

BROOKHAVEN NATIONAL LABORATORY

# OCCUPATIONAL HEALTH AND SAFETY GUIDE

|               |        |
|---------------|--------|
| MARINE SAFETY | 1.12.0 |
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## I. INTRODUCTION

Research at Brookhaven National Laboratory involving the use of marine craft, associated equipment and personnel necessitates a guide to coordinate and standardize a uniform safety effort during such operations.

It is essential that marine operations be performed in the safest manner practicable, in order to minimize hazards to personnel and property.

## II. SCOPE

This Guide covers marine operations in all types and sizes of marine craft (under direct control of, or charter by, BNL) with respect to preparedness, prevention, control and counteraction of marine incidents in addition to safe guarding of personnel, and equipment. All marine operations shall be consistent with the requirements of this Guide and with applicable federal, state and local regulations. Diving operations are covered under Guide 1.12.1.

## III. CLASSIFICATIONS

A. Motorboat. Vessels 65 feet and under, and equipped with propulsion machinery. Motorboats are classed as

1. Class A - less than 16 feet.
2. Class 1 - 16 feet to less than 26 feet.
3. Class 2 - 26 feet to less than 40 feet.
4. Class 3 - 40 feet to 65 feet.

B. Motor Vessels. Any vessel more than 65 feet which is propelled by machinery.

C. Small Craft. Craft such as, but not limited to, punts, canoes, inflatables and rafts.

D. Vessel. Every type of water craft, other than a seaplane on the water, used or capable of being used as a means of transportation on the water.

## IV. DEFINITIONS

A. Crew. Trained personnel with assigned duties relative to the operation of the vessel.

B. Cruise Plan. Any scheduled voyage.

C. Life Preserver. A personal flotation device designed to turn an unconscious person from a face down position in the water to a vertical or slightly backward position and which provides more than 20 pounds of buoyancy.

D. Limnology. Scientific study of physical, chemical, meteorological, and biological conditions in fresh water, especially of ponds and lakes.

E. Logbook. An official record for entries with respect to time of departures/arrivals, tests, drills, and inspection, fuel oil data, drafts, change of personnel assignments, casualties (personnel and material), unusual occurrences, etc. Such logs or records shall be retained for the life of the vessel.

F. Master (Qualified and Licensed). A person responsible for the operation of the vessel and who has had experience with similar vessels on a body of water like that on which the individual expects to operate and who holds a validated operator's or a superior license.

G. Marine Supervisor. A person responsible for the state of readiness of the vessel and crews, scheduling tests, maintenance and repairs, maintaining all records pertaining to vessels, and procuring supplies.

H. Markings. Identification of emergency equipment, instructions and controls for the guidance of the persons on board in case of an emergency.

I. Owners Certificate. A letter, certificate or plaque certifying that the vessel is operated as an oceanographic research vessel under the laws of the United States.

J. Oceanographic Research Vessel. A vessel employed exclusively in oceanography or limnology, or both, or exclusively in oceanographic research, including, but not limited to, studies pertaining to the sea as seismic, gravity meter and magnetic exploration and other marine geophysical or geological surveys, atmospheric research, and biological research.

K. Principal Investigator. Chief scientist on the vessel in charge of the scientific crew, and the on scene representative of the Department Chairman/Division Head.

L. Scientific Personnel. Those persons aboard a vessel solely for the purpose of engaging in scientific research or receiving instruction in oceanography or limnology. Scientific personnel are not considered "passengers" or "crew members," but are included as "persons" when requirements are based on total persons on board.

M. Station Bill. A document posted in conspicuous locations in the vessel setting forth the emergency assignments and duties of all personnel on board, and signals for announcing emergencies.

N. Work Vest. A personal flotation device designed for restricted use under favorable and non-emergency conditions.

## V. RESPONSIBILITIES

A. Department Chairmen/Division Heads are responsible for ensuring implementation of this Guide. For all operations, the Department Chairman/Division Head or their designee shall ensure that a written cruise plan is submitted in accordance with Sect. VI.C.6. Specifically they shall designate qualified and licensed Masters and a Marine Supervisor. Department Chairmen/Division Heads will also decide the degree of safety control on charter operations.

B. The Master of the vessel, regardless of its size, is responsible for the safety of all persons aboard the vessel, for the safe operation and condition of the vessel and to assure that all requirements of this Guide are satisfied. Additionally the Master is responsible for the following:

1. To conduct the overall vessel administration, organization, and training of the crew in emergency procedures.
2. To insure appropriate station bills and identification markings are posted, and that sufficient drills are conducted, for continued development and maintenance of crew and scientific personnel skills, in the performance of emergency duties.
3. By means of frequent inspections, assure that all safety features are in proper working condition, and a checkoff list to periodically test all power driven emergency equipment is maintained.
4. To assure that lifesaving equipment is properly located and in a state of readiness.
5. To maintain a vessel logbook.
6. To take appropriate emergency action in the event of a collision, grounding, man overboard, fire and/or abandoning the vessel. This action may include, and is not limited to, rendering or requesting assistance, diversion from cruise plan, and dumping non-emergency equipment overboard to maintain satisfactory stability or buoyancy.

C. Principal Investigator (if assigned) defers to the Master of the vessel in matters of personnel safety, seamanship, operation, navigation, vessel's policies and emergency procedures. On those occasions, when serving as Master on small craft, the scientific duties shall not cause neglect of the responsibilities and duties of the Master. Specifically, the Principal Investigator shall:

1. Be responsible for safety matters in regard to the stowage and handling of chemicals, flammable and dangerous scientific materials; and the safety aspects of the scientific laboratory.
2. Be in overall charge of the scientific aspects of a cruise.

3. Collaborate with the Master in the training and participation of scientific personnel in emergency exercises.

4. Take station on the bridge during emergencies and direct activities, as ordered by the Master, for the safety of scientific personnel.

D. Marine Supervisor will maintain all records pertaining to vessels, such as, maintenance, repairs, tests, etc. Specifically the Marine Supervisor shall:

1. Assure proposed alterations to the hull, machinery and equipment do not adversely affect the stability and safety of the vessel.

2. Develop and implement a preventative maintenance program.

3. Schedule required periodic tests of emergency equipment.

4. Maintain an inventory list of equipment, spare parts and expendable items.

5. Draft and update operating manual, emergency procedures, general arrangement plans and maintain inactive log files.

E. Engineer (if required) shall, as directed by the Master, organize, train and direct engineering personnel. In addition, the engineer shall:

1. Inspect, test, mark, maintain, and repair all emergency equipment for which the engineer is responsible.

2. Take charge of emergencies occurring in engineering spaces.

3. During drills and emergencies take charge in the engineroom, or where most needed for the purpose of coordinating and directing action as directed by the Master.

F. Mate (if required) serves as second in command directly under the Master and is in general charge of emergency procedures. In addition, the mate shall:

1. Assure that appropriate markings and instructions are displayed on all emergency equipment and stations.

2. Make periodic inspections of and initiate actions for maintenance, repair, or replacement of emergency equipment.

3. Delegate training duties to subordinates as necessary to insure continuous and progressive development of the vessel's emergency organization.

4. Take charge at the scene of an emergency and direct and coordinate emergency action.

G. Crew Members and/or Scientific Personnel are responsible for complying with the provisions of this Guide. Specifically, they shall:

1. Obey all orders, rules and regulations of the Master.
2. Assume additional duties as assigned by the Master for the handling of a particular emergency.

H. Safety and Environmental Protection Division (SEP) will assist the departments in all matters concerning the safe operation of vessels. Specifically, it shall:

1. Provide an ex officio member of the quarterly inspecting team.
2. Provide training as requested.
3. Review proposed changes and modifications to the vessels hull and/or structures.

## VI. REQUIREMENTS

The Master shall assure that the vessel and equipment is in accordance with the following requirements. Further details as to the requirements shall be found under Responsibilities, Section V.

### A. Administrative

1. DOCUMENTS (Class 3 and Motor Vessels). Each vessel shall have prominently posted in conspicuous locations the following: station bill(s), stability data, U.S. Coast Guard licenses or equivalent, owner's certificate, prohibited discharge warning placard and radiotelephone operator permit.

2. OPERATING MANUAL (Class 1 and Larger Vessels). Personnel on board will be guided by an operating manual outlining procedures for maintaining watertight integrity, eliminating fire hazards, use of emergency equipment, and maintaining stability and buoyancy. The manual will also provide procedures for eliminating fire hazards, combating fire and flooding as well as handling man overboard, collision grounding, and abandoning ship situations.

3. INSPECTIONS. Inspections shall be in accordance with Occupation, Health Safety Guide No. 1.2.0. Inspections will include, but not necessarily be limited to, inspecting and surveying the following.

a. General Arrangement Drawings (Class 3 and Motor Vessels). All vessels shall have permanently exhibited a drawing of the vessel, showing for each deck the location of emergency equipment such as, fire fighting apparatus, alarms, remote controls, watertight bulkheads and hatches, ventilation systems and dampers, distress signals, bilge/fire pumps and radio.

b. Markings. Appropriate markings shall be affixed for the following: General alarm bells, extinguishing equipment, controls and alarms, firehose stations, self contained breathing apparatus, emergency lights, instructions for changing steering gear, rudder orders, liferafts, life floats, life preservers, ring life buoys, work vests, pyrotechnics, emergency position indicating radiobeacon and other emergency equipment.

c. Maintenance. Inspections shall note deficiencies in vessels' hull, machinery and equipment, such as, corrosion and/or deterioration of strength members, leaky pipe lines and fittings, inoperative machinery and hull integrity.

d. Emergency Equipment. Inspections shall also include an inventory and state of readiness of all emergency equipment.

## B. Equipment

### 1. FLOTATION.

All vessels shall meet the general principles and standards set forth as follows:

#### a. Lifeboats (if required)

i. The name of the parent vessel, port of registry, and number of each lifeboat shall be plainly marked or painted on each side of the bow of each lifeboat in letters not less than 3 inches high.

ii. The cubical contents and number of persons allowed to be carried in each lifeboat shall be plainly marked or painted on each side of the bow of each lifeboat in letters and numbers not less than 1 1/2 inches high. In addition, the number of persons allowed shall be plainly marked or painted on top of at least two thwarts in letters and numbers not less than 3 inches high.

iii. All oars and paddles shall be conspicuously marked with the vessel's name.

iv. Where mechanical disengaging apparatus is used, the control effecting the release of the lifeboat shall be painted bright red and shall have thereon in raised letters the words "DANGER LEVER DROPS BOAT."

v. The top of thwarts, side benches, and footings of lifeboats shall be painted or otherwise colored international orange. The area in way of the red mechanical disengaging gear control lever, from the keel to the side bench, shall be painted or otherwise colored white, to provide a contrasting background for the lever. This band of white should be approximately 12 inches wide depending on the internal arrangement of the lifeboat.

b. Life rafts.

All vessels may carry approved inflatable life rafts(s) as substitutes for required lifeboats, life rafts and life floats. Each raft shall bear the parent vessel's name.

i. The decks (immediate area) on which inflatable life rafts are carried shall be kept clear of any obstructions which would interfere with the immediate launching of the lifesaving appliances.

ii. Inflatable life rafts carried by vessels shall be inspected and serviced at approximately 12 month intervals at an approved facility.

iii. On vessels equipped with inflatable life rafts, the total vessel complement shall not exceed the capacity of the life rafts.

c. Life Preservers

i. All vessels shall be provided with properly fitted USCG approved life preservers for each person on board plus approximately 10%. Under a total complement of 10, have at least one spare life preserver. Additional life preservers shall also be provided in the engine room, pilot house, bow lookout and laboratories for personnel on watch.

ii. For small craft, it is sufficient to have one preserver for each person aboard.

iii. All life preservers shall be marked with the vessel's name.

iv. Life preservers shall be inspected semi-annually and marked with the inspection date.

v. Life preservers should be worn by all personnel during emergencies and drills.

vi. Life preservers shall also be worn by personnel working independently and remote from immediate assistance.

d. Work Vests.

An appropriate number of approved work vests shall be carried and used by personnel working near or over water. Such vests are not an acceptable substitute for life preservers and should not be stowed in the same locations as life preservers.

e. Ring Life Buoys.

All Class 2 and larger vessels shall carry at least two USCG approved ring life buoys with approved waterlights. As the vessels' size increases in number of ring life buoys should increase as required by USCG, ap-

proaching the required number for vessels of 300 gross tons. They shall also be international orange in color, bear the name of the vessel and be provided with an approved self activated smoke signal and water light.

f. Small Craft

Small craft are required to have:

- i. Built in flotation.
- ii. Oars and/or paddles and a bailer.

2. DISTRESS SIGNALS.

a. All Class 2 and larger vessels shall carry in the pilothouse or other suitable location at least 6 approved hand held red flare distress signals and 6 approved hand held orange smoke distress signals; or 12 approved hand held rocket propelled red flare distress signals as per Appendix E. Pyrotechnics shall be in an approved watertight container and shall be replaced at intervals not more than three years from date of manufacture.

b. All Class 1 and smaller vessels shall carry pyrotechnic devices.

c. As specified in Appendix E, a bright orange or yellow 2' x 2' or larger signal flag shall be provided for small craft and Class A vessels during daytime operations and a watertight flashlight approved for flammable atmospheres during night operations.

3. FIRE FIGHTING

a. Portable Fire Extinguishers.

All power driven vessels shall carry on board USCG approved portable fire extinguishers of a type and quantity in accordance with Appendix A.

b. Fixed Extinguishing Systems.

All vessels shall have installed, if practical, a U.S. Coast Guard approve fixed fire extinguishing system to protect machinery spaces, paint lockers, chemical storerooms and similar spaces.

c. Fire Pumps.

Motor vessels shall be equipped with at least one independently driven fire pump and provided with an appropriate number of 1 1/2 inch hydrants and hoses. On Class 3 vessels a hand operated fire pump provided with appropriate 3/4 inch hose is sufficient. Firehose shall not be used for any other purpose than fire extinguishing, drills, and testing.

d. Tests and Inspections.

i. All portable and fixed fire extinguishers should be examined monthly to make certain that they have not been tampered with, and have not suffered corrosion or damage. Seals should be inspected to determine that the extinguishers have not been operated since last being charged.

ii. Extinguishers shall be recharged after use, even though only partially discharged. A record of inspections shall be maintained and the equipment so tagged.

iii. Foam extinguishers shall be recharged annually. Dry chemical extinguishers shall be weighed annually, and should be shaken semiannually to avoid packing. All other cylinders shall be weighed annually.

iv. All portable fixed pressurized cylinders shall be hydrostatically tested and inspected internally at intervals not to exceed five years.

4. ELECTRICAL

a. Electrical Equipment

All electrical equipment shall comply with U.S. Coast Guard Electrical Regulations.

b. Batteries

Lead acid batteries, or equivalent, shall be properly secured in an acid proof tray and the terminals protected against accidental contact by tools and other gear. Polarity check indicators should be utilized when using dock side power for battery charging. Battery compartment shall be ventilated and "No Smoking" signs posted.

c. Circuits

All shipboard circuits of 120 volts or over shall be grounded and equipped with ground fault interruptors.

d. Portable Equipment

Portable equipment, such as portable generators shall be equipped with ground fault interruptors.

i. Ground fault protective systems shall be used with dock side power.

e. Emergency Lighting

Appropriate emergency lighting shall be available in engine compartments, labs and bridge and tested weekly.

5. PROPULSION

a. Propulsion Equipment

All propulsion equipment shall be properly maintained. Maintenance checks and servicing shall be recorded in the vessel's log.

b. Malfunctions

All malfunctions and breakdowns shall be logged.

c. Fuel Systems

All fuel tanks and associated equipment shall be inspected routinely. Diesel fuel tank additives should be used to combat water accumulation and bacteria growth. Bypass fuel filters shall be installed to facilitate "underway" switch over.

d. Engine Instruments

To monitor engine low-oil pressure, high engine temperature, and engine compartment temperature, alarms shall be installed where possible.

6. VESSEL HANDLING

a. Lines

The number, type and size of docking and anchor lines shall be commensurate to the vessel's size and operations.

b. Anchor

At least one proper anchor shall be aboard every vessel.

c. Steering System

The entire steering gear system shall be inspected and serviced at intervals not to exceed one year.

7. SCIENTIFIC

a. Scientific Equipment

All scientific equipment and material to be used shall be reviewed by the department in consultation with Safety and Environmental Protection

Division in respect to possibly creating a hazardous condition aboard the vessel. Some of the factors to be considered are effects on stability of the vessel, compressed gas cylinder securing techniques, explosive, radioactive or other reactive and/or toxic materials, electrical, distribution systems, rigging, and location of equipment which may block passageways or cause tripping hazards.

b. Large Structures

The design and materials of portable vans, tanks, and other equipment shall be appropriate for the environment to which the structure, attachments and connections will be exposed.

8. RIGGING EQUIPMENT

Rigging equipment shall be installed and maintained to conform with recognized codes and practices as well as the BNL standard pertaining to material handling equipment.

9. COMMUNICATIONS

a. Radios

All vessels operating off shore, i.e., oceans, bays, sounds, or other bodies of water (large lakes), shall be equipped with SSB or VHF FM with adequate channels to insure transmission of operational or emergency messages and the receipt of weather information. Citizens band radio, although useful on routine tasks, is not an adequate substitute.

b. Emergency Power

Radio equipped vessels shall have an emergency source of power, either a generator or a battery.

c. Reporting

All operating vessels shall make the following daily radio or telephone reports to designated home base if applicable.

i. Any change in the cruise plan affecting the planned course, position, ETA, or destination.

ii. Any equipment failure affecting the capability of the vessel.

iii. Adverse weather.

iv. Personnel injuries.

d. Base Radio

If communications with the USCG are not available, then a base radio station shall be manned.

e. Emergency Position Indicating Radio Beacon

All Class 3 and motor vessels shall have an operable USCG approved TYPE A Emergency Position Indicating Radio Beacon (EPIRB) stowed and tested in accordance with current instructions.

10. EMERGENCY WATER

Emergency rations of drinking water contained in sealed cans or plastic bottles shall be provided in accordance with Section VI.C.9, aboard vessels operating in ocean waters.

C. Operational Requirements

The following operational requirements apply to small craft where practical.

1. READINESS

Prior to getting underway, the Master will assure himself of the vessel's readiness by testing all machinery, navigation, and communication units essential for the safe operation of the vessel. All equipment must test satisfactory prior to getting underway.

2. STATION BILLS

All Class 2 and larger vessels shall have posted in conspicuous place(s) station bills setting forth the duties of the crew and scientific personnel under emergency situations.

3. DRILLS

All Class 2 and larger vessels shall conduct and log routine emergency drills for fire, collision, grounding, man overboard and abandon ship.

4. LOGBOOK

All Class 2 and larger vessels shall maintain an official logbook.

5. MEDICAL

All vessels shall carry or have access to an approved first aid kit, and medical supplies recommended by the BNL Industrial Medicine Clinic. In

addition, all Motor Vessels shall carry a semi rigid stretcher for handling personnel casualties. See (VI,D,E) "Training" for master and crew medical training requirements.

#### 6. CRUISE PLANS

A written "Cruise Plan" shall be submitted prior to embarking and shall include:

- a. Names of all crew (unless properly recorded elsewhere) scientific personnel and designated personnel on official status.
- b. Designation of Master.
- c. Principal Investigator.
- d. Date, time and point of departure.
- e. Date, estimated time, point of arrival, cruise track and/or operating area.
- f. Communication instructions.
- g. Other instructions as may be appropriate for the safe and effective operation of the vessel.

#### 7. POST CRUISE REPORT

- a. A post cruise report shall be prepared to note essential hull and equipment repairs required prior to the next cruise.
- b. A follow up procedure shall insure that necessary repairs are effected before embarking on a subsequent cruise.

#### 8. DECK SURFACES

- a. All deck surfaces shall be maintained in such a manner that firm footing is assured, and that no tripping hazards exist.
- b. All decks shall be provided with hand holds and guard rails with life lines as appropriate.
- c. Barriers shall be provided on equipment which could cause injury if accidentally touched.

#### 9. SANITATION

- a. The Master shall inspect weekly the quarters, toilet and washing space, galleys and food lockers for conformance with good sanitary conditions and serviceability.

b. Government owned and/or contracted vessels operating under BNL authority shall meet the EPA drinking water standards to assure that their drinking water tanks are free of toxic chemical and biological contaminants.

c. Routine water samples shall be taken from each drinking water tank during departmental safety inspections for analysis.

d. A fresh water hose shall be designated and marked for transfer of fresh water only.

e. Eating shall be prohibited in areas where toxic chemical or biological agents are in use.

#### 10. STABILITY

CLASS 1 and larger vessels shall have stability data supplied to the Master such as instructions as are necessary to enable him to obtain accurate guidance as to the stability of the vessel under varying conditions of service, loading, overside operations and weather.

#### 11. WATERTIGHT INTEGRITY

a. All practical measures should be taken to limit the entry and spread of water below the main deck.

b. All water line and below thru hull pipes and fittings shall be equipped with sea cocks with the exception of bilge drain plugs.

c. Bilges shall be kept dry to prevent loss of stability.

d. During inclement weather, all doors, ports, hatches, manhole covers, and sounding tubes shall be secured except when actually in use.

#### 12. ALCOHOLIC BEVERAGES

Drinking of alcoholic beverages while on duty or going on duty while under the influence of alcohol is prohibited.

#### 13. PASSENGERS

Only individuals engaged in official business shall be permitted on the vessel.

#### D. Qualifications for Masters

1. BNL will issue a license for those individuals who successfully pass a written test prepared and conducted by SEP. (The test is similar to the appropriate Coast Guard license.) After existing operators (captains) obtain qualified time aboard BNL vessels, they will be required to apply for a validated U.S. Coast Guard license.

1.12.0

2. If vessel is equipped with navigational radar, the Master shall also hold a validated Radar Operator Certification.

E. Training

1. The Master shall receive CPR, first aid and fire fighting training prior to assignment on vessel.

2. All crew personnel should be trained in fire fighting techniques and CPR prior to reporting aboard assigned vessel.

APPENDIX A-1

FIRE EXTINGUISHER CLASSIFICATIONS

Classification

| <u>Type</u> | <u>Size</u> | <u>Soda acid<br/>and<br/>water<br/>gallons</u> | <u>Foam<br/>gallons</u> | <u>Carbon<br/>dioxide<br/>pounds</u> | <u>Dry<br/>chemical<br/>pounds</u> |
|-------------|-------------|--|-------------------------|--------------------------------------|------------------------------------|
| A           | II          | 2 1/2  | 2 1/2                   |                                      |                                    |
| B           | I           |  | 1 1/4                   | 4                                    | 2                                  |
| B           | II          |  | 2 1/2                   | 15                                   | 10                                 |
| B           | III         |  | 12                      | 35                                   | 20                                 |
| B           | IV          |  | 20                      | 50                                   | 30                                 |
| B           | V           |  | 40                      | 100                                  | 50                                 |
| C           | I           |  |                         | 4                                    | 2                                  |
| C           | II          |  |                         | 15                                   | 10                                 |

## APPENDIX A-2

## NUMBER AND DISTRIBUTION OF FIRE EXTINGUISHERS

(Motorboats Less Than 65 feet)

| <u>Type of Vessel</u>    | <u>Class of Extinguishers</u> | <u>Minimum Required</u> | <u>Recommended Locations</u>  |
|--------------------------|-------------------------------|-------------------------|---|
| Class A-under 16 ft.     | B I                           | 1                       | Helmsman's position   |
| Class 1-over 16 ft.      | B I                           | 2                       | Helmsman's position and passenger space                             |
| Class 2-26 ft. to 40 ft. | B I                           | 3                       | Engine compartment, helmsman's position and galley**                |
| Class 3-40 ft. to 65 ft. | B I                           | 4*                      | Engine compartment, helmsman's position, crew quarters and galley** |

\*Where more than three B I units are recommended, the extinguishing capacity may be made up of a smaller number of larger units, provided each recommended location is protected with an extinguisher readily accessible; e.g., three B II units may be used in lieu of 4, 5 or 6 of the smaller B I units.

\*\*Extinguishers recommended for "engine compartment" should not be located inside such compartment but near an entrance to the compartment unless someone is normally present in the compartment.

APPENDIX A-3

NUMBER AND DISTRIBUTION OF FIRE EXTINGUISHERS

(Vessels Between 65 ft. in Length and 300 Gross Tons)

| <u>Space</u>   | <u>Classification</u> | <u>Quantity and Location</u>                            |
|--|-----------------------|---|
| Communicating corridors                                | A II                  | one in each main corridor not more than 150 feet apart. |
| Radio room   | C II                  | two in vicinity of exit.                                |
| Galleys  | B II or C II          | one for each 2,500 square feet.                         |
| Paint and lamp rooms                                   | B II                  | one outside space in vicinity of exit.                  |
| Accessible baggage, mail, specie rooms, and storerooms | A II                  | one for each 2,500 square feet.                         |
| Carpenter shop and similar spaces                      | A II                  | one outside the space in vicinity of exit.              |
| Internal combustion propelling machinery spaces        | B II                  | one for each 1,000 BHP, but not less than two.          |

## APPENDIX B

## WILLIAMSON TURN

The Williamson turn consists of putting the rudder hard over towards the side from which the man fell overboard while maintaining normal cruising speed. As the vessel's head approaches  $60^\circ$  from the original course, the rudder is reversed and the vessel circles and steadies on the reciprocal of the original course. As soon as the vessel steadies on the reciprocal course, the engines are stopped and the vessel will drift to approximately the position at which the person fell overboard. Vessels using this maneuver at normal cruising speeds report that it is effective in various conditions of wind and sea although it requires more time than backing down or circling. The advantages of the Williamson turn during darkness or reduced visibility are obvious.

A recent proposal for improvement of the man overboard procedure advocates the use of a raft or a float. If dropped overboard immediately after the alarm is sounded, it provides a larger marker for the vessel to return to as well as a haven for the individual in the water to swim to. Thus, both vessel and person in water will be aiming for the same point. The vessel will have a better reference point and the individual a resting point. The vessel can keep its searchlight on the float at night, as a guide for both vessel and person in water.

## APPENDIX C

## EMERGENCY PROCEDURES

1. Fire - Master shall take appropriate action, including:
  - a. Sound general alarm (if provided).
  - b. Maneuver vessel to minimize effect of wind on fire.
  - c. Secure ventilation (hatches, doors, ports and fans).
  - d. If unable to control fire, immediately notify the Coast Guard and other vessels in the vicinity.
  - e. Move personnel away from the fire (upwind), have them don life preservers, and prepare to abandon ship.
  
2. Collision/Grounding - The Master is responsible for the overall administration, organization and preparedness of the crew to cope with collision/grounding damage. The Master shall also assure that appropriate crew members are well versed in the use of radar, radar plotting (if installed), Rules of the Road, navigation, and good seamanship as related to the prevention of collisions.
  - a. If a collision/grounding is imminent, the following emergency procedures (where applicable) will be taken in addition to others as directed by the Master:
    - i. Sound alarm.
    - ii. Close watertight doors and secure ventilation.
    - iii. Survey damage area and set secondary flooding boundaries.
    - iv. Conduct rescue maneuvers.
    - v. Fix vessel's position.
    - vi. Send radio report.
  
3. Man Overboard - Master shall on receiving a man overboard report, initiate the following actions:
  - a. Maneuver as necessary to avoid the person in the water (throw stern away from man overboard).
  - b. Throw ring life buoy(s) over the side person fell overboard. At night use ring life buoy with water light attached.

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c. Drop man overboard signal marker (other smoke distress signals and/or sea dye markers may also be used during daylight).

d. Sound man overboard alarm.

e. Station lookouts to locate and keep the individual in the water in sight.

f. Maneuver as necessary and approach directly coming right around or backing down. When person cannot be seen, or at night, use the Williamson turn (Appendix B).

g. Utilize searchlight at night and train it continuously on ring life buoy, raft or other floating object to provide a reference point toward which person can swim and cling to.

h. Have crew member put on lifejacket, equipped with a safety line, standby to jump into the water to assist the person overboard if necessary.

i. If person is not immediately located notify Coast Guard and other vessels in vicinity by radiotelephone.

j. Continue search until release by Coast Guard.

APPENDIX D

References

Code 46

|           | <u>Inspection &amp; Certification</u> | <u>Construction</u> | <u>Stability</u> | <u>Life Saving</u> |
|-----------|---------------------------------------|---------------------|------------------|--------------------|
| Sections  | 361                                   | 363                 | 85a              | 363                |
|           | 362                                   | 367                 | 88a              | 367                |
|           | 363                                   | 391                 | 363              | 391                |
|           | 366                                   | 392                 | 367              | 392                |
|           | 367                                   | 404                 | 391              | 404                |
|           | 391                                   | 481                 | 392              | 481                |
|           | 392                                   | 482                 | 404              | 526P               |
|           | 395                                   |                     | 481              |                    |
|           | 404                                   |                     | 482              |                    |
|           | 405                                   |                     | 483              |                    |
|           | 411                                   |                     |                  |                    |
|           | 435                                   |                     |                  |                    |
|           | 481                                   |                     |                  |                    |
| Code 50 - | 198                                   | 50 - 198            | 50 - 198         | 50 - 198           |

|         | <u>Fire Prevention</u> | <u>Vessel Control</u> | <u>Operations</u> |
|---------|------------------------|-----------------------|-------------------|
| Section | 363                    | 363                   | 363               |
|         | 367                    | 307                   | 367               |
|         | 391                    | 395                   | 391               |
|         | 392                    | 391                   | 392               |
|         | 395                    | 392                   | 395               |
|         | 404                    | 404                   | 404               |
|         | 481                    | 435                   | 435               |
|         | 526P                   |                       |                   |
|         | 50 - 198               | 50 - 198              | 50 - 198          |

Title 46 has 599 parts USCG - Shipping  
 47 has 299 parts Telecommunications  
 50 has 499 parts Wildlife and Fisheries  
 42 has 499 parts Public Health  
 33 has 499 parts Navigation and Navigable H<sub>2</sub>O's

## APPENDIX E

Index of Required Items for Various Vessels

|                              | Small<br>Craft |      |      |   |   | Motor<br>vessels |
|------------------------------|----------------|------|------|---|---|------------------|
|                              |                | A    | 1    | 2 | 3 |                  |
| Documents                    |                |      |      |   | X | X                |
| Operating Manual             |                |      | X    | X | X | X                |
| General Arrangement Plan     |                |      |      |   | X | X                |
| Markings                     | X              | X    | X    | X | X | X                |
| Life Boats                   |                |      |      |   |   | X(1)             |
| Life Rafts                   |                |      |      |   |   | X(2)             |
| Life Preservers              | X              | X    | X    | X | X | X                |
| Work Vests                   |                |      | X    | X | X | X                |
| Ring Life Buoys              |                |      |      | X | X | X                |
| Signal Flag                  | X              | X    |      |   |   |                  |
| Watertight Flashlight        | X              | X    |      |   |   |                  |
| Oars/Paddles                 | X              | X    |      |   |   |                  |
| Bailer                       | X              | X    |      |   |   |                  |
| Anchor(s)                    |                | X    | X    | X | X | X                |
| Pyrotechnics                 |                | X(3) | X(3) | X | X | X                |
| Fire Extinguishers           |                |      | X    | X | X | X                |
| Fixed CO <sub>2</sub> System |                |      |      |   |   | X                |
| Fire Pumps                   |                |      |      |   | X | X                |
| EPIRB                        |                |      |      |   | X | X                |
| First Aid Kit                | X              | X    | X    | X | X | X                |
| Stretcher                    |                |      |      |   |   | X                |
| Log Book                     |                |      |      | X | X | X                |
| Stability Data               |                |      | X    | X | X | X                |
| Station Bills                |                |      |      | X | X | X                |
| Drills                       |                |      |      | X | X | X                |
| Radio                        |                |      |      |   | X | X                |

(← See Section VI, 9, a →)

- X - required
- (1) - if required
- (2) - substitute
- (3) - when practical