

**Walrus Research Operations Safety Plan:
HLY09-01**

Walrus Radio-tagging in the Bering Sea
USGS Alaska Science Center

Chadwick V. Jay, Project Leader
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Purpose: Attach satellite-linked radio-tags to walrus on sea ice in the Bering Sea.

Background: USGS has developed standard operating procedures (SOP) for radio-tagging walrus on sea ice (attached). USGS is the Federal Agency responsible for addressing research issues of walrus habitat use and walrus response to changing marine and sea ice conditions. Walrus telemetry studies require deployment of radio-tags using crossbows in the sea ice environment. The USGS SOP has been developed based on eight years experience tagging walrus on sea ice and over 25 years experience handling polar bears on sea ice. The USGS SOP has benefitted from direct field involvement of Siberian Yu'pik, Chukchi and Inupiat marine mammal hunters, as well as senior Russian and American walrus harvest biologists.

General Operation Plan: The USGS walrus tagging crew will approach walrus on sea ice and apply radio-tags using a crossbow system. Walrus are widely distributed. Helicopter support will enable walrus reconnaissance and the transport of the walrus tagging crew. If walrus are found adjacent to an oceanographic sampling station and conditions permit, the tagging crew may be deployed directly onto the ice from the USCGC Healy. If the ice conditions are unusually loose, walrus tagging may be conducted from Healy work boats. The primary, and quite possibly, the only method for walrus tagging will be conducted by helicopter because of anticipated heavy ice conditions.

Specific Operation Plans:

Helicopter Operations: Helicopter operations will comply with the policies of the USCG, with the Department of the Interior's Aviation Management, and with the USGS aviation policies.

Personal Protective Equipment:

Under the authority of the USGS aviation personal protective equipment (PPE) waiver (policy memo attached), the USGS tagging crews may elect to wear marine and arctic survival gear rather than fire resistant PPE.

Approach to walrus groups:

USGS is permitted to approach walrus groups for research purposes under the federal Office of Management Authority permit number MA801652-4. While flying reconnaissance, the helicopter will maintain an elevation above 1500 feet to minimize disturbing marine mammals. After spotting a walrus group in a situation suitable for tagging, the helicopter will circle around to a suitable landing zone down wind from the target walrus group. The helicopter pilot will remain with the aircraft and maintain radio contact with the tagging crew while the tagging crew conducts an on-ice approach. Upon completion of the tagging, the tagging crew will communicate with the helicopter pilot to either be picked up or to return to the waiting helicopter. The helicopter pilot will maintain 30-min radio checks with the Healy bridge during each mission.

On Ice Operations: While conducting tagging operations, the tagging crew will be outfitted sufficiently to ensure their safety and their ability to communicate for at least two days. This equipment will be provided by USGS except where noted below.

Personal Protective Equipment:

- Boat Crew Dry suit (Kokatat);
- USCG approved inflatable personal flotation device vest;
- arctic parka and clothing and marine arctic boots;

Survival and communication gear:

- marine hand-held VHF radios (one for each crew member);
- spare handheld GPS;
- Satellite telephone;
- GPS EPIRB;
- arctic marine survival gear (tarps, emergency food and water rations, and additional arctic clothing for each walrus crew member);
- USCG approved hand-held flares (provided by USCGC Healy);
- USCG approved rocket flares (provided by USCGC Healy);
- signaling mirrors;
- polar bear deterrent firearms (as required by Department of Interior safety protocols - attached);

Work Boats Operations: If the sea ice is broken and loose, work boats may be required to approach walrus groups for tagging. The USGS crew requests support from the Healy's small work boats for this operation. USGS understands that work boats employed for walrus tagging will be operated by a USCG boat operation crew and that the USCG will take steps to ensure the safety of all aboard the work boat. During transit to the sea ice in open water, the work boat will run on step. Once ice is encountered the workboat will be operated at displacement hull speeds to mitigate ice damage.

STANDARD OPERATING PROCEDURE
Remotely Attaching Satellite Radio-tags to Walruses with a Crossbow

USGS Alaska Science Center
4230 University Drive, Suite 201
Anchorage, Alaska 99508

MODIFICATION DATE: December 21, 2006
IACUC APPROVAL NUMBER: 06SOP05

SCOPE: Remotely attaching radio-tags on walruses eliminates the need for animal capture and makes it possible to deploy a large number of transmitters quickly and safely. The transmitter lies external to the walrus and is subdermally anchored with a harpoon head in the walrus' blubber layer.

PRINCIPLE: Tags that anchor subdermally into the animal's blubber have been remotely deployed on cetaceans and have had a long history of development (Mate et al. 2000, Heide-Jørgensen et al. 2001*a*, 2001*b*, 2003). The combined thickness of walrus skin and blubber (roughly 6 cm at the dorsal shoulder region of adults) is sufficient for subdermal anchoring of small tags. Subdermal tagging of walruses was attempted in the 1950-60s, but was largely ineffective (Mansfield 1958, Loughrey 1959, Krylov 1965).

A subdermally anchored satellite radio-tag, which is deployed with a crossbow, was developed recently by USGS Alaska Science Center (Jay et al. 2006). The tag in use now is a puck-shaped transmitter (5.2 × 2.8 cm, 91 g) that attaches to the walrus with a harpoon head mounted on a stainless steel post (Fig. 1). This tag was deployed on over 75 walruses in 2004-06 and is used by colleagues in Norway and Canada. The harpoon head has broad flexible backward-projecting stainless steel fins and a cutting blade at the tip to facilitate entry through the skin and into the blubber layer (harpoon: total length from tip of harpoon to base of transmitter 6.5 cm; harpoon head 3.7 cm long, 2.1 cm wide at widest point, cutting head 1.9 cm wide; post 0.6 cm diameter and 2.8 cm long (excluding length of harpoon head)). The tag is delivered to the walrus with an arrow that fits loosely into the back of the transmitter and shot from a recurve crossbow (arrow: 2315 Lite Easton aluminum shaft filled with a solid fiberglass rod; crossbow: Excalibur, Exocet model, approx. 1.06 J work). To date, all walruses tagged have been adult walruses over 6 years old, except one 4-5 year old walrus, which was tagged with a shortened harpoon post.

Very little information exists on the effect of subdermal tags on walruses. It is noteworthy however, that walruses experience extensive superficial wounds from tusk strikes inflicted on each other. It is common to see large scars on walruses from these and other sources, suggesting that their immune system and healing processes are well adapted to recover from such injuries. The unusual thickness of walrus integument is optimally suited for flexibility and protection, and the elastic subdermis may be self-sealing to punctures as wide as 1-2 cm (Brodie 2001).

The harpoon head to which the tag attaches is expected to fall out of the animal within a few months through normal healing. Tagged walruses are seldom re-sighted in their remote sea ice environment so direct observations on tag retention and healing are usually not possible. To date, the average functional longevity of these tags, as measured from Argos satellite receptions, is about 6 weeks. Although this duration approaches the longevity of the tag's battery, battery

voltage measures suggest that many of the tags are damaged or become detached from the walrus within about 8 weeks. Remotely attached radio-tags will be used when relatively short deployment periods can meet study objectives. Modifications to current tag designs are ongoing to improve tag retention duration and data collection capabilities.

The only species expected to be impacted from this procedure is the target species. The number of walrus affected during a given procedure depends on the proximity and number of neighboring walrus. When this procedure is used in sea ice habitat, it is usual for the entire group of walrus to abandon the ice after the targeted walrus has been tagged. Group sizes in ice are typically less than 10 individuals and rarely more than 100. When used on land haul-outs (mostly adult males), often only a few walrus immediately adjacent to the target walrus are disturbed. Group or herd sizes on land haul-outs can number from a few to thousands of individuals. In all situations, quiet and stealthy approaches to the targeted walrus will be made to minimize disturbance to surrounding walrus. Once the walrus is tagged, researchers will quietly vacate the area.

PROCEDURES:

1. Removable harpoon heads are cleaned with an ultrasound water bath and immersed in alcohol prior to deployment.
2. The target walrus is approached to within 15 m with a small work boat or on foot.
3. Only adult females or males ≥ 6 years of age are targeted, because the combined skin and blubber layers in young animals are too thin to accommodate the harpoon. Age is estimated primarily from the ratio of the length of the tusk to the width of the muzzle, and sex is determined by tusk and animal morphology (Fay et al. 1984).
4. The tag is deployed with a crossbow on the walrus' midline, between or slightly forward of the shoulders. Care should be taken to avoid shots that can result in a miss and striking a neighboring walrus.

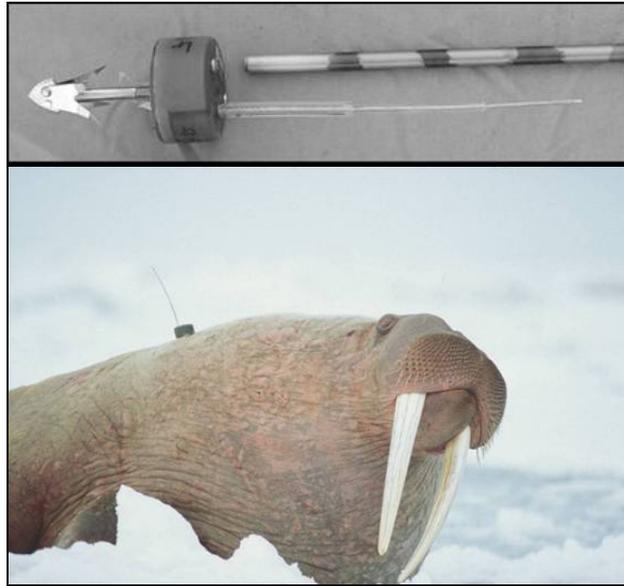


Figure 1. Satellite radio-tag shown with a detached crossbow arrow (top), and attached to an adult male walrus.

PERSONNEL: Remote attachment of radio-tags on walruses will be conducted under the supervision of the Principal Investigator, Chadwick V. Jay, Ph.D., USGS Alaska Science Center. Co-investigators may be authorized by the Principal Investigator to conduct similar collections upon receiving appropriate training and possessing adequate proficiency such that they will not cause undue injury to walruses.

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STANDARD OPERATING PROCEDURES
Collecting Walrus Skin Biopsies with a Crossbow

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MODIFICATION DATE: December 21, 2006
IACUC APPROVAL NUMBER: 06SOP06

SCOPE: The purpose of collecting biopsies with an arrow and crossbow is to enable collection from live animals without capture. Tissue samples can be used for a variety of purposes including genetic, contaminant, and diet studies. The collection of skin biopsies with a crossbow from live walruses has been a very useful technique and is necessary to augment tissue archives for ongoing genetic studies. Remotely collected skin biopsies are also used during remote deployments of radio-tags to confirm the field identified sex of tagged walruses from DNA analysis, because the targeted walrus often flees into the water from a prone position very quickly, making accurate field diagnosis of sex and age difficult.

PRINCIPLE: Tissue and blubber samples have been collected from cetaceans and pinnipeds with remote sampling systems over many years with little adverse effect (Karesh et al. 1987, Gemmell and Majluf 1997, Wiig et al. 2000, Hoberecht et al. 2006, Reeb and Best 2006).

Tissue biopsies are collected from live walruses with a cutting head attached to a floating arrow (Ceta-Dart, Finn Larsen, Copenhagen, Denmark) and shot from a recurve crossbow (Barnett, Wildcat III model, approx. 0.71 J work) (Fig. 1). We have used this system to collect small skin and blubber biopsies from over 175 walruses from 2004-2006 for a genetics study and to identify or verify animal sex using DNA analysis. Cutting heads are 25-40 mm long and about 8 mm in diameter (Palsbøll 1991). Three small backward projecting prongs line the inside of the head to retain the tissue. A line is attached to the arrow to facilitate retrieval of the arrow.

The only species expected to be impacted from this procedure is the target species. The number of walruses affected during a given procedure depends on the proximity and number of neighboring walruses. When this procedure is used in sea ice habitat, it is usual for the entire group of walruses to abandon the ice after the targeted walrus has been biopsied. Group sizes in ice are typically less than 10 individuals and rarely more than 100. When used on land haul-outs (mostly adult males), often only a few walruses immediately adjacent to the target walrus are disturbed. Group or herd sizes on land haul-outs can number from a few to thousands of individuals. In all situations, quiet and stealthy approaches to the targeted walrus will be made to minimize disturbance to surrounding walruses. Once a biopsy is recovered, researchers will quietly vacate the area.

PROCEDURES:

1. The target walrus is approached to within 15 m.
2. Lateral and dorsal sides of the walrus are targeted, with care to avoid shots near the animal's head, genitals, and ventral surfaces.
3. The arrow is retrieved with an attending line or from the surface of the water with a dip net.

4. The cutting head is unscrewed from the arrow and placed in a sterile polyethylene sampling bag.
5. Tissue samples are extracted from each cutting head later in the day and stored in vials with tissue preservative.
6. The cutting head is soaked in bleach to degrade residual DNA, scrubbed with a brush, and then soaked in alcohol before subsequent use.



Figure 1. Dart and crossbow used to collect skin biopsies from walrus.

PERSONNEL: Remote biopsy collections will be conducted under the supervision of the Principal Investigator, Chadwick V. Jay, Ph.D., USGS Alaska Science Center. Co-investigators may be authorized by the Principal Investigator to conduct similar collections upon receiving appropriate training and possessing adequate proficiency such that they will not cause undue injury to walrus.

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In Reply Refer to:
Mail Stop 246

MEMORANDUM

To: Robert Lewis, Acting Associate Director
National Business Center - Aviation Management

From: William R. Miller /s/ Bill Miller
Bureau Occupational Safety, Health and Environmental Program Manager

Subject: Waiver - Personal Protective Equipment (revised)

Exercising my authority as delegated within the USGS 445-2-H Occupational Safety Handbook, Chapter 2, paragraph 2.8(F) (Attachment 1), and in accordance with 350 Department of Interior Manual (DM) 1.9., this memo establishes a U.S. Geological Survey (USGS) waiver to the Department of the Interior Aviation Policy Manual requirements for personal protective equipment (DM 350-354) and to the Aviation Life Support Equipment Handbook (ALSE).

This waiver is applicable to USGS employees, volunteers, persons supervised by USGS employees, and Contractors when conducting special-use missions under *either of* the following conditions:

- In extreme weather or environmental conditions, the use of synthetic or synthetic-natural fiber blends is authorized in lieu of fire-resistant clothing (inner- and outerwear). Footwear made of rubber (i.e., hip waders) or rubber combined with cotton, canvas, or leather with felt liners (i.e., snow-pack or bunny boots) may be worn in lieu of leather boots, or
- The requirement for fire-resistant clothing (i.e., nomex) and leather boots is waived for helicopter special-use operations conducted in aircraft using Jet A fuel.

This waiver is contingent upon supervisors verifying that all persons involved in these aviation operations have been informed of the increased personal hazard associated with wearing other than fire-resistant clothing, gloves, and footwear in the event of a post-mishap fire.

Risk assessment matrices (Attachment 2) were completed for typical USGS special-use missions. The factors compared were hazards, hazards probability, consequences, personal protective equipment options, and risks. The matrices indicated that fire-resistant clothing/gloves and all-leather upper boots do not provide adequate protection from exposure, frostbite, and

hypothermia in snow/cold/wet conditions. In addition the use of fire resistant clothing in extreme heat conditions promotes the greater risk of heat exhaustion or hyperthermia. Thus, this waiver of Departmental personal protective equipment requirements is warranted, and will run continuously until rescinded.

Attachments

cc:

USGS Bureau DASHO

USGS Aviation Manager

USGS Regional Aviation Managers

USGS Regional Safety Managers/Officers

USGS
ALASKA SCIENCE CENTER
FIREARMS SAFETY POLICY

April 27, 2005

Purpose and Scope

A. This policy has been developed in accordance with 29 CFR 1910, 29 CFR 26, DOI Safety and Health Handbook 485DM, and the USGS Safety and Occupational Safety and Health Handbook 445-2-H to protect and inform the employees of the Alaska Science Center (ASC). This plan must be reviewed and updated annually (Appendix 3).

B. To specify the minimum Occupational Safety and Health Program requirements for the firearms safety program at the U.S. Geological Survey, Alaska Science Center (ASC).

C. The requirements covered in this Policy apply to USGS personnel, volunteers, and those who work under USGS funding/direction who, in the performance of their official duties, are required to use government or personally owned firearms for protection against wild animal attacks or for specimen collection.

Authorities/References/Definitions

A. Physical Security Handbook SM 440-2-H, Property Handbook SM 408-2-H.
<http://www.usgs.gov/usgs-manual/handbook/hb/445-2-H.html>

B. USGS Safety Manual SM 445-2-H. <http://www.usgs.gov/usgs-manual/410/440.2.html>

C. State Firearm Laws and Regulations pertaining to firearms use, handling, transport, and storage.

D. In this policy, the word “use” denotes use, handle, carry, or store; the word “personnel” denotes personnel, volunteers, and those who work under USGS funding/direction.

E. A firearm is defined as any breech-loaded handgun or shoulder-fired small arm from which a solid projectile is fired by gunpowder or compressed gas.

General Requirements

A. Certificate of Need and Qualification Inquiry.

(1) A Certificate of Need (Appendix 1, Certificate of Need for Issuance of a Firearm for Official Use) shall be completed for all personnel authorized to use a firearm as part of their official duties. The Certificate of Need shall only be issued for the time frame required (Time Frame of Use) and, at no time, be issued to cover more than a 12-month period. An approved study plan is required for issuance of a Certificate of Need for specimen collection.

(2) Approval of the Certificate of Need shall be by a direct supervisor who has knowledge of their personnel's firearm needs and training in firearms safety.

(3) Failure to return a government-owned firearm within 30 days of the termination of Time Frame of Use shall cause the user to be responsible for damage or theft of this sensitive property. General guidelines for safekeeping of firearms are as follows:

(a) Stored in locked facilities when not in use.

(b) Removed from public view when leaving an unattended area for even short periods of time.

(c) Safeguarded when on travel status.

(4) On September 30, 1996, 18 United States Code 992(g)(9) took effect, making it a felony for anyone convicted of a misdemeanor crime of domestic violence to possess firearms or ammunition. Personnel that use a firearm on official business shall fill out a Qualification Inquiry (Appendix 2, Qualification Inquiry Form) self-certifying they have not been convicted of such crimes prior to approval of the Certificate of Need or participation in firearms training. A new Qualification Inquiry shall be submitted for each new Certificate of Need or firearms training course.

B. Firearms Training. (USGS SM 445-2-H, Chapter 29)

(1) Personnel cannot be certified to use a firearm without first successfully completing an appropriate USGS-approved Basic Firearms Certification Course, which includes the 24-hour Basic Defense Course for defense against wild animals, or the 8-hour Basic Specimen Collection. The Basic Defense Course can suffice for certification for collection purposes. However, personnel carrying a firearm for both self-defense and specimen collection must first complete the Basic Defense Course. All firearms safety training must be documented by completion of Training Form SF-182.

(2) To recertify for defense purposes, an 8-hour USGS-approved Defense Refresher Certification Course must be attended annually in order to use government- or personally-owned firearms. Re-certification is valid for 12 months.

(3) The Basic Defense Course must be repeated if the person (1) does not use firearms and does not attend a Defense Refresher Course within a 2-year period, or (2) does not successfully complete the Defense Refresher Course. Poor performance or unsafe behavior by personnel using firearms also constitutes grounds for repeating the Basic Defense Course.

(4) To recertify for collection purposes, a 4-hour USGS-approved Specimen Collection Refresher Course is attended annually. The refresher training can be waived (in writing) by the person's supervisor if the person documents that they safely used firearms for specimen collecting the previous year.

(5) Alternative firearms certification courses and training schedules may be substituted upon review and approval of the USGS Firearms Safety Committee or Alaska Regional Firearms Committee. Any contractor should work directly with the USGS Firearms Safety Committee or Regional Firearms Committee, to ensure that the contracted training is relevant to survey objectives. All USGS-approved Firearms Certification courses must cover the minimum firearms training standards specified in the USGS SM 225-2-H, Chapter 29, and Appendix 29-3.

(6) Personnel who use devices that resemble firearms and that fire paper blanks, hypodermic darts, etc., shall complete safety training as detailed in USGS SM 445-2-H, Chapter 29, Appendix 29-3.

C. Other required training

(1) ASC Bear Safety training course. Recertification is required every three years.

Field Safety Requirements

(While working in areas where bears present a hazard)

A. Field personnel are encouraged to work in groups of two to the greatest extent possible.

B. Field personnel should carry at least one type of non-lethal means to deter bear attacks. Non-lethal deterrence should be used prior to lethal action whenever possible.

C. Field personnel should carry a firearm OR work in a party that includes at least one person with a firearm.

D. Project supervisors will provide a briefing on bear safety and firearms operation to project visitors.

E. Using the ASC bear encounter report form, field personnel shall report all bear incidents requiring the use of deterrence, or that resulted in an attack.

Minimum Field Firearms Requirements

A. Firearms and ammunition carried for defensive purposes shall meet the following minimum standards:

(1) Shotguns shall be 12 gauge or larger, (3-inch magnum is recommended), ammunition will be 1-ounce minimum foster or brenneke type slugs.

(2) Rifles shall be 30 caliber or larger, ammunition will be 180 grain or larger factory ammunition designed for big game.

(3) Handguns shall be 44 magnum or larger, ammunition will be 240 grain or larger factory ammunition designed for big game. Upon Regional Firearms Manager approval, those employees unable to safely handle a 44 magnum may be granted a waiver to carry a .357 caliber handgun.

B. Shotguns and Rifles should be equipped with a sling. Rifle sighted barrel are strongly encouraged.

C. Optical or electronic sights may not be used on defensive firearms, however, these sighting systems may be used on firearms for specimen collection purposes.

D. All Center firearms will be maintained to manufacturer specifications.

E. Prudent field maintenance is expected of all employees to ensure firearms are maintained in a clean and safe condition.

F. Personally owned firearms may be used by Center personnel upon approval of the Regional Firearms Manager. A qualified gunsmith must certify, in writing within a two-year period, that the firearm is in safe working condition. The ASC shall not be held liable for damage or loss of personally owned firearms.

G. Firearms and ammunition used for specimen collection will be determined by the project manager dependent upon the specimen to be collected and method of collection.

Safe Storage and Security

- A. All firearms and ammunition shall be stored in a secure area under lock and key in accordance with USGS Physical Securities Handbook (10-4 to 10-7) when not being used in the field.
- B. Firearms will be returned to the office armory within 96-hours of return from the field or as soon as practical.
- C. Any missing or lost firearms (ammo dropped) shall be reported within 24 hours to the Alaska Regional Firearms Manager, as well as the local law enforcement agency for entry into the National Crime Information Center (NCIC) System.
- D. A DOI memo on Child Safety Locking Devices for Handguns specifically implies that any firearm (government- or personally-owned) used by USGS personnel shall be under lock and key when: (1) not being used in the field, (2) in transit, or (3) the firearm is not under the direct control of the cognizant person. The concept of “being locked” implies that the firearm is to be stored in a locked hard case or stored in a soft gun case and a trigger safety lock employed.
- E. Firearms and ammunition transported on commercial airlines must be declared and an FAA tag must be signed stating that the firearm is unloaded. The ammunition must be separated from the firearm, shipped in factory-sealed containers, and is limited to 11 lbs. weight. For field aircraft, the firearm must be declared to the pilot or authorized representative prior to boarding.
- F. Any personnel authorized to use a firearm in the field, as a part of their duties must follow the State and municipal laws concerning the transportation and mode of carry of firearms in motor vehicles. State permits authorizing concealed carry are not recognized by the USGS and do not apply to government personnel as long as the person is on official duty.

Recordkeeping

- A. The Alaska Regional Firearms Manager will maintain files containing the following information:
 - (1) Firearms training records for personnel who attend USGS Basic and Refresher Firearms Certification courses to ensure training currency.
 - (2) Certificate of Need Records.
 - (3) Inventories of firearms maintained at Center armories.

(4) Firearms sign-out log to track the locations of government-owned firearms outside the armory and respective responsible personnel.

(5) All records of firearms maintenance and repair.

(6) Records of unintended firearms discharges in other than a training environment.

(7) Records of lost, stolen, or functionally damaged firearms.

B. Firearms Accidents or Incidents. For any firearm accident, incident (inclusive of discharges), or defensive action, the supervisor authorizing the person's Certificate of Need will complete an entry into the automated DOI Safety Management Information System (SMIS) as described in USGS SM 445-2-H, Chapter 7. In addition to the filing requirements, a hard copy of the incident report shall be printed out from the SMIS system and forwarded through the Alaska Regional Firearms manager to the USGS Firearms Safety Program Manager for review by the USGS Firearms Safety Committee. Any injury or death resulting from a firearms accident/incident must be reported in accordance with USGS SM 445-2-H, Chapter 7.

Responsibilities

A. ASC Director: Designate individual to serve as the Regional Firearms Manager. Provide support and funding for the ASC Firearms safety program.

B. ASC Safety Manager: Provide support and assistance to the Alaska Regional Firearms Manager and field organizational Collateral Duty Safety Program Coordinator's, in establishment and implementation of firearms safety program requirements and training.

C. Alaska Regional Firearms Manager.

(1) Serves as a focal point for all firearm-related matters at the ASC.

(2) Maintains ASC firearms records.

(3) Coordinates training activities within the ASC

(4) Assists regional science program firearms representatives in selecting appropriate contractors for firearms training and evaluating contractor course curricula.

(5) Oversees ASC firearms activities and chairs the Alaska Regional Firearms Committee.

(6) Assists the Bureau Firearms Manager with policy and training curricula development.

D. Alaska Regional Firearms Committee.

(1) The Alaska Regional Firearms Manager, appointed by the Center Director, will oversee respective Regional Firearms activities and chair the Alaska Regional Firearms Committee.

(2) The Alaska Regional Firearms Committee should contain representatives from each Center science office that uses firearms.

(3) The Alaska Regional Firearms Committee will:

(a) Oversee firearms training in the region.

(b) Assist managers in selecting appropriate contractors for firearms training.

(c) Evaluate contractor course curriculum.

E. ASC Firearms Instructors.

(1) Personnel who serve as USGS Firearms Instructors for the Basic Defense and Refresher Defense courses shall be certified by the Bureau Firearms Manager.

(2) Participate in ASC Firearms Safety Committee activities.

(3) Maintain a level of instructional and technical proficiency as described within this USGS SM 445-2-H, Chapter 29, and as recommended by the Alaska Regional Firearms Manager.

(4) Teach the USGS Basic and Refresher Firearms Certification courses in accordance with the USGS Firearms Instructor Manual(s).

F. Assistant Firearms Instructor.

(1) Performs firearms-related duties as assigned by, and under the direction of, the lead certified USGS Firearms Instructor teaching the course.

(2) Maintains currency with firearms training requirements described in this policy.

G. ASC Office Chiefs. Provide appropriate personnel and budgetary resources to establish the ASC firearms safety program inclusive of operator training, periodic inspection and maintenance, personal protective and other equipment as

mentioned herein as necessary for safe operation of firearms in all expected conditions.

H. Supervisors.

(1) Verify personnel completion of all firearms safety and related training prior to issuance of the Certificate of Need.

(2) Obtain a Certificate of Need for each person authorized to use a firearm and forward a copy to the Alaska Regional Firearms Manager.

(3) Ensure firearms are properly maintained to Manufacturer's specifications. Inspection by a qualified Gunsmith should take place every two years.

I. Personnel.

(1) Attend the Basic or Refresher Firearms Certification course(s) and maintain currency with all firearms training requirements specified in this chapter.

(2) Responsible for the safe use of all firearms under their control.

(3) Maintain all personal-owned firearms used for official business in safe, serviceable condition.

(4) Safeguard USGS firearms and ammunition upon removal from an ASC armory until returned to the armory.

Additional Resources

A. State Firearm Laws and Regulations pertaining to firearms use, handling, transport, and storage.

B. USGS Physical Security Handbook 440-2-H.

C. USGS Property Handbook 408-2-H.

Leslie Holland-Bartels

Date

Director, Alaska Science Center

**United States
Department of the Interior**

ALSE

Aviation Life Support Equipment

(351 DM 1)



September 1, 2006

DEPARTMENT OF THE INTERIOR
DEPARTMENTAL MANUAL
AVIATION LIFE SUPPORT EQUIPMENT HANDBOOK
(351 DM 1)

FOREWORD

This Departmental Manual Handbook establishes standards for approval and use of aviation life support equipment when conducting Department of the Interior (DOI) aviation activities.

Questions regarding the content or guidance referenced in this Handbook may be directed to the Aviation Safety Office, Aviation Management (AMD), 300 E. Mallard Drive, Suite 200, Boise, ID 83706-3991. The Handbook is available on the AMD web site at: www.oas.gov.

/s/ Mark L. Bathrick
Associate Director, NBC AMD

Date: September 1, 2006

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Chapter 1 General Information

1.1

1.1 Purpose. This Handbook outlines policies, procedures, and responsibilities for using aviation life support equipment (ALSE) during Department of the Interior (DOI) aviation activities. It is designed to supplement the Departmental Manual, providing detailed information as well as specific requirements.

1.2 Policy.

A. DOI Policy. It is Interior policy to provide employees with a safe and healthful work environment free from recognized safety and health hazards.

B. Responsibilities. Bureaus are responsible for implementing their Personal Protective Equipment (PPE) Program. Supervisors are responsible for evaluating aviation activities and providing employees with appropriate ALSE equipment. Supervisors are also required to provide employee training on the proper use of ALSE equipment. When minimum requirements are listed, bureaus and individuals are encouraged to supplement these requirements to meet the needs of the mission and environment.

1.3 Scope. ALSE covers a broad spectrum of equipment and procedures for protecting aircrews, passengers, and support personnel engaged in aviation activities, including mishap or survival situations. While the emphasis is on special use activities, other mission-specific equipment such as fire extinguishers, first aid kits, restraint systems, and overwater equipment are also included.

Note: ALSE listed in this Handbook may require fitting, periodic inspections, testing, and scheduled replacement. Users must ensure the equipment is maintained in serviceable condition and in accordance with the manufacturer's guidance.

1.4 Exceptions and Waivers.

A. Exceptions.

1. Fire resistant clothing, gloves, and leather boots are not required for overwater flights beyond gliding distance to shore, or for offshore vessel and platform landings.
2. Fire resistant clothing is not required for aerial agricultural and chemical application operations.
3. Wildland firefighters assigned to wildland fire incidents may wear approved hardhats in lieu of flight helmets. Hardhats must be worn with the chinstrap properly fastened.
4. Personal protective equipment (PPE) is not required for precision reconnaissance (including fire recon) flights conducted above 500' AGL.
5. Flight helmets are not required in multiengine fixed wing airplanes.

Note: These exceptions do not authorize the wearing of outerwear or undergarments made of materials with low temperature melting characteristics, such as synthetics (nylon, dacron, polyester, and so on) and synthetic blends, as provided by paragraphs 2.2C and D of this Handbook.

B. Waivers. If the bureau identifies an ALSE requirement that presents a concern affecting employee safety or security, then bureau directors have discretionary authorization to grant a waiver. This authority may be exercised by the bureau director or by written delegation at a lower authority. Exercising this authority requires that the Director-AMD be provided a copy of the waiver and any written delegation.

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C. Other. All other waivers must be approved by the Director-AMD in accordance with 350 DM 1.9.

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Chapter 2 Personal Protective Equipment (PPE)

2.1

2.1 General. Personal protective equipment (PPE) includes head protection, flash fire protection, and the Occupational Safety and Health Administration (OSHA) requirements for hearing conservation and eye protection. Flight crews and passengers engaged in special use activities are required to wear the following ALSE unless exempted by paragraph 1.4A:

- A. Fire resistant clothing. ← Contradicts immersion ppe. Immersion is greater concern than fire.
- B. All-leather, or leather and Nomex gloves.
- C. Leather boots. ← Not acceptable for sea ice work.
- D. Flight helmets.

Note: Extreme environmental work conditions may dictate that a waiver be obtained, as provided by paragraph 1.4B, to negate or substitute an ALSE requirement.

2.2 Fire Resistant Clothing. Fire resistant clothing protects the wearer from flash fire burns. The preferred material is commonly known as "Nomex." The actual material may be Nomex, polyamide, aramide, polybenzimidazole, Kevlar, or blends thereof. These materials, while not fireproof, will char rather than burn at about 700 to 800 degrees Fahrenheit. Cotton materials, chemically altered and marketed as fire resistant, are acceptable. Materials treated with fire resistant chemicals which launder out and materials with low temperature melting characteristics, such as synthetics (nylon, dacron, polyester, and so on) and synthetic blends, are not approved.

Nomex shirts and trousers used by wildland firefighters are approved for DOI aviation operations. Shirt sleeves should be long enough to overlap the glove with the cuffs fastened. The shirttail should be tucked into the trouser and the trouser should cover the boot tops.

Note: Clothing must be kept clean of fuels, grease, oils, and other combustible materials. Combustibles embedded in fabric will decrease the garment's fire protection. Nomex material may be dry cleaned or laundered and tumble dried at temperatures up to 180 degrees Fahrenheit without shrinkage or damage.

Caution: Do not use starch. A garment's fire protection is reduced when starched.

A. Flight Suits. For optimum protection, Nomex coveralls should fit loosely, providing trapped air for insulation. Sleeves should be long enough to reach the first knuckle on the thumb before securing snugly over the flight gloves at the wrist. Pant legs should reach the floor while standing and secure snugly over the leather boots at the ankle while seated. Fabrics are available in 4.5- and 6.0-ounce material.

B. Flight Gloves. Gloves (Type GS/FRP-2) constructed of a soft leather palm and stretchable Nomex fabric for the back is preferred. The glove has a long cuff extending several inches above the wrist providing total coverage when the flight suit sleeve is properly worn. The gloves should fit snugly to provide maximum finger dexterity for the wearer. All-leather gloves (without the synthetic liners) are acceptable if they provide the wearer with wrist coverage and finger dexterity.

C. Outerwear Garments. Garments worn over the Nomex flight suit, such as coats, bib pants, and coveralls, should also be made of Nomex. Outerwear garments made from natural fibers, such as leather, cotton, wool, or wool/cotton blends, as well as from fire resistant cotton and cotton blends, are acceptable substitutes. Materials with low temperature melting characteristics, such as synthetics (nylon, Dacron, polyester, and so on) and synthetic blends, are not approved.

Note: When adequate clothing for hypothermia protection is not feasible, additional survival equipment should be

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considered.

Chapter 2 Personal Protective Equipment

2.2D

D. Undergarments. Underwear, socks, and clothing worn under the flight suit and next to the skin will provide the best protection if made of Nomex. Natural fibers, such as cotton, wool, or wool/cotton blend, as well as fire resistant cotton and cotton blends, are acceptable substitutes. **Materials with low temperature melting characteristics, such as synthetics (nylon, dacron, polyester, and so on) and synthetic blends, are not approved.**

Caution: In cold climates, cotton undergarments and socks will absorb perspiration and water, subjecting the wearer to chill, hypothermia, and frostbite.

E. Boots. Boots must be made of all-leather uppers that come above the ankles (the higher the better) and must be constructed so that metal parts, such as shoestrings eyes or zippers, do not contact the wearer's skin. Non-leather boots must be flight approved in accordance with U.S. Military standards for aviation use. Boots made of fire-resistant rubber are an acceptable substitute.

770 - Waterproof Black Insulated Combat and Flight Boot \$117

The following

Weather Conditions	http://www.bellevilleshoe.com/product.php		
Cold	Belleville	770 (Black)	http://www.bellevilleshoe.com/federal/federal_5.htm
Temperate	Bates	E01500	http://www.batesfootwear.com/
	Belleville	700 (Black) 790 (Tan)	http://www.bellevilleshoe.com/federal/federal_5.htm
	Wellco	ACBBTW (Black) ACBTTW (Tan)	http://www.wellco.com/html/acbbtw.html http://www.wellco.com/html/acbttw.html
Hot	Belleville	340 DES	http://www.bellevilleshoe.com/federal/federal_5.htm

2.3 Head, Hearing, and Eye Protection. Flight helmets provide head, hearing, and eye protection in most environments.

A. Flight Helmets. Flight helmets, consisting of a one-piece hard shell made of polycarbonate, Kevlar, carbon fiber, or fiberglass, must cover the top, sides (including the temple area and to below the ears), and the rear of the head. Flight helmets must conform to a national certifying agency standard, such as DOT, Snell-95, SFI, or an appropriate military standard, and be compatible with required avionics. "Shorty" helmets are not approved.

Flight helmets most often used by DOI personnel are the SPH-5 and HGU-55. Other flight helmets that meet the requirements are: SPH-3, SPH-4, SPH-4B, HGU-33, HGU-34, HGU-39, HGU-53, HGU-54, and Alpha (British).

Caution: Helmets designed for use in fixed wing aircraft may not provide adequate protection in helicopter accidents

B. Hearing Protection. A hearing protection program is required whenever employees are exposed to noise equal to, or exceeding, an 8-hour time-weighted average of 85 decibels (dBA). Most operating aircraft generate noise levels above 85 dBA.

When not conducting special use activities, ear muffs and earplugs may be substituted for the flight helmet. Earplugs generally provide the best noise reduction. Earmuffs provide warmth, relieve pressure in ear canals, and reduce noise. Earplugs can be worn with ear muffs or flight helmets for added protection.

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C. Eye Protection. DOI requires eye protection in work environments where air particle contaminants are present.

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Chapter 3 Survival Equipment

3.1

3.1 General. This chapter describes the minimum survival equipment and first aid kit requirements for overwater flights, special use activities, and flights conducted overland. This does not exempt mission planners from ensuring that occupants have in their possession, when boarding the aircraft, adequate clothing for the mission environment in the event of a mishap or survival situation. Additional requirements for flights conducted in Canada and Alaska are listed in Appendix 2.

Appendix 3 provides rescue and survival planning considerations.

3.2 Over Water. The appropriate overwater ALSE is based on many factors, including mission, search and rescue time, weather, and water conditions.

For extended overwater operations, DOI aircraft must comply with 14 CFR 135.167.

A. Personal Flotation Devices (PFDs). In addition to complying with applicable Federal Aviation Regulations, occupants must wear PFDs aboard DOI flights when performing takeoffs or landings to water (including float and boat-hulled aircraft) and when performing water bucket dipping or snorkeling operations.

1. Single-Engine Aircraft. PFDs must be worn by occupants aboard DOI flights operating beyond gliding distance to shore.

2. Multiengine Aircraft. PFDs need not be worn but must be immediately available to occupants aboard DOI flights operating beyond gliding distance to shore.

Note: Inflatable PFDs are preferred because they do not restrict the occupant's movement or egress.

Caution: PFDs should not be inflated in the aircraft. An occupant wearing an inflated PFD (or non-inflatable PFD) may experience difficulty egressing from an overturned or submerged aircraft. PFDs equipped with automatic (water activated) inflation devices should not be worn in aircraft.

B. Anti-Exposure Garments. Anti-exposure garments must be worn in single-engine aircraft and readily available to occupants of multiengine aircraft when conducting extended overwater flights (as defined in 14 CFR 1.1) where water temperature is colder than 50 degrees Fahrenheit. Table 3-1 estimates the effectiveness of several survival garments at various water temperatures.

1. The anti-exposure flight suit approved for DOI use is a one-piece coverall insulated to provide some hypothermia protection and buoyancy. Hood and hand protection must be carried in a specific pocket provided for that purpose.

Need waiver for sea ice work.

2. Survival suits must be a dry immersion type, constructed from a closed-cell material, and insulated. Quick-donning anti-exposure suits are acceptable in multiengine aircraft.

Caution: Aircraft occupants wearing anti-exposure garments may experience difficulty egressing from an overturned or submerged aircraft.

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Probable Survival Time With Inflatable Life Vest

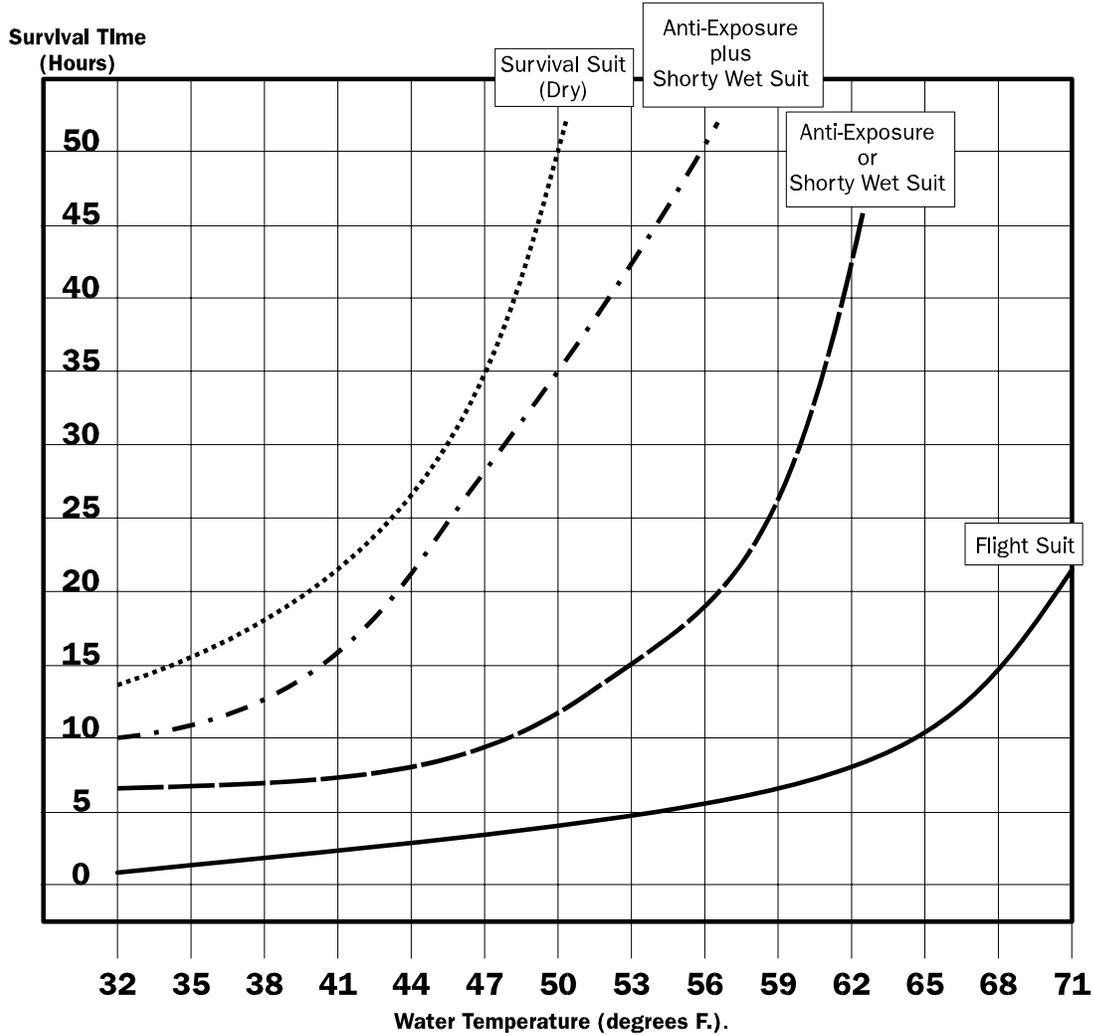


Table 3-1

This table is based on U.S. Coast Guard data for the following conditions:

- Rough Seas (4' to 6' Swells)
- Approx. 18% Body Fat
- Inflatable Life Vest with Self-Righting Characteristics

NOTE: Survival time in a covered life raft will be significantly longer in all water temperatures.

C. Life Rafts. Life rafts are required for extended overwater operations, in accordance with 14 CFR 135.167, and recommended when operating beyond gliding distance to shore.

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Chapter 3 Survival Equipment

3.3

3.3 Over Land. The appropriate overland ALSE is based on many factors, including mission, search and rescue time, weather, and terrain.

A. Survival Kits. Survival kits are required for special use activities and are recommended for all missions. Kits will include the items listed in Appendix 1, plus additional equipment appropriate to the route, environmental conditions, and number of occupants aboard the aircraft.

Caution: Avoid storing survival kits in seaplane float compartments. Kits stored in these compartments are often damaged or inaccessible after an aircraft mishap.

B. Personal Survival Vests or Hand-Carried Survival Kits. Personal survival vests or hand-carried kits, in addition to the required survival kits, are recommended for all DOI flights. Aircraft accident experience has shown that survival equipment not attached to the occupants at time of egress is often not recovered by the survivors. Suggested items include:

- | | |
|---------------------------|---|
| ·Waterproof matches | ·Pocketknife |
| ·Magnesium fire starter | ·Personal emergency locator transmitter (ELT) |
| ·Two space blankets | ·Water purification tablets |
| ·Large plastic bag | ·Signal mirror |
| ·Water bag (collapsible) | ·Six aerial signal flares |
| ·Individual first aid kit | ·Strobe light or flashlight |
| ·Insect repellent | ·Whistle |

Caution: Most signal flares and inflatable vests cannot be carried aboard commercial airlines as checked or carry-on baggage.

Appendix 2 provides requirements for flights in Canada and Alaska.

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Chapter 3 Survival Equipment

3.4

3.4 First Aid Kits. Aircraft owned or operated by DOI are required to carry a first aid kit. The kit items must be stored in a dust-proof and moisture-proof container. It must be readily accessible to the aircraft occupants. Kits are available through commercial sources. The kit's contents will include the items listed below plus additional equipment appropriate to the route and number of occupants aboard the aircraft.

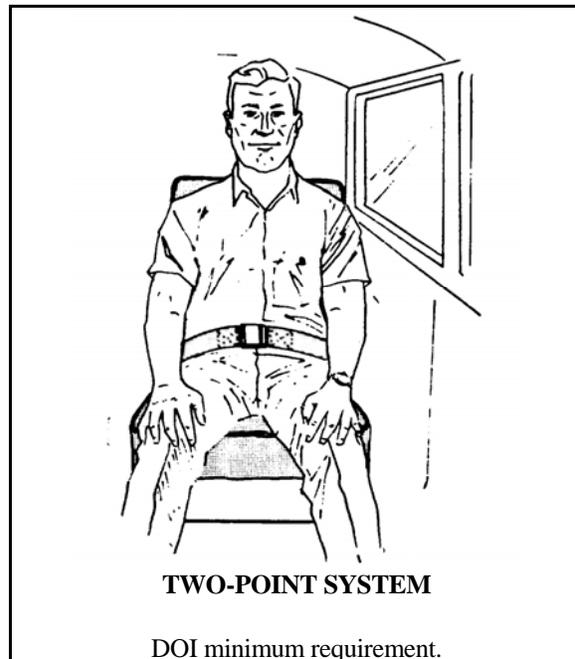
Item	Passenger Seats 0-9	Passenger Seats 10-50
Adhesive bandage strips, (3" long)	8	16
Antiseptic or alcohol wipes (pkts)	10	20
Bandage compresses, 4"	2	4
Triangular bandage, 40" (sling)	2	4
Roller bandage, 4"x 5 yds (gauze)	2	4
Adhesive tape, 1"x 5 yds (std roll)	1	2
Bandage scissors	1	1
Body Fluids Barrier Kit: 2 - pair latex gloves 1 - face shield 1 - mouth-to-mouth barrier 1 - protective gown 2 - antiseptic towelettes 1 - biohazard disposable bag	1	1
NOTE: Splints are recommended if space permits.		

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4.1 General. This chapter covers the ALSE required to be installed in aircraft owned or operated by DOI. It is the responsibility of the operator to ensure the appropriate equipment is provided. The pilot in command must ensure the correct installation, quantity, and serviceability of the equipment. The pilot in command is also responsible for briefing occupants on ALSE location and use.

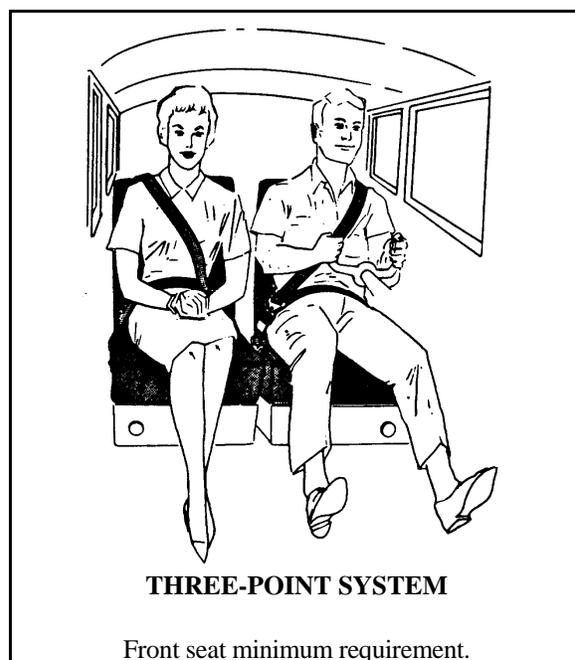
4.2 Restraint Systems. Aircraft must be equipped, as a minimum, to the FAA certification standards for the specific aircraft. Restraint systems must be FAA approved and meet the installation guidance referenced in FAA Advisory Circular (AC 21-34), or its current revision. All installations must secure the occupant with a metal-to-metal buckle or latching mechanism. Occupants shall wear lap belts and installed shoulder harnesses during all phases of flight unless there is a valid operational or safety requirement, which would cause the pilot in command to direct otherwise. Additional requirements are as follows:

All occupied seats must have a lap belt as a minimum (two-point system). Front seat occupants must have a lap belt and shoulder harness as a minimum (three-point system). FAR 91.205 defines a front seat as a seat located at a flight crewmember's station or any seat located alongside such a seat. The single-strap shoulder harness is acceptable provided it crosses the chest diagonally when fastened. Lap belt and shoulder harness installations must not restrict crewmembers from performing their duties.



Single- and double-strap shoulder harnesses utilizing a sewn loop allowing the seat belt to slide through, as a means of attachment, are not approved for DOI use.

Lap belts should fit low and snug across the lap. If the belt is loose, or high around the waist, it can cause injury. Shoulder harnesses should be snug, but not tight, across the chest.



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A. Helicopter. Front seat occupants must have a double-strap shoulder harness and lap belt (four-point system). It must secure the occupant using a single, quick release buckle (flight crewmembers at their duty station must also have an inertia reel). Heavy duty (military style) harnesses with a fabric loop connecting the shoulder harness to the male portion of the lap belt buckle, similar to those installed in transport category helicopters, are acceptable.

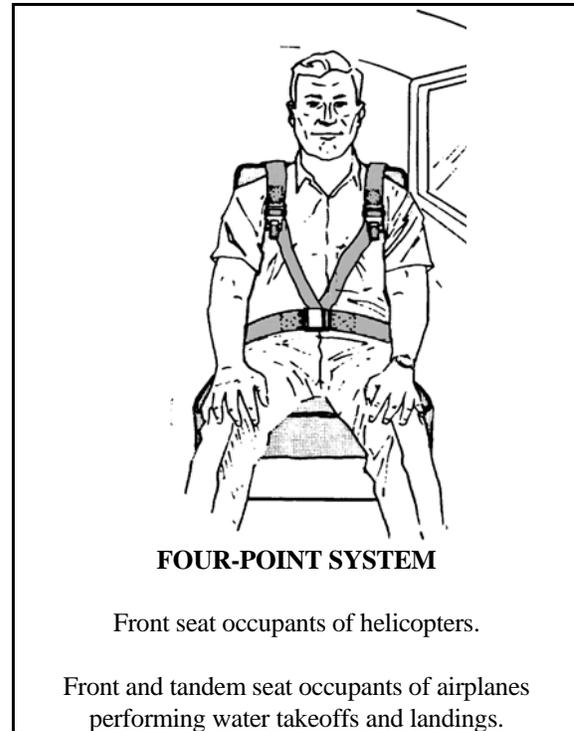
B. Airplane. Airplanes performing water takeoffs and landings must have a double-strap shoulder harness and lap belt (four-point system) for front seat occupants and both tandem seat occupants. The system must secure the occupant using a single, quick release buckle. Four-point systems with shoulder harnesses permanently attached to the lap belt are prohibited when performing water takeoffs and landings in airplanes.

4.3 Fire Extinguishers. See 351 DM 2.1A.

4.4 Emergency Locator Transmitter (ELT). An emergency locator transmitter automatic portable (ELT/AP) or automatic fixed (ELT/AF), meeting the requirements of 14 CFR 91.207, must be installed in all nonturbojet aircraft owned or operated by DOI. If the ELT location is not visible from the cockpit or passenger cabin, a conspicuous placard indicating ELT location must be installed.

A. Helicopter. The ELT must be installed in accordance with the applicable technical standard order (TSO) and the manufacturer's instructions. Install unidirectional ELTs with the directional arrow pointed 45 degrees downward from the forward direction of flight.

B. Airplane. The ELT must be installed in accordance with 14 CFR 91.207, applicable TSOs, and the manufacturer's instructions. An external antenna will be used in all airplane applications and mounted on top of the airplane.



Caution: Personal ELTs should not be operated if the aircraft-installed ELT is transmitting. Two signals, originating from the same location, may prevent the satellite or search aircraft from accurately pinpointing the mishap site.

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Appendix 1

Minimum Aircraft Survival Kit Items

These are minimum required items for special use activities in the United States and U.S. possessions. Additional requirements for flight activities conducted in Canada and Alaska are listed in Appendix 2.

- Knife
- Signal mirror
- Signal flares (six each)
- Matches (two small boxes in waterproof containers)
- Space blanket (one per occupant)
- Water (one quart per occupant [not required when operating over areas with adequate drinking water])
- Food (two days emergency rations per occupant)
- Candles
- Water purification tablets
- Collapsible water bag
- Whistle
- Magnesium fire starter
- Nylon rope or parachute cord (50 feet)

Suggested Survival Kit Items Dependent Upon Terrain and Climate

- | | |
|--|---------------------------------------|
| •Container w/carrying handle or straps | •Individual first aid kit |
| •Large plastic bags | •Signal panels |
| •Flashlight with spare batteries | •Hand saw or wire saw |
| •Collapsible shovel | •Sleeping bag (one per two occupants) |
| •Survival manual (Arctic/Desert) | •Snowshoes |
| •Insect repellent | •Axe or hatchet |
| •Insect headnet (one per occupant) | •Gill net/assorted fishing tackle |
| •Personal ELT | •Sunscreen |

Note: The hand-held 360- or 720-channel VHF transceiver radio is recommended. It should be attached, or immediately accessible, to a crewmember rather than placed in the aircraft survival kit.

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**Special Emergency (Survival) Equipment Required for Flights
in Canada and Alaska**

Remote regions such as Canada and Alaska have survival equipment requirements in addition to DOI survival kit requirements for special use activities listed in Appendix 1. Unlike DOI requirements, Canada and Alaska requirements apply to all flights. Check current flight regulations for your area of operation.

- A. Canada. Canadian law requires the following survival equipment when operating in sparsely populated areas:
1. Food having a caloric value of at least 10,000 calories per person carried, not subject to deterioration by heat or cold, and stored in a sealed waterproof container bearing a tag or label on which the operator of the aircraft or his representative has certified the amount and satisfactory condition of the food in the container following an inspection made no more than six months prior to the flight
 2. Cooking utensils
 3. Matches in a waterproof container
 4. A stove and a supply of fuel or a self-contained means of providing heat for cooking when operating north of the tree line
 5. Portable compass
 6. An axe of at least 2 1/2 pounds or 1 kilogram weight with a handle of not less than 28 inches or 70 centimeters in length
 7. Flexible saw blade or equivalent cutting tool
 8. Snare wire of at least 30 feet or 9 meters and instructions for its use
 9. Fishing equipment including still fishing bait and a gill net of not more than a 2 inch or 5 centimeter mesh
 10. Mosquito nets or netting and insect repellent sufficient to meet the needs of all persons carried when operating in an area where insects are likely to be hazardous
 11. Tents or engine and wing covers of suitable design and color or having panels colored in international orange or other high visibility color, sufficient to accommodate all persons carried when operating north of the tree line
 12. Winter sleeping bags sufficient in quantity to accommodate all persons carried when operating in an area where the mean daily temperature is like to be 7° C or less

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13. Two pairs of now shoes when operating in areas where the ground snow cover is likely to be 12 inches or 30 centimeters or more
14. Signaling mirror
15. At least 3 pyrotechnical distress signals
16. A sharp jackknife or hunting knife of good quality
17. Suitable survival instruction manual
18. Conspicuity panel
19. The following additional items are suggested:
 - Spare axe handle
 - Honing stone or file
 - Ice chisel
 - Snow knife or snow saw-knife
 - Snow shovel
 - Flashlight with spare bulbs and batteries
 - Pack sack

Note: Unless specifically prohibited by bureau regulation, firearms are carried at operator's discretion. Small arms such as hand-held pistols and revolvers, and fully automatic weapons are not authorized to be carried or worn in Canada. It is imperative that firearms be declared to Canadian Customs. Failure to do so may result in seizure of the firearm and aircraft and prosecution of the pilot.

B. Alaska. Alaska law requires the following survival equipment:

1. The minimum equipment to be carried year around, is as follows:
 - Food for each occupant sufficient to sustain life for two weeks
 - Axe or hatchet
 - First aid kit
 - A pistol, revolver, shotgun, or rifle, and ammunition
 - Small gill net and an assortment of tackle
 - Knife
 - Two small boxes of matches
 - Mosquito headnet for each occupant
 - Two small signaling devices such as colored smoke bombs, railroad fusees, or very pistol shells, in sealed metal containers

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2. In addition to the above, the following must be carried as minimum equipment from October 15 to April 1 of each year:

- Pair of snowshoes
- Sleeping bag
- Wool blanket for each occupant over four

Note: Operators of multiengine aircraft licensed to carry more than 15 passengers need carry only the food, mosquito nets, and signaling equipment at all times other than the period from October 15 to April 1 of each year, when two sleeping bags and one blanket for every two passengers shall also be carried. All of the above emergency rations and equipment requirements are the minimum requirements under current law.

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Appendix 3

Rescue and Survival Planning Considerations

When planning a mission, it is important to consider the time and effort that may be required to locate and recover victims should a mishap or survival situation occur. While prompt and safe rescue is by no means ensured, knowledge and preparation often make the difference between success and failure. Mission planning should include a review of the following areas:

Flight Plans The most important protection you can give yourself is to file a flight plan. An Air Force study of 325 search and rescues revealed that "time works against people who experience a distress but are not on a flight plan, since 36 hours normally pass before family concern initiates an (alert)."

Flight Following The time required to rescue a survivor is directly related to how accurately your position can be determined. If you have filed a flight plan, stayed on course, and updated your progress with frequent position reports, your chance of rescue is greatly enhanced.

Search and Rescue The availability of search and rescue agencies and their response time is also an important consideration for timely recovery. Personnel should be familiar with procedures used by search and rescue organizations in order to help recovery efforts.

Other Variables Knowledge of the environment, weather, physical condition, proficiency in signaling, and effectiveness of survival equipment all affect your ability to survive until help arrives. After considering the amount of time it may take for help to arrive, you should prepare accordingly.