - Specific procedures.
  - Schedule.
  - History / records.

Hull

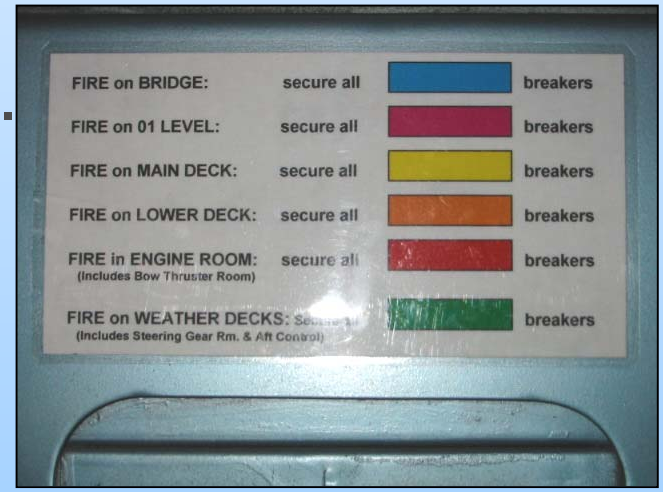
- Treat each compartment / tank as a piece of equipment. Document and schedule action items such as inspection, NDT, structural repair, and preservation. Document condition of coating with photos.
- Treat each WTD and hatch as a piece of equipment for inspection and maintenance. Same for miscellaneous items such as struts, hull / bhd penetrations, piping, etc.
- Analyze hull thickness readings over time to measure corrosion rates, plot high wear areas, and predict future structural replacement.

Machinery

- Overspeed trips on main engines and generators: Are they set correctly? Can they be tested?
- Exercise alarm systems regularly.
- Record and analyze for trends propulsion shaft clearances.
- Relief valves: Are they set correctly? Can they be tested?

Electrical

- Electrical line diagram.
  - Is it up-to-date and accurate?
  - Are emergency circuits clearly identified?
  - Use for planning new installations, basic load analysis.
- Label panels, breakers, cables.
- Pull back dead end cables.

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