U.S. Department
of Transportation

**Federal Aviation
Administration**

AC 91-69A
Date: 11/19/99

Seaplane Safety for 14 CFR Part 91 Operators

SEAPLANE SAFETY
FOR 14 CFR PART 91 OPERATORS

FOREWORD

This Advisory Circular (AC) contains recommendations and revised information for the safe operation of seaplanes operated under Title 14 of the Code of Federal Regulations (14 CFR) part 91. This AC is intended to be operational advisory material and has been produced in a size and format that makes it easily added to pilot flight manuals or carried in flight cases. This AC does not change agency regulations and does not authorize deviation from regulatory requirements.

/s/
L. Nicholas Lacey
Director, Flight Standards Service

CONTENTS

SEAPLANE SAFETY FOR 14 CFR PART 91 OPERATORS

1. PURPOSE.

a. This Advisory Circular (AC) provides revised information to Title 14 of the Code of Federal Regulations (14 CFR) part 91 seaplane operators regarding seaplane preflight, oral briefings for seaplane passengers, the use of safety belts and shoulder harnesses in seaplanes, escape/egress after capsizing, water survival, and flotation gear for seaplane occupants. This AC generally covers seaplanes engaged in not-for-hire operations. Most for-hire seaplane operations are subject to 14 CFR part 135, as well as part 91.

b. The Federal Aviation Administration (FAA) recommends that seaplane operators engaged in not-for-hire operations equip their aircraft with FAA or U.S. Coast Guard (USCG)-approved inflatable personal flotation devices (PFD).

(1) For-hire operators must use FAA-approved inflatable PFD's. A PFD should be worn by each occupant while on the seaplane.

(2) The FAA also recommends that the pilot in command (PIC) brief passengers on the location and use of flotation gear and the location and operation of each normal and emergency exit.

2. CANCELLATION. Advisory Circular 91-69, Seaplane Safety For FAR Part 91 Operators, dated March 13, 1992, is canceled.

3. RELATED CFR SECTIONS. Sections of 14 CFR part 91 that are related to the information in this AC are sections 91.105, 91.107, 91.115, and 91.205. Title 49 CFR part 175, section 175.310, contains information regarding the transportation of flammable liquid fuel in small, passenger-carrying aircraft.

4. DEFINITIONS. In this AC, ***seaplane*** refers to an airplane on floats (amphibious or nonamphibious) or a flying boat (water-only or amphibious).

5. RELATED READING MATERIAL. Readers may find additional information related to the subject of this AC listed below.

a. Current editions of the following AC's may be obtained at no cost by sending a written request to U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785:

(1) AC 120-47, Survival Equipment for Use in Overwater Operations.

(2) AC 121-24, Passenger Safety Information Briefing and Briefing Cards.

(3) AC 150/5210-13, Water Rescue Plans, Facilities, and Equipment.

b. Current editions of the publications below may be purchased from: New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

(1) FAA-H-8083-3, Airplane Flying Handbook.

(2) COMDTINST M16672.2B, Navigation Rules, International-Inland.

(3) Aeronautical Information Manual: Official Guide to Basic Flight Information and Air Traffic Control Procedures.

6. BACKGROUND.

a. For-Hire Operations. For-hire operations are subject to additional regulatory requirements, even if they are permitted to be conducted only under part 91. While most for-hire operations will be covered by both part 91 and part 135, some operations may be permitted to operate only under part 91 pursuant to an exception provided in 14 CFR part 119, section 119.1(e). In any event, section 91.205(b)(12) also applies to an aircraft operating in a for-hire capacity when it is over water and beyond power-off gliding distance from shore. Each person operating a civil aircraft for-hire must provide at least one pyrotechnic signaling device and have FAA-approved flotation gear readily available to each occupant (section 91.205(b)(12)). Aircraft operations subject to part 135 also require a preflight briefing on the use of flotation gear and exiting the aircraft in an emergency (section 135.117(a)(4)). As indicated above, the FAA recommends that seaplane operators engaged in not-for-hire operations under part 91 also conduct such preflight briefings.

b. Status of Seaplanes as Vessels. USCG's Navigation Rules, International-Inland, provides the following definition: "The word 'vessel' includes every description of water craft, including nondisplacement craft and seaplanes, used or capable of being used as a means of transportation on water." Therefore, a seaplane is a vessel once it lands on the water and, as such, is required to comply with the USCG navigation rules applicable to vessels. Adherence to section 91.115 should ensure compliance with the USCG rules.

7. SEAPLANE PREFLIGHT. All PIC's, including those operating within the territorial waters of the U.S. coast, are responsible for taking preflight action consistent with section 91.103. Additionally, in order to comply with the requirements in section 91.7 (Civil aircraft airworthiness), the PIC is responsible for determining whether the aircraft is in a condition for safe flight. One means of assuring compliance with section 91.7 is for the PIC to make sure a thorough preflight inspection of the aircraft is conducted. With some exceptions, the preflight inspection of a seaplane is similar to that for a landplane. The major difference is checking the floats or hull. The airplane flight manual (AFM), pilot's operating handbook (POH), or manufacturer's recommendations will contain procedures for doing this in addition to the usual preflight actions, such as fuel sumping, fuel quantity, engine oil quantity, control checks, etc.

a. Some operators haul seaplanes out of the water for dry land storage on a trailer or raft, making preflight more convenient for the pilot. However, the pilot should **not** conduct an abbreviated inspection just because a seaplane is preflighted while in the water.

b. The pilot should first note how the seaplane rides in the water. If the stern of the floats or hull is very low in the water, i.e., float stern submerged or, in a flying boat, tail in the water, the seaplane could be loaded incorrectly, or there could be a leak in a float compartment or in the hull. This is why manufacturers recommend that floats and hulls be inspected and bilge-pumped before each flight.

(1) The pilot should first inspect floats and hulls for obvious or apparent defects or damage, such as dents, cracks, deep scratches, loose rivets, corrosion, separation of seams, punctures, and general condition of the skin. This might also be a good time to inspect the fuselage for damage. Ensure that the airframe/float combination and attachments are approved for use on the seaplane.

(2) Because of the rigidity of float installations, the pilot should check fittings, wire or tubular bracing, and adjacent structures for cracks, defective welds, proper attachment, alignment, and safety wires and nuts.

(3) Pilots should check all hinge points for wear and corrosion, particularly if the seaplane operates on salt water.

(4) The pilot should inspect the water rudders, if installed, and their cables and springs for free and proper movement. Special attention should be paid to the area where cables go over pulleys, and the pilot should inspect the cable for fraying.

(5) The pilot should pump out each bilge or compartment of a float or the hull to remove water. A small amount of water, e.g., a cupful, is not unusual and can occur from condensation or normal seepage. (If the bilge pumps out no water, it is more likely that the pump itself, or the tube leading to the bilge, is defective.) All

water should be removed before flight by pumping or with a sponge because the water may critically affect the seaplane's weight and its center of gravity. Finding an excessive amount of water should cue the pilot to look for the source of the leak. If drain plugs and inspection plates are installed, the pilot should use a systematic method (refer to manufacturer's recommendations) to remove the plugs and plates and examine the compartments thoroughly. Of course, it is equally important to reinstall the plugs and plates systematically before a water takeoff.

(a) Some floats are equipped with a bilge funnel which does not require the removal of a cover to pump the bilge. However, if the funnel becomes disconnected from the hose that goes to the bottom of the float, the pump will not pump any water, and there may still be water in the float. The answer is to be suspicious if no water emerges when bilging after the seaplane has spent an extended time on the water or in storage.

(b) Floats stored in freezing climates should be inspected particularly closely because water in the floats expands upon freezing. Frozen water in compartment seams can cause severe leakage problems. Many operators who store the floats off the airplane for a season put them away upside down with compartment covers off to allow drainage. It might also be a good idea to look for any creatures that might have made a home in the floats.

(6) The pilot should ensure that nothing is stored in compartments of floats not approved for storage. For those floats approved for storage of items, the pilot must ensure that the contents and their placement allow the seaplane to remain within its weight and balance limitations. Another consideration is that floats are certificated to continue to float after two compartments per float have been flooded. The potential for capsizing or sinking is increased where compartments are at their limit for storage and other compartments become filled with water after accident damage. Pilots should be aware that float compartments have no ventilation. It is extremely dangerous and illegal to carry a container of fuel anywhere fuel vapors could accumulate. Title 49 CFR section 175.310 specifies the manner in which fuel must be transported by air. It permits limited amounts of flammable liquid fuel to be carried on board airplanes for use in remote areas, provided it is carried in closed metal containers that meet the specifications prescribed in section 175.310.

NOTE: Pilots transporting flammable liquids under this section must assure that their operation is not-for-hire; otherwise, they would be required to complete the training specified in 49 CFR sections 172.700-704.

(7) Pilots should be careful when carrying external cargo and should follow the manufacturer's recommendations regarding such carriage. If the manufacturer does not permit it, then the pilot should not either. Because of their bulk or size, certain items may not be able to be loaded in the cabin of small aircraft. Floats, because of their size, make a useful platform for carrying items that are too

large to fit into the cabin. However, certain precautions must be taken to ensure safety of flight. Items must be placed to ensure compliance with weight and balance limitations. The weight should be equally distributed on both floats, items should be aft of the propeller arc, and the weight of any external cargo should be included during the weight and balance calculations. Finally, external loads must be properly secured to the aircraft in a manner that does not block the emergency exits.

8. PASSENGER BRIEFINGS.

a. Background. From the standpoint of passenger survival in seaplanes, an upset or capsizing from accidental water contact--whether it is a float or a wingtip or an encounter with a large wave or landing gear down on amphibious floats--is the most critical type of occurrence. This is because of the lack of time to prepare for evacuation and the likelihood of major cabin structural damage from impact with the water. During such a crisis, the pilot may be too busy coping with the problem to give instructions beyond the order to evacuate. Furthermore, if the pilot becomes incapacitated in an emergency, it is important for the passengers to know what to do and how to do it without additional prompting from the pilot. Since seaplanes tend to come to rest inverted in water accidents or incidents but can remain afloat for long periods if the floats are not breached, ***the FAA cannot stress enough the importance of a thorough preflight passenger briefing, even when one is not required.*** (Although this AC suggests topics to cover in such a preflight briefing, the pilot should also consult the POH or AFM for any special evacuation procedures.) Evacuation of a seaplane creates a few problems not associated with a landplane; therefore, passengers need to know the location and operation of normal and emergency exits, flotation gear, seatbelts, and shoulder harnesses, etc. The PIC is directly responsible for and is the final authority for the safe operation of an aircraft. Being "directly responsible" may also include responsibility for passengers carried in that aircraft in the event of an accident or incident.

b. Presentation. The pilot should present the pretakeoff oral briefing preferably before engine start so passengers can easily hear it and easily see the actual or simulated demonstrations. Pilots should speak clearly and distinctly and physically point out and explain the operation of both normal and emergency exits and any safety equipment on board. Whenever possible, pilots should demonstrate the use of safety equipment and both normal and emergency exits. When a demonstration is impractical, such as demonstrating the actual inflation of flotation gear, the pilot should simulate the actions involved as closely as possible. The FAA Aviation Safety Program has produced an excellent series of videotapes including one that addresses passenger briefings for seaplane operators. Please contact the Aviation Safety Program Manager at your local Flight Standards District Office (FSDO) to view a copy of this videotape.

c. Pretakeoff Briefing. Before each takeoff, the pilot should orally brief all passengers on each of the following:

(1) When, where, and under what conditions passengers may smoke and when smoking materials must be extinguished.

(2) How to fasten, tighten, and unfasten the safety belt and shoulder harness (if installed) without looking at the mechanism, and how to stow the loose end of the seatbelt so that the loose end does not hinder opening the seatbelt in the event of capsizing.

(3) How to recognize, by feel, seatbelt rollover and that the buckle, in this condition, must be righted so it can be opened.

(4) How to operate seats, forward and backward, to enhance egress.

(5) That the seat back should be upright for takeoff and landing.

(6) The location of each normal and emergency exit.

(7) The operation of each normal and emergency exit by explanation and demonstration, if practical.

(8) To leave carry-on items behind in the event of an evacuation in the water.

(9) To establish "situational awareness." During the preflight briefing, the pilot should help passengers establish a definite frame of reference, such as left hand on the left knee or left armrest or right hand toward the direction of the exit. Once they have established situational awareness, passengers can use a "hand-over-hand" technique to make their way to an exit when the pilot gives the evacuation order; e.g., "Exit through the left rear door," or "Exit right side." Using positional and situational awareness and the "hand-over-hand" technique decreases the possibility of becoming disoriented. The pilot should stress the point that whether a passenger is upright or inverted, left and right are still the same; i.e., if the exit is on the passenger's right while upright, it will still be on the passenger's right if inverted. The pilot should also be sure to make all directional references to the passenger's right or left, **not** the pilot's. Pilots should advise passengers if the door handle on the inside of the airplane will work in reverse when they are upside down and that, when the door is closed and locked as in flight, the door may not be able to be opened from the outside.

(10) The following various aspects of flotation gear:

(a) If using flotation cushions, the pilot should brief on the type, location, and how to use in the water, including a physical demonstration, if possible; e.g., how to insert arms through the straps and rest the torso on the cushion once in the water and **not** to wear the cushion on one's back.

(b) If using some form of PFD, the pilot should brief on the type, location, and use of the available PFD, including a demonstration of how to don the device and a simulated demonstration of how to inflate an inflatable device either by carbon dioxide (CO_2) or by oral or manual methods **after** entering the water. ***The pilot must emphasize that an inflatable PFD should NOT be inflated until clear of the wreckage after exiting the aircraft since these devices can easily get hung up on wreckage, block an exit, or prevent a passenger from exiting an inverted seaplane.*** An inflated PFD that becomes damaged because of punctures caused by contact with the wreckage or snagged on debris, may be rendered useless.

NOTE: The FAA suggests that operators consider establishing a policy where all occupants wear an inflatable PFD anytime the seaplane operates on or near the water.

(11) The use and operation of any fire extinguishers on board, location of survival gear--including the Emergency Locator Transmitter (ELT) and pyrotechnic signaling device (flares)--an appropriate brace position, and the proper location for carry-on items.

(12) Seaplanes are dangerous at both ends. Exercise extreme caution when around the propeller and the elevator. Serious injuries, amputations, and death have resulted from propeller strikes and the horizontal stabilizer when unwary passengers attempt to help in the launching or docking of a seaplane. The elevator balance weight on many seaplanes is an effective finger guillotine. In the preflight briefing ***pilots should instruct passengers not to assist unless specifically requested to do so by the pilot.*** If the pilot anticipates needing passenger assistance, the pilot should provide specific instructions on the passenger's duties, including a precaution about avoiding the spinning propeller, and how to properly handle the horizontal stabilizer.

d. Passengers Needing Assistance. The pilot should individually brief a passenger who may need assistance in exiting. The briefing should include all of the above information and who will be assisting the passenger to exit. If the passenger is accompanied by an attendant, the pilot should brief both the passenger and the attendant on the above information, including the most appropriate route to an exit, when to move toward the exit, and the most appropriate manner of assisting the passenger.

e. Prelanding Briefing. At a minimum before each landing, the pilot should ensure that all passengers have been briefed to fasten seatbelts and shoulder harnesses (if installed), place seat backs in the upright position, and stow carry-on items.

9. USE OF SEATBELTS AND SHOULDER HARNESSES IN SEAPLANES.

a. Seaplanes are subject to the seatbelt and shoulder harness requirements of section 91.107. Unfortunately, takeoff and landing are the phases of flight where improper pilot technique or water or wind conditions could result in a capsized seaplane. The shock of entering cold water and being inverted while strapped into a seat can cause panic in passengers. That is why the preflight briefing on seatbelt operations is very important. The FAA is aware that some operators have passengers leave seatbelts unfastened or loosened during any type of water taxiing to position for takeoff or after landing. Both of these practices are prohibited under FAA regulations.

b. Pilots are reminded that section 91.105(a) requires them to keep their seatbelt fastened during takeoff, landing, and while en route when at the crewmember station unless an absence is necessary to perform duties in connection with the operation of the aircraft. Section 91.105(b) requires pilots to keep their shoulder harness, if installed, fastened during takeoff and landing. However, section 91.107(a)(3) provides that the person pushing off the seaplane from the dock and the person mooring the seaplane are excepted from the requirement to be seated in an approved seat and secured with a seatbelt.

10. ESCAPE/EGRESS IN THE EVENT OF AN UPSET IN THE WATER.

a. Accident History. A review of past seaplane accidents on the water indicates that the pilots and passengers in inverted aircraft often survived the impact but were unable to evacuate the aircraft under water and subsequently drowned. In some cases, passengers were unable to unfasten their seatbelts, and, consequently, their bodies were discovered with little or no impact injuries still strapped to the seats. In other cases, passengers were able to get out of their seatbelts but were unable to find an exit and/or open the exit because of impact damage or ambient water pressure. Those who did survive generally spoke of the extreme disorientation and that they did not exit in what may be considered a normal procedure; i.e., they did whatever they had to in order to get out of the aircraft.

(1) Opening a door under water can be extremely difficult, and some operators adopt the practice of water taxiing with one door open at all times to permit easier egress. However, operators should check the POH or AFM for evacuation procedures since, in the event of capsizing, this practice could lead to the cockpit and cabin flooding sooner and sinking the seaplane faster.

(2) In many cases, pilots exited relatively easily through a smashed cockpit windshield or the cockpit door and seemed to have less difficulty evacuating the seaplane because of their familiarity with it. Passengers, on the other hand, often do not have a thorough knowledge of their surroundings. Investigations of evacuations of air carrier aircraft have shown that passengers tend to want to exit through the door where they entered. It is likely this would hold true even for a small

seaplane because where the passenger entered might be the only familiar frame of reference in an emergency.

(3) In some of the accidents where pilots survived and passengers did not, investigation revealed that pilots had met the requirements of section 91.107 but did not go beyond that; i.e., did not brief passengers on how to exit in an emergency, on the location, donning, and inflation of a PFD, and on the procedures for an underwater exit of the aircraft. There were accidents where the pilot was injured or killed and could not assist passengers in an underwater evacuation. Therefore, ***a comprehensive preflight briefing, although not a regulatory requirement, can provide critical information to passengers so that they can help themselves.*** The information in that preflight briefing could make the difference between a successful evacuation and being trapped inside a submerged seaplane.

b. Evacuation. The pilot should ***never*** take for granted that people already know how to exit the seaplane. After an accident, and especially while submerged inverted in water, the passengers are likely to panic, but they will usually defer to what the pilot instructs. In their eyes, the pilot knows what to do.

(1) The pilot should keep commands simple and concise, since it is likely that passengers will cease to listen much beyond the initial order to evacuate. Passengers respond to very short instructions, i.e., “stop,” “leave it,” and “come here.” Pilots should issue commands and make decisions in a positive, confident, and expeditious manner.

(2) Being upside down can cause orientation problems. Once the turbulence of the upset has subsided, even though the pilot may have briefed passengers on situational awareness before takeoff, the pilot may still need to help passengers establish positive situational awareness so that they can determine left from right.

(3) Maneuvering while holding flotation devices can also be disorienting because it occupies the hands, making swimming or treading water difficult. This adds to the argument for wearing an inflatable PFD. However, it is important to remember ***not to inflate the PFD until after exiting the seaplane.*** It is virtually impossible to swim downward to an exit (from an inverted position) with an inflated PFD. Any preflight briefing on the use of inflatable PFD's should include this vital point.

(4) Impact forces may jam normal or emergency exits and prevent them from operating. Pilots should be prepared to, and have briefed passengers to be prepared to, break out or kick out windows in order to escape. In many instances, this may be the only option for evacuation and everyone on board should plan to use this technique if necessary.

11. WATER SURVIVAL. Successful egress from an inverted seaplane into the water is only the beginning of the survival process. The pilot may be the only person who understands the effects of cold water, even water only a few degrees cooler than normal body temperature, on the human body. Seaplane accidents that occur even on small bodies of water may mean a wait for rescue, especially if the location is remote. Furthermore, even if the evacuees make it to shore fairly quickly after submersion, they may still be at risk for hypothermia if the outside temperatures are cold and the evacuees do not have access to dry clothing or shelter. Especially for seaplanes operating into remote areas, operators should consider stocking the seaplane with survival gear appropriate for the operation. The survival kit should be assembled in one container that is leak proof, easily accessible, and floatable. Some Alaskan and Canadian operators attach a rope and a float to the survival kit to allow for easier recovery once everyone has exited the aircraft. This has proved quite successful in emergency situations in some of North America's harshest terrain. Pilots are advised that some states and other countries require survival equipment appropriate for the geographical area, the season of the year, and anticipated seasonal climatic variations. Pilots should familiarize themselves and comply with these requirements before flight. Seaplane operators should include provisions for shelter, water, fire, and signaling when considering what equipment to include in a survival kit. They should also emphasize the need for passengers to wear appropriate survival gear, e.g., good shoes and clothing. Also, if the weather is cool enough to wear a coat, it should be a coat that will still maintain insulating properties after being submerged. Also, anything you wear on board the seaplane should not be bulky enough to hinder escape through an aircraft window. Section 91.509 specifies the operations for survival equipment for overwater operations for large and turbine-powered multiengine airplanes.

a. Hypothermia. Cold water (less than 70°F) lowers body temperature rapidly, creating a condition called ***hypothermia***. Hypothermia means that the body's inner core temperature has begun to descend significantly below the body's norm of 98.6°F. A drop of only 3° or 4° in body temperature could overload the heart, impair circulation, and lead to irreversible brain damage. (Hypothermic persons still in the water generally lose consciousness and drown before these effects can occur.)

(1) Even though a person may be wearing a life jacket-type PFD, the body cools down about 25 times faster in cold water than in cold air. Water temperature, body size, amount of body fat, and movement in the water are all factors that play a part in how quickly a person becomes hypothermic and, therefore, in that person's survival. Generally, small people cool down faster than larger people; children cool down faster than adults.

(2) Flotation gear can help a person stay alive longer in cold water because it allows the person to float without expenditure of energy; i.e., the person's movement in the water can be used exclusively for moving toward shore rather than trying to stay afloat. Flotation gear also protects the upper torso somewhat from the

effects of cold water. For example, a snug-fitting life vest would be more effective in keeping the upper torso warm than a loose-fitting one or a seat cushion used as flotation gear.

(3) Because any activity not necessary for survival will quicken the body's heat loss, before takeoff pilots should instruct their passengers that in the event of an accident, they should assume the "Heat Escape Lessening Position" while awaiting rescue. This position may be used in the water or land and reportedly will reduce the body's heat loss by 50 percent. The position is assumed by holding your arms tightly to the sides of the chest, crossing the forearms over the chest, and drawing up the legs and crossing them at the ankles. This position closes off most major heat loss areas. If there are several people involved, huddling close, side to side in a circle, will also help preserve body heat.

b. Effects of Hypothermia. The exact nature of the hypothermic process is not yet fully understood. The following table provides some indication of onset of unconsciousness and the expected time of survival in water of specific temperatures.*

Water Temperature in ^{o} Fahrenheit	Exhaustion or Unconsciousness	Expected Time of Survival
Up to 32.5°	Under 15 minutes	15 to 45 minutes
32.5° to 40°	15 to 30 minutes	30 to 90 minutes
40° to 50°	30 to 60 minutes	1 to 3 hours
50° to 60°	1 to 2 hours	1 to 6 hours
60° to 70°	2 to 7 hours	2 to 40 hours
70° to 80°	2 to 12 hours	3 hours to indefinitely
Over 80°	Deferred indefinitely	Indefinitely

**Information from Underwriters Laboratory, Inc.*

c. Handling Victims of Hypothermia. A hypothermic person requires special attention, and rescue personnel (this could be the operator's personnel who have no medical training) should be aware of the following guidelines on how to handle victims of hypothermia.

(1) Lack of movement does not mean dead. Rescue personnel should make no assumptions based only on the victim's appearance, touch, or absence of a discernible pulse or breathing. In deep hypothermia, it is not always possible to make an onsite determination whether a person is still alive. Some medical experts believe that deep hypothermia places the body in a state similar to hibernation, where brain and other organ functions become depressed, therefore requiring less oxygen from a reduced blood flow. Some victims have been revived, but the extent of injury or damage from the hypothermia has varied.

(2) Rescuers should **not** warm the victim externally, such as by immersion in warm water or by applying heat directly to the body. Rescuers should cover exposed skin with a blanket and provide shelter but should avoid abrupt temperature changes in the victim's immediate environment. The rescuers should arrange for transport to a medical facility as soon as possible.

12. FLOTATION GEAR FOR SEAPLANES. As stated above, one of the purposes of this AC is to suggest that seaplane operators who are not engaged in for-hire operations provide flotation gear for occupants any time a seaplane operates on or near water. The following paragraphs will discuss the various requirements of the FAA and the USCG for the types of flotation gear. Operators must bear in mind that seaplane operations pose unique ingress/egress situations in which a non-inflatable, USCG-approved PFD, because of its bulkiness, could restrict or impair exiting the seaplane. For this reason, the FAA recommends the use of FAA or USCG-approved, inflatable PFD in not-for-hire operations. For-hire operators must use FAA-approved PFD.

a. USCG Requirements. Title 33 CFR part 175, section 175.15 (USCG regulation), requires a PFD for each occupant on all vessels, but this does not include seaplanes. A seaplane is exempt from the USCG safety equipment requirements, including the requirements for USCG-approved PFD's. Requiring seaplanes on the water to comply with USCG equipment requirements in addition to the FAA equipment requirements would be an unnecessary burden on seaplane owners and operators. However, many states have statutes requiring PFD's to be carried on board vessels operating on any inland body of water for which the USCG has no jurisdiction. Navigable bodies of water may come under Federal, State, or local jurisdiction or, in a few cases, may be privately owned.

b. FAA Requirements. Section 91.205(b)(12) requires approved flotation gear for aircraft operated for-hire over water and beyond power-off gliding distance from shore. FAA approves life preservers under Technical Standard Order (TSO) C13f and individual flotation devices under TSO C726. In addition, section 91.509 specifies the requirements for survival equipment for overwater operations for large and turbine-powered multiengine airplanes.

(1) At one time, FAA-approved gear differed substantially from that required for navigable waterways under USCG rules. FAA-approved life preservers

are inflatable designs as compared to the USCG's inherently buoyant PFD's that may consist of solid, bulky material. Such USCG PFD's are impractical for seaplanes and other aircraft because they may block passage through the relatively narrow exits available to pilots and passengers. In 1995, the USCG adopted structural and performance standards for inflatable PFD's used on recreational boats. These PFD's are intended for general boating activities by adults and on inland waters, or where there is a good chance of a fast rescue. However, USCG-approved inflatable PFD's are **not** for use by **children** younger than 16 years of age or by persons weighing less than 80 pounds, not recommended for nonswimmers or weak swimmers (unless worn **inflated**), and not for water sports like skiing or for personal water craft use. Therefore, the FAA recommends that seaplane operators who are not engaged in for-hire operations use the FAA's TSO life preservers or individual PFD's.

(2) Life preservers approved under TSO C13f contain fully inflatable compartments. The wearer inflates the compartments primarily by independent CO_2 cartridges with an oral inflation tube as a backup. This flotation gear also contains a water-activated, self-illuminating signal light. The fact that pilots and passengers can easily don and wear inflatable life preservers (when not inflated) provides maximum effectiveness and features an uncluttered exterior surface that protects the working components and allows for unrestricted movement.

c. Buoyancy. The buoyancy in a flotation device must be distributed so that if the wearer is unconscious or disoriented in the water, the device will "self-right" the wearer; i.e., if the wearer is face down in the water, the distribution of the buoyant material in the device will "turn" the wearer face up. This is another important reason why pilots should demonstrate or supervise the proper donning of the device so that wearers will not put the device on improperly and defeat this self-righting ability. The TSO C13f life preservers have excellent self-righting capabilities.

d. Flotation Gear Maintenance. Lifesaving equipment must be maintained in serviceable condition in accordance with the manufacturer's recommendations. Any FAA-approved flotation gear used in operations for compensation or hire must be inspected at least every 12 months by persons authorized by 14 CFR part 43. This inspection would be included in the annual or 100-hour inspection for the aircraft or under any other inspection program that the operator is authorized to use.

e. Wearing of Flotation Gear During all Phases of Flight. When a standard marine life jacket or FAA-approved life preserver stored in a pouch is tucked unrestrained under a seat, it could be thrown or tossed from the seaplane with other debris in the event of an accident or capsizing. In this case, the flotation gear becomes ineffective for swimmer and nonswimmer alike. Furthermore, life jackets in sealed pouches can be awkward to remove and don in a flooded aircraft. When a survivor attempts to put on a jacket in the water, it may be difficult to find and fasten its straps and hooks. It would take considerable effort to accomplish the combined

maneuver of pulling a life jacket over one's head while in the water trying to stay afloat. If a life preserver is not worn before flight, it is practically impossible for a survivor with an injured arm, for example, to don the life preserver in time for it to be effective for survival. Wearing an ***uninflated*** TSO C13f life preserver at all times in the seaplane and inflating it only ***after exiting the seaplane*** would seem to be the best protection.

f. Types of PFD's. There are various types of inherently buoyant and inflatable, USCG-approved PFD's categorized by type and intended use. The USCG has indicated the advantages and disadvantages of each. To obtain information, go to the following URL: http://www.uscg.mil/hq/g%2dm/mse4/pfd.htm. If you do not have Internet access, contact your local FAA FSDO, which can print the information out for you, or contact the USCG Auxiliary.

g. The USCG regulations allow for the approval of PFD's that inflate automatically when the inflation mechanism contacts water. Please keep the following in mind regarding USCG-approved inflatable PFD's:

(1) Type I and Type II inflatable PFD's have a higher minimum buoyancy than a Type III PFD. They will out perform a Type III PFD that does not exceed the USCG minimum requirements.

(2) Some automatics will allow the user to disarm the automatic portion of the inflation mechanism.

(3) If the user improperly disarms the automatic portion of the inflatable PFD, he/she might also disarm the manual portion.

(4) Wearing a PFD with the automatic portion armed would most certainly put passengers at risk of being trapped in the airplane or damaging the PFD, rendering it unusable.

(5) If the device is to be used in both a seaplane and a boat, then the device must be rearmed for boating.

h. Other Water Survival Equipment. Dive shops and marine equipment retailers offer many types of supplemental water survival equipment. Among these are buoyancy compensatory belts and small, compact alternate air source containers used by scuba divers as a backup to their regular air tanks. These containers were originally developed for military helicopter crews, can hold up to 4 minutes of air, and are relatively lightweight and easy to stow. Four minutes of breathable air could provide pilots and passengers with some extra time to don lifejackets and exit an overturned seaplane that has flooded. Although these alternate air source containers may meet or exceed USCG requirements, they are not FAA-approved.

13. SUMMARY. The best time to know emergency procedures and the worst time to learn them is during an actual emergency. Inherently buoyant USCG-approved PFD's are usually impractical for most seaplanes and other aircraft because they may prevent people from exiting through doors or windows. The best protection is afforded when wearing inflatable life preservers. When wearing inflatable life preservers, pilots and passengers should always wait until clear of the seaplane before inflating. Finally, the best safety devices are useless without the proper preflight briefings and safety demonstrations.

APPENDIX 1. SAMPLE PASSENGER PREFLIGHT BRIEFING CHECKLIST

NOTE: This "checklist" is a guideline for pilots to use in conducting an oral preflight briefing of passengers. This list *should not* be used as a substitute for the briefing itself.

1. Smoking considerations: Where, when, and under what conditions.

2. Seatbelts/Shoulder harnesses: How to fasten, tighten, and unfasten; how to stow the loose end of the belt.

3. Seats: Operation forward and rearward; seat backs upright for takeoff and landing.

4. Exits: Location and operation (by demonstration) of each normal and, if applicable, emergency exit.

5. Carry-on items: Stowed properly and left on board during evacuation.

6. Situational awareness: Establish a frame of reference for left and right in relation to the aircraft exits; remind left and right are the same whether right side up or upside down. Bubbles always travel up.

7. Flotation gear:

    - Cushions: Type, location, use, and demonstration of use.
    - PFD's: Type, location, use, donning, and simulated demonstration of inflation.

8. Fire extinguishers: Location and how to operate.

9. Survival equipment: Location and how to retrieve.

10. ELT or Emergency Position Indicating Radio Beacon: Location and how to turn on.

11. Pyrotechnic signaling device: Location and how to use.

12. Brace position: Demonstration.

13. Heat Escape Lessening Position: Demonstration.

APPENDIX 1. SAMPLE PASSENGER PREFLIGHT BRIEFING CHECKLIST (Continued)

14. Propeller cautions: No assistance in docking/launching by passengers unless requested by pilot; if passenger assistance is required, specific instructions on duties, placement, and caution about propellers.

15. Passengers needing assistance: Briefed individually on all above topics including who will be assisting the passenger to exit; if passenger is accompanied by an attendant, brief both.

Be Safe - Wear Your PFD

Most drownings occur way out at sea, right? Wrong! Fact is, the USCG reports that 9 out of 10 drownings occur in inland waters, most within a few feet of safety. Most of the victims owned PFD's, but they died without them. A wearable PFD can save your life - if you wear it.

If you or your passengers haven't been wearing your PFD because of the way it makes you look or feel, there's good news. Today's PFD's fit better, look better, and allow easy movement. A brightly colored PFD can increase your chances of rescue.

One more thing: Before you take off, make sure all on board are wearing PFD's. To work best, a PFD must be worn with all straps, zippers, and ties fastened. Tuck in any loose strap ends to avoid getting hung up.

When you don't wear your PFD, the odds are against you. You're taking a chance on your life.

APPENDIX 2. INDEX