

HELICOPTER SHORT-HAUL OPERATIONS PLAN



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Interior National Park Service**

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FOREWORD

It is recognized that this document may be adopted for use by state or local agencies; however, its content remains the responsibility of the NPS, acting upon recommendations from the Short-haul Working Group. Proposed changes or deletions to this document should be addressed through the National Park Service to the working group.

The objectives, policies, and procedures prescribed herein are generally broad in scope and define minimum program standards. It is the responsibility of each using Park to determine, within the parameters of this document, additional requirements necessary for safe and efficient operations. These requirements must identify and define specific and often unique program needs and shall be outlined in this short-haul operations plan.

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CHAPTER 1: GENERAL INFORMATION

1.1 DEFINITION

Short-haul: To transport one or more persons suspended beneath a helicopter (HEC - Human External Cargo).

1.2 HISTORY

The development of the short-haul technique in this country has been closely associated with the evolution of helicopter rappelling (heli-rappelling). When ground evacuation was dangerous or impractical, personnel were removed from rappel sites by attaching to rappel lines that were anchored to the helicopter. While heli-rappel requires extended hover time for the delivery of persons to a specific location, short-haul emphasizes limited hover time with added capability of the extraction of persons and cargo.

Helicopter short-haul technique was originally researched and developed by Swiss Air Rescue (REGA) in 1966. Short-haul gained popularity in Europe prior to 1970 as an effective rescue technique in mountainous areas. In 1970, National Parks Canada incorporated short-haul into their search and rescue program, where it continues to be widely used.

In the early 1980s, short-haul was adopted and modified by a variety of agencies for use in rescue and law enforcement programs in the United States. Helicopter short-haul continues to be an effective tool in meeting safe and efficient operational objectives within these programs.

1.3 PURPOSE

This operations plan outlines minimum policies, procedures, qualifications, training requirements and equipment for helicopter short-haul programs within the National Park Service (NPS).

The policies and procedures prescribed herein are generally broad in scope and define minimum program standards. It is the responsibility of each using park to determine, within the parameters of this document, additional requirements necessary for safe and efficient operations. These requirements must identify and define specific and often unique program needs, and will be outlined in the park-specific short-haul operations plan. Proposed changes or deletions to this document should be addressed through the NPS to the group of representatives.

1.4 AUTHORITY

The National Park Service is authorized to perform search and rescue (Title 54 United States Code 102701). NPS policy states that "the saving of human life will take priority over all other Park operations" (NPS Management Policies, 2006, 8.2.5.1).

The authority to perform short-haul operations is found in United States Department of the Interior Aviation Policy, Departmental Manual 351 DM 1.7, Special Use Activities. Guidelines for conducting short-haul operations are set forth in Operational Procedures Memorandum (OPM) No. 29.

1.5 APPROVAL

New program requests must be forwarded to and approved by the NPS Director or their delegate, per Reference Manual (RM) 60. Requests must include a copy of the NPS Enhancement Application and the proposed short-haul operations plan. The operations plan must include a GO/NO-GO process for risk management. Plans must comply with agency and departmental policies and guidelines. A copy of the approved NPS Enhancement Application will be provided to the Director of the Office of Aviation Services (OAS).

1.6 NEW PROGRAMS

Refer to Appendix A for new program start-up procedures. Local aviation program managers will select spotter trainees. Initial short-haul training will be conducted by approved training specialists in accordance with this operations plan. Qualified check spotters from other approved programs will be used for initial training and qualifications.

CHAPTER 2: QUALIFICATIONS AND REQUIREMENTS

2.1 PILOT REQUIREMENTS

A safe and effective short-haul program is highly dependent upon precision longline skills. Accordingly, pilots must comply with the following minimum requirements:

1. Qualified in accordance with 14 CFR 133 for Class A and B external load operations and meet pilot requirements identified in the procurement document.
2. 50 hours Pilot-In-Command (PIC) in make and model in the preceding 12 months.
3. 25 hours of vertical reference experience requiring precision placement in the preceding 12 months.
4. Approved for longline operations.
5. Pass the OAS-administered Short-Haul Pilot Practical Test outlined in the Interagency Helicopter Practical Test Standards (PTS).
6. Complete annual operational training with the using unit.
7. Understand short-haul techniques, short-haul/spotter signals and operational concerns.
8. Demonstrate ability to work with the short-haul spotter(s).

2.2 SPOTTER AND SHORT-HAULER REQUIREMENTS

Spotters and short-haulers must complete the following minimum requirements. Additional training may be required of an individual based on the complexity of the program.

A. Check Spotter

Parks will recommend Check Spotter candidates. Check Spotters will be approved annually by the Regional Aviation Manager (RAM) in the form of a designation letter. In addition to meeting all Spotter requirements, Check Spotter candidates must:

1. Be qualified as Resource Helicopter Managers, per RM-60.
2. Have served as a qualified Spotter for 2 years.
3. Have demonstrated ability as an instructor and assisted in the training of at least two Spotters.

B. Spotter

Spotter candidates must:

1. Have completed the Interagency Helicopter Crewmember course (S-271).
2. Be familiar with the helicopter procurement documents.
3. Under the supervision of a qualified check spotter:
 - a. Demonstrate knowledge of the inspection, care and maintenance of short-haul equipment.
 - b. Demonstrate ability to rig the helicopter for short-haul, to provide a safety briefing and to conduct a safety check of short-haul personnel without procedural error.
 - c. Demonstrate knowledge of emergency procedures.
 - d. Spot six loads of short-haul personnel, two in typical terrain. If applicable, spot four loads of cargo (e.g., a rescue litter) without procedural error.
 - e. Demonstrate ability to work with the pilot.
 - f. Demonstrate knowledge of risk assessment and mission structure.

C. Short-Hauler

Short-hauler candidates must:

1. Have completed the Interagency Helicopter Crewmember Training course (S-271).
2. Demonstrate knowledge of the inspection, care and maintenance of short-haul equipment and rigging.
3. Demonstrate knowledge of short-haul procedures.
4. Demonstrate knowledge of emergency procedures.
5. Complete a minimum of four short-hauls, two in typical terrain, without procedural error.
6. Demonstrate knowledge of mission components and ability to perform risk assessments.

NOTE: The Spotter should incorporate short-haul scenarios with deployments in typical terrain and/or confined areas into short-haulers initial training.

2.3 ANNUAL REQUALIFICATION REQUIREMENTS

Pilots and all short-haul personnel must participate in annual training and complete the following requirements to the satisfaction of the Check Spotter or Spotter.

A. Annual short-haul training will include:

1. Participation in helicopter safety refresher training.
2. Review and discussion of the local short-haul operations plan, emergency procedures and risk assessment.
3. Review of short-haul related incidents and lessons learned.
4. Review of the procurement document.

B. Pilot

In addition to the annual short-haul training, the Pilot will successfully complete the OAS-administered Short-Haul Pilot Practical Test outlined in the Interagency Helicopter Practical Test Standards as required per the procurement contract.

C. Check Spotter and Spotter

In addition to the annual short-haul training, Check Spotters and Spotters will:

1. Demonstrate knowledge of short-haul procedures and spotter responsibilities to another Spotter.
2. Complete four short-hauls without procedural error. If applicable, four cargo loads may be substituted for Human External Cargo (HEC).

D. Short-Hauler

In addition to the annual short-haul training, Short-haulers will:

1. Demonstrate knowledge of short-haul procedures.
2. Complete at least two short-hauls without procedural error. At least one must be in typical terrain.

E. Documentation

It is the responsibility of the Spotter or short-haul program manager to maintain documentation of initial training, requalification, proficiency and operational short-hauls. Documentation will include:

1. Names of personnel involved.
2. Terrain description.
3. Type of mission, either training or operational.
4. Date.
5. Number of evolutions performed, both with and without haulers.

2.4 PROFICIENCY REQUIREMENTS

It will be the responsibility of the Check Spotter or short-haul program manager to determine the frequency of proficiency short-hauls for all short-haul personnel, including the Pilot. In no case will the proficiency period exceed 90 days. The Check Spotter may require additional training based on the complexity of the program or for individuals needing more instruction. An operational short-haul within the proficiency period may count as a proficiency short-haul. Once past the proficiency period, only training short-hauls may be used to re-qualify.

Minimum Requirements:

Position	Initial Certification	Annual Refresher	Proficiency
Pilot	Meet PTS Operational training. Demonstrate ability to short-haul.	Meet PTS Operational training. Demonstrate ability to short-haul.	Precision longline, which may include HEC every 30 days. HEC mission every 90 days.
Check Spotter/ Spotter	Operational training. Spot six loads, two in typical terrain.	Operational training. Spot four loads without procedural error.	Spot HEC every 90 days.
Short-Haul Rescuer	Operational training. Complete minimum of four short-hauls, two in typical terrain, without procedural error	Operational training. Complete two short-hauls, one of which must be in typical terrain, without procedural error.	Short-haul every 90 days.

NOTE: Without sacrificing efficiency or safety, short-haul pilots are encouraged to practice precision placement of external loads as often as possible. During routine project work it may be useful to define targets and use a long line of the same length as the rope normally used for short-haul. This practice encourages the maintenance of short-haul skills.

CHAPTER 3: PERSONAL PROTECTIVE EQUIPMENT (PPE)

3.1 PPE STANDARDS

On board PPE will be worn in accordance with the Aviation Life Support Equipment (ALSE) Handbook during short-haul training and operations.

Short-hauler PPE: After an appropriate risk analysis, alternative PPE may be used outside the aircraft to enhance the safety of the short-hauler. For short-haulers on the rope, an approved aviator's helmet is recommended. A climbing helmet that is Union International Alpine Association (UIAA) or Common European (CE) approved is also permitted.

3.2 EXCEPTIONS

There are environmental conditions that require specific PPE that may vary from ALSE standards. Reference the 351 DM 1, NPS RM-60, and OPM 29 for authorization of exceptions and waivers to PPE.

A. Waiver Delegation.

Discretionary authorization for approval of waivers is delegated to NPS Regional Directors, per RM-60, for those circumstances where the protection of the individual after exiting the aircraft is deemed more critical to personal safety and security than that provided by PPE generally required for flight.

When the waiver authorization has been placed in effect by a region, a copy will be provided to the OAS Director. Waiver authorizations must also be included with bureau requests for procurement services when such operations are conducted.

B. Documentation.

A copy of the approved waiver will be included in the local aviation management plan and short-haul operations plan.

CHAPTER 4: SHORT-HAUL EQUIPMENT

4.1 LIFE SAFETY EQUIPMENT STRENGTH AND CERTIFICATION

A 5:1 Static System Safety Factor (SSSF) will be used for all life safety equipment used in the short-haul system, e.g., a minimum breaking strength of 10kN in the equipment's designed position of function is required for components anticipating a 2kN load. For the purpose of this document, life safety equipment is defined as that equipment used to suspend human external cargo. The SSSF is the ratio of the breaking strength of the weakest link in the system to the maximum expected static force.

There are a number of European and North American organizations that establish life safety equipment standards and validate the minimum breaking strengths and design components of equipment used in mountaineering, industrial fall protection and rescue systems. All life safety equipment used in short-haul will adhere to design standards and be certified by one of the following organizations.

- A. Underwriter Laboratories (UL)
- B. American National Standards Institute (ANSI)
- C. American Standard for Testing and Materials (ASTM)
- D. National Fire Protection Association (NFPA)
- E. Union International Alpine Association (UIAA)

Additionally, equipment conforming to the Common European (CE) standard will conform to the appropriate EN # for European Standards.

NOTE: The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader and does not constitute an endorsement by the NPS Short-haul Representatives for any product or service to the exclusion of others that may be suitable.

4.2 SHORT-HAUL ROPE ATTACHMENT POINT/ANCHOR

A short-haul anchor system is defined as the points of attachment of the short-haul rope system to the helicopter. This system will include both a primary and a secondary anchor. The primary and secondary anchors must be designed for pilot and/or spotter release in an emergency. The load must be fully jettisonable, using two separate and independent actions for release.

The aircraft cargo hook is excluded from the 5:1 SSSF requirement. The Federal Aviation Administration (FAA) is responsible for approving attachment devices or brackets, their installation and any proposed changes.

A FAA-certified Airframe and Powerplant (A&P) mechanic will perform maintenance tasks associated with hard point short-haul anchors (cargo hook).

- A. Metallic components of the short-haul anchor must be inspected annually, as a minimum.
- B. Belly bands and 3-ring release systems must be inspected annually and retired 5 years from the date put in service, or 10 years from the date of manufacture, regardless of condition. Software components that become fuel or oil soaked will be retired from service.
- C. Modification or repair of the anchor system will be done in accordance with the original equipment manufacturers standards.
- D. The short-haul program manager or Spotter will maintain records of inspection, maintenance and use for the government-furnished anchor system. Records will be retained for the life of the equipment and will contain the following information:
 - Identification number issued by the manufacturer;
 - Date of manufacture, date put in service, usage, last inspection with initials of individual;
 - Maintenance performed, including the date and the initials of the person who did the work.

4.3 SHORT-HAUL ROPE AND BALLAST

Short-haul rope is used to suspend HEC and cargo beneath the helicopter during short-haul operations. This is used for attachment from the helicopter anchor to personnel on the end of the rope in lengths that are safe and efficient for the specific needs of the individual mission and short-haul program.

The short-haul rope will be constructed of synthetic material which may include nylon, polyester or high molecular weight polyethylene, e.g., Spectra™ or Dyneema™. Cordage will be single strand or greater and of low-stretch, kernmantle, or braid-on-braid construction.

An un-weighted short-haul rope will have a minimum of 12 pound ballast attached to it in order to prevent excessive trailing behind the aircraft during forward flight. Additional weight should be considered for rope lengths in excess of 100 feet. Forward flight should not exceed 60 mph with the short-haul rope deployed.

Short-haul rope requirements

- A. Ropes will be marked in a non-destructive manner for identification.
- B. Short-haul rope history will be documented by the Spotter or short-haul program manager following each use. Documentation will include the date and specific type of use.
- C. Rope history will begin when it is put into service, noting the date of manufacture.

- D. Retirement of a short-haul rope may be dictated by age, documented usage history, or visual inspection.
- E. Short-haul rope will be retired 5 years from the date put into service, or 10 years from the date of manufacture, regardless of condition.

NOTE: When in doubt, retire it. For further guidance with regard to rope wear, inspection, care, and maintenance, refer to manufacturer's specifications and guidelines.

4.4 HARNESSSES AND PATIENT EXTRACTION EQUIPMENT

All harnesses will be commercially manufactured.

Short-haulers will attach to the short-haul rope with two independent tethers and carabiners.

The manufacturer's recommendations for proper use will be followed. Short-haul team members will inspect harnesses, tethers and extraction equipment frequently for wear or other damage, e.g., stitching, buckles, webbing abrasion, etc.

4.5 CARABINERS

All carabiners used for short-haul will be of a locking screw-gate, twist or auto-lock design and will satisfy the certifications listed in 4.1. Both steel and aluminum are approved.

Carabiners should be inspected frequently for proper function of gate and locking mechanisms, abrasion, burrs, rough edges, etc. As with other short-haul components and hardware, single points of attachment such as a single carabiner, should be avoided and backed up where possible.

NOTE: Carabiners are designed to be loaded longitudinally. If loading occurs on the side, i.e., cross-gate loading, failure may occur. If screw-gate carabiners are used, be aware of the potential for vibration induced movement of the locking mechanism.

4.6 KNIFE

A knife suitable for rapid cutting of tethers will be worn where it is accessible and easily deployed for emergency use.

4.7 SPOTTER ATTACHMENT

Refer to the ALSE Handbook, Chapter 2.4, “Aircrew Member Secondary Restraint System”.

- A. With the doors of the aircraft in the open position, the spotter on board the aircraft will maintain a two restraint system, one of which may include the seat belt.
- B. The spotter will attach two independent tethers to the harness. The tethers will be attached to aircraft hard points with carabiners in accordance with ALSE.
- C. Spotter will be in a seat and seat belted during takeoff and landing.

4.8 PROCESS FOR APPROVAL OF NEW EQUIPMENT

A New Equipment Testing Approval Request Form (Appendix E) will be submitted to the Short-haul Program Managers at each short-haul park when a proposed piece of life safety equipment either:

- A. Does not meet the equipment standards identified in 4.1,
- B. Or the use of the equipment results in a change to the standard procedures identified herein.

The Short-haul Program Managers will submit questions regarding the testing approval form to the NPS Lead Short-Haul Representative for the applicant to address. If all the Short-haul Program Managers have reached a consensus of approval for testing, the recommendation for testing will be submitted by the NPS Lead Short-Haul Representative to the applicant program’s Regional Aviation Manager for testing authorization.

If authorized for testing, the testing period will not exceed one year. After that time, the results of testing should be submitted to the Short-haul Program Managers.

Final approval for NPS use of the equipment will be decided by quorum, as compiled by the NPS Lead Short-Haul Representative. This plan will be updated as necessary.

CHAPTER 5: OPERATIONS

5.1 OPERATIONAL REQUIREMENTS

Operations and procedures will comply with DOI and NPS policy, the helicopter procurement document, and the local short-haul operations plan. All flight operations have inherent risk. Training and the judicious use of aviation resources may reduce the risk associated with a particular mission. Risk assessment is the subjective analysis of physical hazards and operational procedures used to arrive at informed GO/NO GO decisions. Initial and ongoing risk assessments are important to the successful outcome of any short-haul mission. The pilot retains final authority for a GO/NO GO decision when safe operation of the aircraft is a factor (per 352 DM 1, Aviation Safety; 1.9, A). See Appendix D for Risk Assessment examples.

- A. The standard crew configuration includes a spotter on board the aircraft during short-haul operations.
- B. When there are aircraft performance limitations or other incident specific safety issues, the spotter may be located outside of the aircraft. It is imperative that the pilot have clear communications with the spotter regardless of location.

5.2 SHORT-HAUL OPERATIONS SEQUENCE

The following steps, at minimum, must be completed during short-haul operations.

- A load calculation for reconnaissance flight/proposed site/operation.
- Reconnaissance flight.
- Mission planning.
- Mission briefing, with risk assessment.
- Ship configured for short-haul.
- Short-haul operation completed.
- Mission debriefed.

5.3 HELICOPTER LOAD CALCULATIONS AND FLIGHT RESTRICTIONS

- Interagency Helicopter Load Calculation will be completed per the instructions for Form OAS-67/FS 5700-17.

- Flight operations and procedures will be conducted from 1/2 hour before official sunrise until 1/2 hour after official sunset.
- Visibility for short-haul operations will be in accordance with applicable policy.

NOTE: Life-threatening emergencies may prompt deviation from the Departmental Manual and/or this Short-Haul Operations Plan. In such an event, thorough documentation and submittal of a SAFECOM is required. The risk-to-benefit gain of deviation should be carefully assessed through risk management procedures.

5.4 RECONNAISSANCE FLIGHT AND MISSION PLANNING

The purposes of the reconnaissance flight is to size up the scene, determine if short-haul is the appropriate response and, if so, collect the necessary environmental data and aircraft performance data necessary for the risk analysis. The flight is also used to identify suitable short-haul and staging sites.

The Spotter will assist with navigation and be alert to hazards (use hazard map, watch for other aircraft, clearances, wires, changing conditions, etc.).

The Spotter and Pilot will evaluate the short-haul site, staging site, and contingency insertion/extraction sites. Personnel already on scene may assist with gathering the following information:

- proximity to the incident
- approximate size
- slope
- rotor clearance
- wind conditions
- ground hazards
- approach and departure routes
- whether non-incident personnel are in the area
- flight hazards

A hover out of ground effect (HOGE) power assurance check, to include a positive rate of climb check, will be performed near the short-haul site.

Based on information gathered during the reconnaissance flight, the Pilot and Spotter will make the final determination if a short-haul is within the performance capabilities and power limitations of the helicopter.

The incident command team will make the final decision as to whether or not a short-haul is warranted after consideration of all other factors.

5.5 MISSION BRIEFING

A briefing will be provided by the Spotter prior to short-haul operations and must include the Pilot, the Helicopter Manager and, to the greatest degree possible, all persons involved in the operation.

As a minimum, the following will be addressed during the mission briefing:

- Short-haul GAR.
- Nature of the mission.
- Location.
- Terrain.
- Weather.
- Landing areas.
- Aircraft capabilities (load calculation, performance, etc.).
- Individual responsibilities (i.e. line management, commo/radio management, patient management).
- Cargo, if applicable.
- Geographic hazards (e.g. power lines, towers, snags, etc).
- Environmental hazards (e.g., fire behavior, avalanche danger, rock fall danger).
- Safety considerations.
- Emergency procedures.
- Situational awareness review.

5.6 HELICOPTER EQUIPMENT

The Pilot and Spotter will ensure the following (may vary by aircraft):

- Aircraft configured (e.g. doors on or doors off) as directed by the pilot.
- Unnecessary cargo removed from aircraft. Necessary cargo secured and accessible. External cargo baskets removed, as needed.
- Avionics cords secured.
- Seat belts secured.
- Maps and mission information secured, but accessible.
- All radios operational and on correct frequencies.
- Intercom system operational.

5.7 AIRCRAFT RIGGING

The Spotter is responsible for rigging the helicopter for short-haul and will ensure the completion of the following: (See checklist in Short-haul Procedures Field Guide, Appendix C).

- Short-haul rope inspected and deployed.
- Ballast bag secured.
- Secondary attachment installed correctly and inspected.
- Short-haul rope steel ring hooked into primary cargo hook.
- Short-haul rope steel ring connected to secondary attachment with a locking carabiner.
- Primary/Secondary Attachment release checks.
- Pilot's primary electrical
- Pilot's primary manual
- Pilot's secondary manual
- External primary manual
- Walk-around.

5.8 SHORT-HAULER INDIVIDUAL/BUDDY EQUIPMENT CHECK

A Short-hauler individual/buddy equipment check will be completed prior to any short-haul operation. All steps of the equipment check should be visual, tactile and verbal for thoroughness. Individuals being checked will be attentive to each step of the process. Inspection will be from head to toe and adapt to specific equipment used. When a partner is not available, a self-check will be performed. Helmet - Chin strap secure. Eye and hearing protection in place.

1. **Radio** - Attached under the harness and connected to the helmet. Radio on, correct frequency selected, scan off.
2. **Harness** - Properly donned, strap ends stowed, no twists, adjusted per individual.
3. **Knife** - Readily accessible and secured.
4. **Clothing, Footwear & Gloves** - Mission appropriate.
5. **Tether** - Appropriately attached to harness, carabiner(s) properly attached to tether.
6. **Anchor(s)** - Ready for deployment (applicable only to programs employing anchoring of short-haulers to terrain).

NOTE: If the check is interrupted, or a discrepancy is found, it will start over from the beginning.

5.9 SPOTTER INDIVIDUAL/BUDDY EQUIPMENT CHECK

A Spotter individual/buddy equipment check will be completed prior to any short-haul operation. All steps of the equipment check should be visual, tactile and verbal for thoroughness. Individuals being checked will be attentive to each step of the process. Inspection will be from head to toe and adapt to specific equipment used. When a partner is not available, a self-check will be performed. Helmet secured with chin strap. Eye and hearing protection in place.

1. **Radio** – Connected to onboard radio and intercom system. Short-haul frequency selected.
2. **Harness** - Properly donned, strap ends stowed, no twists, adjusted per individual.
3. **Knife** - Readily accessible and secured.
4. **Clothing, Footwear & Gloves** - Mission appropriate.
5. **Tether** - Appropriately attached to harness, carabiner(s) properly attached to tether and to aircraft.

NOTE: If the check is interrupted, or a discrepancy is found, it will start over from the beginning.

5.10 SHORT-HAUL INSERTION/EXTRACTION PROCEDURES AND COMMUNICATIONS

During short-haul operations the Spotter/Pilot will request/verify that the radio frequency is cleared for “emergency traffic only” and will advise when initiating operations and when complete with operations.

A radio check should be done to establish communications between the aircraft and appropriate short-haul personnel, including Pilot, Spotter, short-haulers and ground crewmembers.

Radio communication between the aircraft and the short-hauler(s) will be conducted between the Pilot and the short-hauler(s) unless the pilot delegates communications to the Spotter.

I. Short-haul Extraction Operations

- A. Pilot initiates final approach to the extraction site, slows descent and stabilizes the rope.
- B. Communication is established between short-haulers and aircraft.
- C. Short-hauler relays
 - Winds.
 - Known hazards.
 - Weights.
 - Configuration, e.g., “Two short-haulers and Bauman bag”.

- D. Short-hauler states, “**Ready to receive**”. Response from helicopter to ground crew, “**inbound**”.
- E. Short-hauler(s) may assist pilot by calling out distances of end of the rope (ring) above the canopy/obstacles and will assist pilot in calling out distances of end of the rope (ring) above ground. All radio traffic should be clear and concise.
- F. When applicable, short-hauler will indicate load “**entering canopy**”.
- G. Short-hauler will call distance from lowest point on rope (ring/load) to the ground “**five zero**”
- H. Pilot responds “**Copy, five zero**” at the start of the cadence.
- I. Height above ground will then be delineated by calling out “**four zero, three zero, two zero, one zero, eye level.**” No mirrored responses to these calls are given by the Pilot.
- J. When the short-hauler has control of the line, the short-hauler communicates “**got it**”, indicating to the Pilot to hold and maintain hover.
- K. When ready, the Pilot radios short-hauler to “**hook up**” and Spotter gives the “**hook up**” signal.
- L. Once hooked in, acknowledgment of readiness is made between the short-haulers.
- M. The short-hauler communicates “**ready**” and gives the “lift” signal.
- N. Pilot states “**coming up**” and lifts short-hauler(s). Short-hauler communicates “**clear of obstacles**” and gives the “**clear of obstacles**” signal when appropriate.

While these communications are standard, additional communications may be necessary.

II. Short-haul Insertion Operations

- A. Pilot initiates final approach to the insertion site, slows descent and stabilizes the short-hauler(s)/load on the rope.
- B. Short-hauler(s) will assist Pilot by calling out distances of load above the canopy/obstacles and will assist pilot in calling out distances of load above ground. Short-hauler(s) will also point out any hazards to the Pilot. All short-hauler radio traffic should be clear and concise.
- C. When applicable, short-hauler may indicate load “**entering canopy**”.
- D. Short-hauler will call distance from lowest point on the rope to the ground “**five zero**”.
- E. Pilot responds “**copy, five zero**” at the start of the cadence.
- F. Height above ground will then be relayed by calling out “**four zero, three zero, two zero, one zero.**” No mirrored responses to these calls are given by the Pilot.

- G. When the short-hauler is on the ground and ready to unhook, short-hauler communicates “**secure**” and unhooks. The pilot will acknowledge by responding “**unhook**” and the spotter gives the “**unhook**” signal.
- H. Short-hauler radios the pilot that they are clear of the line by stating “**clear**” and gives the “lift” hand signal.
- I. Pilot states “**coming up**” and lifts empty rope. Short-hauler communicates “**clear of obstacles**” and gives the “**clear of obstacles**” signal when appropriate for forward flight.

While these communications are standard, additional communications may be necessary.

NOTE: If receiving an unattended external load, short-haul ground personnel will follow the standard height-above-ground call outs.

III. In-flight Considerations

- A. Short-haul rope should be flown with line ballast in order to prevent excessive trailing behind the aircraft in forward flight.
- B. Forward flight should not exceed 60 mph with the short-haul rope deployed.
- C. In-flight spinning or position changes may be reduced by short-hauler extending an arm or a leg.
- D. Radio communication quality is best if the helmet boom mic is flush against the lips and cupped by hand and the head is turned away from the wind.

IV. Loss of Radio Communication Considerations

- A. If radio communication cannot be established on the initial approach (no HEC), the evolution should be aborted until radio communication can be re-established.
- B. If radio communication is lost during the insertion or extraction sequence with HEC, the mission may continue using hand signals. Loss of radio communication does not necessitate cessation of the mission, but should be evaluated on a case-by-case basis
- C. If radio communication is lost at any time during the transport or ferry portion of the short-haul insertion or extraction, the Pilot and Spotter may opt to return to the staging site.
- D. If the short-hauler(s) lose radio communication or wish to terminate the mission, they should initiate the “wave-off” hand signal.

V. Communication Within Aircraft Between Spotter and Pilot

- A. Task assignment is agreed upon between Spotter and Pilot prior to any short-haul mission, including delegation of radio communication with short-haulers or ground personnel.

- B. Flight hazards are communicated using common terms such as up, down, left, right, forward, and back. Distances from obstacles should be communicated in feet.

VI. Short-haul Procedures Field Card

- A. During short-haul training and operations, personnel may use the Short-haul Procedures Field Card (Appendix C) as a job aid to help ensure consistency. The items included in the Card serve as a minimum standard and programs may choose to add additional items.

5.11 MISSION DEBRIEF

Following short-haul training and operations, a debriefing should be conducted. The debrief immediately following the operation should include:

- Provide feedback to personnel involved.
- Identify areas of concern for follow up.
- Reinforce lessons learned.

5.12 SHORT-HAUL HAND SIGNALS

Onboard Spotter Hand Signals



WAVE – OFF

Wave-off indicates the need to stop and do the opposite of current operations.

This is performed by waving one outstretched arm back and forth on a horizontal plane.

Onboard Spotter Hand Signals Continued



HOOK / UNHOOK

This is performed by holding one outstretched arm with a closed fist in a stationary position.

Short-hauler Hand Signals



LIFT

This is performed by extending one forearm upward from shoulder height in a 90° angle bend at the elbow. With fingers outstretched, rotate in a circular motion.



CLEAR OF OBSTACLES

This is performed by extending one arm out in front of the body using a chopping motion. Fingers are to be outstretched in a vertical plane.

Short-hauler Hand Signals Cont.



OK? / OK!

This is performed by tapping one hand on the top of haulers helmet.



HOLD HOVER

This is performed by extending one arm out to the side of the body at shoulder height. This is to be held in a stationary position with a closed fist.



WAVE OFF

This is performed by extending two arms over head and waving back and forth.

NOTE: Short-haul hand signals should be clearly visible to the intended recipient. If additional hand signals are needed, refer to standard helicopter hand signals in the IHOG or the Incident Response Pocket Guide (IRPG).

5.13 ADMINISTRATIVE DUTIES

The Short-haul Program Managers will be responsible for the completion of documentation related to short-haul activities.

The Spotter will have sufficient training, qualifications and experience to accomplish the following duties and responsibilities:

- A. Communicate problems with contract personnel or equipment to appropriate personnel (Helicopter Manager, Project Inspector, Contracting Officer's Representative, etc.).
- B. Complete necessary SAFECOMs in a timely manner.
- C. Monitor currency of short-haul personnel and schedule training as needed.
- D. Ensure that short-haul equipment logbooks are current.

CHAPTER 6: EMERGENCY PROCEDURES

Planning for emergencies is a critical component of risk management. Short-haul programs must evaluate and discuss potential scenarios and actions that may best mitigate any associated hazards. Training for effective crew resource management should be a part of this process.

It is imperative that everyone involved in short-haul understand how instantaneously an in-flight emergency may occur. Examples of formalized emergency planning procedures are outlined below.

WARNING: Short-haul operations are inherently dangerous and could be fatal. This must be discussed during training and operations. Release of the short-haul rope while human external cargo is attached beneath the aircraft is a possibility. In case of an aircraft emergency, the Pilot may attempt to land with HEC attached to the short-haul rope. The decision of any short-hauler to cut away from the line is a personal choice depending on the circumstances and best chance for survival.

6.1 SHORT-HAUL ROPE ENTANGLEMENT

In the event of rope entanglement, the pilot may determine it is necessary to release the rope. The Pilot will notify the Spotter and ground personnel if the rope will be released.

6.2 IN-FLIGHT EMERGENCIES

In-Flight Short-haul Emergency Procedures

Pilots, Spotters and Short-haulers must understand the significance of an in-flight emergency involving human external cargo (HEC) and discuss emergency procedures and their respective roles. During an emergency is NOT the time or place to discover that, “What you heard is not what I meant.”

Clear and concise communication between the Spotter and Pilot is critical to a successful outcome of an in-flight emergency. There are two categories of short-haul in-flight emergencies.

- A. **Delayed Response** - Those that allow a delayed action (land as soon as practicable).
- B. **Immediate Response** - Those that require an immediate action (land as soon as possible).

Pilots are trained to respond to in-flight emergencies in accordance with the Rotorcraft Flight Manual in addition to the emergency procedures outlined in this plan.

Delayed Response Emergencies (Land as Soon as Practicable)

Many events fall into this category. These are characterized by an ability to delay the departure from the short-haul hover. These events typically allow time to place the load safely on the ground prior to departing the hover.

Examples of Possible Delayed Response Emergencies:

- A. Transmission/engine/tail rotor gearbox chip light.
- B. Hydraulic failure.
- C. Oil temp/oil pressure light.
- D. Hydraulic temp or pressure light.
- E. Unknown Master Caution.
- F. Fire light.
- G. Stuck pedal.
- H. Fuel control or governor failure high side.
- I. Electrical failure.
- J. Compressor stall.
- K. Adverse environmental conditions.
- L. Line entanglement.

Immediate Response Emergencies (Land as Soon as Possible)

There are a limited number of emergencies that fall into this category. These are characterized by a need to transition immediately to forward flight, establish an autorotation, or execute a forced landing. In this type of emergency, a positive outcome may be impacted by the ability to jettison any external load quickly.

Examples of Possible Immediate Response Emergencies:

- A. Engine failure
- B. Tail rotor failure
- C. Hard-over of controls
- D. Engine over speed/driveshaft failure
- E. Compressor stall
- F. Governor failure
- G. Fire

Pilot and Spotter Delayed Response Actions

These procedures apply when rope is attached to aircraft.

“EXPEDITE, EXPEDITE” and the subsequent actions taken by the Pilot and Spotter will occur almost simultaneously. The Pilot will attempt to gain forward flight, which may require releasing the short-haul line. Any failure to immediately release the line may pose a threat to the aircraft and personnel onboard, as well as increase the risk to the short-hauler.

Pilot Duty:

During a delayed response emergency, the pilot will alert with “EXPEDITE, EXPEDITE” as the initial alert for the crew that the short-haul must be halted due to an aircraft malfunction or environmental condition. It should not be the only communication. As the situation allows, the pilot should advise the crew of the aircraft status and the intended duration of the flight. Safe delivery of the hauler nearest suitable site should happen immediately. Delays may occur when no suitable site is readily available.

Alert should be broadcast over short-haul frequency.

Spotter Duty:

The spotter should assist the pilot in locating a suitable site for the hauler.

PILOT STATES:	ACTION/RESPONSE:
Short-haul rope attached, No HEC “EXPEDITE, EXPEDITE”	Spotter: Take seat and fasten seat belt. State “READY.” Pilot: Release secondary and, as necessary, release primary. Pilot/Spotter: Note location of jettisoned equipment for subsequent retrieval.
Short-haul rope attached, with HEC attached: “EXPEDITE, EXPEDITE”	Spotter: Assist in locating nearest suitable site to insert hauler. Pilot: Insert hauler to suitable site. Spotter: Take seat and fasten seat belt. State “READY.” Pilot: Release secondary, as necessary, release primary. Pilot/Spotter: Note location of hauler and equipment for subsequent retrieval.

For those programs that require a Spotter to release the secondary anchor due to configuration of the aircraft, references to releasing the secondary anchor by the Pilot, above, instead defer to the Spotter.

Pilot and Spotter Immediate Response Actions

These procedures apply when a rope is attached to aircraft.

“MAYDAY, MAYDAY” and the subsequent actions taken by the Pilot and Spotter will occur almost simultaneously. The Pilot will attempt to gain forward flight, which may require releasing the short-haul rope. Failure to immediately release the rope may pose a threat to the aircraft and personnel on board, as well as increase the risk to the short-hauler.

Pilot Duty:

Identify emergency and alert others without delay.

Alert should be broadcast over short-haul frequency.

Spotter Duty:

Take seat and fasten seat belt. Assist in line release if possible.

PILOT STATES:	ACTION/ RESPONSE:
“MAYDAY, MAYDAY”	<p>Spotter: Take seat, Fasten seat belt, and Prepare for emergency landing.</p> <p>Pilot: Release secondary, Evaluate situation, Release primary as necessary.</p> <p>Spotter: Time permitting, state “LINE CLEAR”.</p>

SHORT-HAULERS (if on the rope): Assess situation, determine best course of action.

For those programs that require the Spotter to release the secondary anchor due to the configuration of the aircraft, references to the Pilot releasing the secondary anchor, above, instead defer to the Spotter.

APPENDIX A: NEW SHORT-HAUL PROGRAM START-UP PROCEDURES

For new short-haul programs, initial start-up can be a daunting and intimidating. The process takes time to initiate and implement. Standing up a new short-haul program should follow a logical sequence. The following recommendations are intended to provide direction.

Approval

A local short-haul program manager must be designated. Usually this person creates the short-haul program request and presents it to NPS management, per RM-60, for initial approval.

Short-haul programs must be approved by the bureau. New program requests will be forwarded to and approved by the Director of the National Park Service or their delegate and then forwarded to the DOI Associate Director.

Requests will include a copy of the proposed local short-haul operations plan describing when and how short-haul will be used. The operations plan must also include a GO/NO-GO process for risk management purposes. Plans must comply with departmental and bureau policy and guidelines.

- ❖ A short-haul operations plan is normally written by the local program aviation manager and details program requirements for the local unit. The plan should be referenced in the local aviation management plan. It is recommended that new programs seek input from the NPS Short-Haul Group of Representatives and NPS specialists.

Program Funding

It is important that funding be available to provide for initial start-up and continual support of the short-haul program. Some funding considerations are:

- ❖ **Helicopter costs** – Pilot and short-haul personnel proficiency training may require between 8 to 10 hours of flight time per year.
- ❖ **Short-Haul equipment purchase** - Initial equipment purchase may cost between \$10,000 and \$20,000. Annual equipment upkeep may be at least \$1,000 average per year.
- ❖ **Short-Haul workshop attendance** - Additional annual costs for training and workshops are approximately \$2,000 to 5,000.
- ❖ **Pilot proficiency** - The Pilot(s) must pass a four phase short-haul check ride. This will require practice time. The cost of the accrued flight time may be stipulated in the procurement document or negotiated between the contractor and Contracting Officer.
- ❖ **Short-Haul personnel** will be required to attend Interagency Helicopter Crewmember Training (S-271) and annual and proficiency short-haul training.
- ❖ **Additional costs to consider:**
 - There may be additional cost if a check spotter has to be brought in.
 - Spotters are required to be qualified as resource helicopter managers.
 - Short-haul program managers should attend the annual short-haul workshop.
 - Spotters are required to attend a triennial helicopter manager workshop (RT-372).

Timeframe

Anticipate at least 8 to 12 months as a minimum before initial short-haul training can begin. The amount of time required to initiate a short-haul program will vary due to a number of factors.

- ❖ Will the aircraft type require new development of equipment or procedures? Helicopter models currently not being used for short-haul may require at least 12 months for equipment evaluation and approval.
- ❖ What type of helicopter procurement document? An existing procurement document will require modification to include pilot short-haul proficiency and possible aircraft equipment modifications.

Program Preparation

Approval Process

- ❖ Local
- ❖ Regional
- ❖ National
- ❖ Send to OAS Associate Director

Program Funding

- ❖ Helicopter procurement document – Contact the appropriate OAS region as soon as possible to initiate the aircraft procurement and pilot approval process.
- ❖ Short-haul equipment purchase – Secondary short-haul anchor will be associated with helicopter make and model, and so may influence procurement and installation.
- ❖ Develop an estimate of total cost for personnel and aircraft associated equipment.
- ❖ Develop an estimate of annual training costs for Short-haul personnel and pilot proficiency.
- ❖ Program additional funds to cover miscellaneous costs.

Final Details

- ❖ Aircraft inspection – New make and model of aircraft that have not been used for short-haul previously may require additional research and evaluation. Sufficient time will be required prior to the pilot proficiency test.
- ❖ Pilot proficiency – Evaluations will be conducted by an OAS Helicopter Inspector Pilot and the local short-haul program manager. Ample time should be provided in case the pilot fails the test and requires additional proficiency training.
- ❖ Short-haul training – Training should not be scheduled until the aircraft inspection and the pilot proficiency test have been successfully completed.

NOTE: It is imperative that the local short-haul program manager and the OAS Regional Office maintain close contact throughout the entire process. Sufficient planning must occur at each stage to eliminate additional costs and to prepare for the next stage. After the approval process, program funding and final details are completed; the program is considered an operational short-haul program.

APPENDIX B: TRAINING OUTLINE

Short-haul programs should use the following training outline and may add program-specific items as needed.

Unit I: Program Orientation and Overview

Objective: Provide students with an overview of short-haul program and policy requirements

Approximate Time: 3 to 4 hours

Training Aids: NPS Helicopter Short-Haul Operations Plan, local short-haul operations plan, Aviation Life Support Equipment Handbook (ALSE), Interagency Helicopter Operations Guide (IHOG).

<u>OUTLINE</u>	<u>NOTES</u>
<p>Make sure students have copies of the NPS Short-Haul Operations Plan and local short-haul operations plan, ALSE Handbook, and IHOG. It is preferable that students are given these documents, along with other pertinent reading material, prior to training.</p> <p>I. Program history</p> <p style="padding-left: 40px;">A. Local</p> <p style="padding-left: 40px;">B. National</p> <p>II. Review NPS policy and guidelines.</p> <p>III. Review Short-haul Operations Plan and Local Short-haul Operations Plan</p> <p style="padding-left: 40px;">A. New Programs</p> <p style="padding-left: 40px;">B. Pilot Requirements</p> <p style="padding-left: 40px;">C. Training Requirements</p> <ul style="list-style-type: none"> • Check Spotter • Spotter • Short-Hauler • Annual Requalification • Proficiency Requirements 	<p>❖ <i>NPS Short-haul Ops Plan, Ch 1</i></p> <p>❖ <i>Reference RM-60, IHOG, Park Aviation Management Plan</i></p> <p>❖ <i>Short-Haul Ops Plan and Park Short-haul Ops Plan</i></p>

OUTLINE	NOTES
<p>D. Operational Requirements</p> <ul style="list-style-type: none"> • Load Calculations • Flight Restrictions • Mission Briefing • Risk Assessment • Equipment Checks • Duties <p>E. In-Flight Emergencies</p> <p>F. Documentation</p>	
<p>IV. Equipment Orientation</p>	
<p>A. Personal Equipment</p> <ul style="list-style-type: none"> • Clothing • Helmet • Harness • Knife • Tethers • Other (PFD, Footwear, Packs, etc.) 	<ul style="list-style-type: none"> ❖ <i>ALSE Handbook, IHOG</i> ❖ <i>Short-haul Ops Plan Ch 4</i> ❖ <i>Discuss the use of PPE waivers</i>
<p>B. Secondary Release System</p> <ul style="list-style-type: none"> • Construction Specifications • Installation Procedures • Inspection Requirements • Release system function 	
<p>C. Short-Haul Ropes and Equipment</p> <ol style="list-style-type: none"> 1. Hardware <ul style="list-style-type: none"> • Inspection (preflight and post flight) • Care during use • Cleaning • Storage • Retirement • Documentation 2. Software <ul style="list-style-type: none"> • Construction and requirements • Inspection (preflight and post flight) • Care during use • Cleaning • Storage • Retirement • Documentation 	

OUTLINE	NOTES
<p>V. Communications</p> <ul style="list-style-type: none"> A. Radio B. Hand Signal C. Siren/PA D. Other 	<p>❖ <i>Short-haul Ops Plan, Ch 5</i></p>
<p>VI. Safety and Emergency Procedures</p> <ul style="list-style-type: none"> A. Local Hazards and Problems B. Review Immediate and Delayed Response Emergency Procedures C. Entanglement <ul style="list-style-type: none"> • Prevention • Release procedures D. Crash Procedures <ul style="list-style-type: none"> • Pilot duties • Spotter duties • Short-haul personnel E. Survival Equipment and Use <ul style="list-style-type: none"> • Signal mirror • Signal smoke • Other 	<p>❖ <i>Short-haul Ops Plan, Ch 6</i></p>
<p>VII. Documentation</p> <ul style="list-style-type: none"> A. Training and Qualifications B. Operational Short-Haul C. Training Short-Haul D. Case Incident Reports E. SAFECOM/Mishaps F. Equipment documentation G. AARs/FLAs 	<p>❖ <i>Short-haul Ops Plan, Appendices, local short-haul ops plan</i></p>

Unit II: Field Training

Objective: Train and qualify students in safe short-haul procedures.

Approximate Time: 6 to 12 hours

Training Aids: Helicopter, lifting device, raised platform, ground markers/targets, and local equipment (SAR/EMS/LE), typical terrain.

<u>OUTLINE</u>	<u>NOTES</u>
<p>Step-by-Step Orientation (with Helicopter)</p> <p>I. Ground Mock-up</p> <p>A. Pilot Briefing</p> <p>B. Rigs equipment and rope</p> <p>C. Doors removed and secured</p> <p>D. Loose equipment removed/secured</p> <p>E. Radio frequency established</p> <p>F. Radio check with pilot and personnel</p> <p>G. Understanding of mission/role</p> <p>H. Short-hauler Equipment Check</p> <ul style="list-style-type: none"> • Helmet • Eye protection • Fire resistant clothing • Knife • Radio check • Personal tethers • Harness • Gloves • Boots • Pack • Other equipment <p>I. Short-haul Equipment</p> <ul style="list-style-type: none"> • Screamer suit • Bauman bag • Other <p>J. Communication</p> <ul style="list-style-type: none"> • Hand signals • Radio 	<ul style="list-style-type: none"> ❖ <i>Spotter and pilot will check cabin and configuration for short-haul.</i> ❖ <i>The pilot and spotter will install and test anchor (primary and secondary).</i> ❖ <i>Short-haulers should observe and double-check this procedure.</i> ❖ <i>Short-haul rope, carabiners, and other equipment attached correctly, checked and operational.</i> ❖ <i>Each short-hauler will perform a buddy check, working from head to toe.</i> ❖ <i>Check knife for tether and easy accessibility.</i> ❖ <i>Radio/comm check.</i>

<u>OUTLINE</u>	<u>NOTES</u>
<p>confirms radio communications.</p> <ul style="list-style-type: none"> • Short-hauler relays hazards, environmental conditions, weights, short-haul configuration and states “ready to receive”. • Response from helicopter to ground crew “inbound”. • Short-hauler(s) assist pilot by calling out distance above ground and any hazards. All short-hauler radio traffic must be clear and concise. • Heights above ground will be delineated by calling “five zero, four zero, three zero, two zero, one zero” pilot acknowledges “five zero” at the start of the count and then silent. • When short-hauler has the rope in hand, short-hauler radios “got it”. • When ready, pilot radios to short-hauler to “hook up” and spotter gives the hook signal. • Once attached, the short-hauler radios “ready” and gives the lift signal. • Pilot states “coming up” and lifts short-hauler(s). Short-hauler radios “clear” and gives the clear of obstacles signal when clear for forward flight. <p>C. Insertion Evolution</p> <ul style="list-style-type: none"> • Pilot initiates final approach to the insertion site, slows descent and stabilizes the short-hauler(s) on the line. • Short-hauler may assist pilot by calling out distance above the canopy and short-hauler(s) will assist pilot by calling out distance above ground. Short-hauler(s) should also point out any hazards to pilot. When applicable, short-hauler(s) will radio when load is “entering canopy”. • Height above ground will be relayed by calling out “five zero, four zero, three zero, two zero, one zero”. Pilot 	

<u>OUTLINE</u>	<u>NOTES</u>
<p>acknowledges “five zero” at the start of the count and then silent.</p> <ul style="list-style-type: none"> • When short-hauler is ready to unhook short-hauler radios “secure”. • When ready, the pilot will say “unhook”, and the spotter will give the “unhook signal”. • Short-hauler(s) unhook(s) and radios “clear”, and gives the lift signal. <p>D. In Flight Considerations</p> <ul style="list-style-type: none"> • Short-haul rope will not be flown un-weighted in order to prevent excessive trailing behind the aircraft in forward flight. • In flight spinning can be prevented by extending an arm or leg. • Quality radio communication is best if the helmet boom mic is flush against the lips and cupped by hand and the head is turned away from the wind. • If, at any time during the transport or ferry portion of the short-haul insertion or extraction, radio communications are lost or become inadequate, the pilot and spotter may decide to return to the staging site. • If the short-hauler(s) lose communication or wish to terminate the mission, initiate the wave off hand signal. 	

<u>OUTLINE</u>	<u>NOTES</u>
<p>VII. Typical Terrain Training</p> <p>A. Varied Locations.</p> <p>B. Typical Hazards such as snow, pinnacles, ledges, moving water, etc.</p> <p>C. Pilot Duties (recon check flight)</p> <ul style="list-style-type: none"> • Flight following (spotter may assist with navigation, watching for other aircraft, hazards, etc). • Pilot, spotter, and short-haulers will select a short-haul site. • Evaluate short-haul site for: <ul style="list-style-type: none"> a) proximity to incident b) size c) slope d) rotor clearance e) wind conditions • Complete hover check and Go/No-Go decision. • Select staging area to rig for short-haul. <p>D. Short-Hauler Duties (Extraction, Insertion)</p>	<p>❖ <i>Evaluate training locations ahead of time.</i></p> <p>❖ <i>Reference Short-hauler duties as outlined above in live helicopter evolution training</i></p>
<p>VIII. Mission Scenario (optional)</p> <p>A. Create a realistic situation</p> <p>B. Pilot and spotter briefing</p> <p>C. Pilot duties</p> <p>D. Spotter duties</p> <p>E. Short-hauler duties</p>	<p>❖ <i>Planning for missions should be accomplished with input from instructors, program manager, pilot, spotter and short-hauler.</i></p> <p>❖ <i>Use risk assessment and risk management tools/procedures.</i></p>
<p>IX. Critique and Wrap-Up</p> <p>A. Debrief.</p> <p>B. Seek input for program improvement.</p> <p>C. Documentation completed</p>	<p>❖ <i>Everyone is encouraged to participate.</i></p> <p>❖ <i>Document feedback, both positive and negative.</i></p>

APPENDIX C: JOB AIDS

SHORT HAUL PROCEDURES FIELD GUIDE

NPS Short-Haul Procedures

Page 1

Reconnaissance Check Flight

Lat ____° ____' ____" Long ____° ____' ____"

Pressure Altitude: _____'

Outside Air Temp: _____°

Wind Speed _____ Direction _____ Gust _____

Wx issues _____

Power: Adequate/ Not Adequate

Rotor Clearance: Adequate/Not Adequate

Light/Vis issues? (flat light, poor vis, darkness, etc)

Terrain _____ Slope ∠ _____

Anchors Needed? Yes / No

Other Hazards: _____

of patients _____ Approx weights _____

Patient Status: Green Yellow Red Black

Fuel on Board: _____

Totality of Circumstances _____

Relay Information to IC/Ops Chief

Staging Site

Load Calc in agreement with recon findings

Short-Haul Mission Briefing conducted

Go-No-Go decision made

Mission Approval at appropriate level received

Aircraft Rigging

Check (minimum spotter + 1 qualified s-h)

SH rope laid out and inspected

Ballast bag secured

Secondary attachment inspected

SH rope steel ring hooked into primary cargo hook

SH rope steel ring connected to secondary via
locking carabiner

Primary/Secondary Attachment release checks

Pilot's primary electrical

Pilot's primary manual

Pilot's secondary manual

External primary manual

Walk-around completed

Page 2

Buddy Check: Look-Touch-Talk

Helmet, Eye/Ear protection

Radio system operational

Harness & S-H attachments correct & mission ready

Knife easily accessible and secure

Clothing, Footwear & Gloves mission appropriate

Anchor(s) ready for deployment

Repeat check on backside

Spotter tether attached to spotter attachment point(s)

Comm Check:

Pilot ↔ Spotter ICS check

Pilot ↔ SH'er radio check

Radio Silence / Priority Status

Short-Haul Commands

Extraction:

SH'er Establishes positive comms with pilot
(provide winds, weights, concerns, hazards, config)

“Ready to receive”

Pilot “Inbound” delivers rope to SH'er(s)

SH'er “5-zero”

Pilot “Copy 5-zero”

SH'er “4-zero...3-zero...2-zero...1-zero...eye level”

Pilot Holds rope in position

SH'er “Got it”

Pilot “Hook up”

SH'er “Ready” (Lift Hand Signal)

Pilot “Coming up”

SH'er When lifted clear for forward flight: **“Clear of obstacles”** (Clear of Obstacles Hand Signal)

Insertion:

SH'er “5-zero”

Pilot “Copy 5-zero”

SH'er “4-zero...3-zero...2-zero...1-zero...5,4,3,2,1..”

SH'er “Secure” once down and footing established

Pilot “Unhook”

SH'er “Clear” (Lift Hand Signal)

NOTE: Page 1 is intended as a checklist for Pilot and Spotter. Page 2 displays buddy checks and verbal commands for the participating Short-haul team members.

APPENDIX D: RISK ASSESSMENT /MANAGEMENT WORKSHEETS

The following documents are examples of risk assessment templates, forms and checklists used to properly identify hazards and mitigate the risks associated with a short-haul mission. These documents are used to open critical conversations and prompt individuals involved to consider the added risk of a helicopter short-haul.

The GAR Risk Assessment Helicopter Short-Haul Worksheet is required for all rescue short-hauls. It should include the key overhead and functional positions to execute a short-haul rescue. This may include:

- Incident Commander
- Pilot
- Spotter
- Hauler(s)
- Duty Officer
- Helicopter Manager if different from Spotter

The additional checklists are suggested templates to gather the information needed to make the best Go/No-Go decision based on known and expected conditions. The forms may be re-formatted/re-organized to meet individual Park Unit program needs.

It is understood that risk management is an on-going process. Key elements of all risk assessments and discussions will be documented and kept with the Short-haul records.

GAR RISK ASSESSMENT – HELICOPTER SHORT-HAUL

Employing the GAR Model (GREEN AMBER RED)

A GAR Risk Assessment, which creates a GO-NO GO decision tool, will be conducted by involved personnel prior to a helicopter short-haul mission.

Compute the total level of risk for each hazard identified below. Assign a risk score of 0 (No Risk) through 10 (Maximum Risk) for each element. This is your personal estimate of risk. Add the individual risk scores to come up with a Total Risk Score.

SUPERVISION

Presence of qualified, accessible, and effective supervision. Clear chain of command in place.

PLANNING

Adequate incident information is available and clear. There is sufficient time to plan, operational guidelines are current, briefing of personnel is being conducted and team input solicited?

CONTINGENCY RESOURCES

Backup resources that can assist if needed. Evaluate shared communications plan and frequencies. Has alternate plan to short-haul been evaluated?

COMMUNICATION

Evaluate how well personnel are briefed and communicating. How effective is communication system and is there is an established communication plan? Operating environment values input.

TEAM SELECTION

Team selection should consider the qualifications and experience level of the individuals. Consider the experience for the mission being performed.

TEAM FITNESS

Consider physical and mental state of the crew. Evaluate team morale and any distractions.

ENVIRONMENT

Consider factors affecting performance of personnel and equipment such as time, temperature, precipitation, topography and altitude. Evaluate site factors such as narrow canyons, forest canopy, technical terrain, snow, swiftwater, etc.

INCIDENT COMPLEXITY

Evaluate severity, exposure time and probability of mishap. Assess difficulty of the mission and proficiency of personnel.

GAR RISK ASSESSMENT WORKSHEET

		NAME:	NAME:	NAME:
SUPERVISION	0-10			
PLANNING	0-10			
CONTINGENCY RESOURCES	0-10			
COMMUNICATION	0-10			
TEAM SELECTION	0-10			
TEAM FITNESS	0-10			
ENVIRONMENT	0-10			
INCIDENT COMPLEXITY	0-10			
TOTAL RISK SCORE	1-80			

GREEN	AMBER	RED
1-35	36-60	61-80
LOW RISK- Proceed With Mission	MODERATE RISK- Proceed With Caution	HIGH RISK- Implement Measures Prior to Proceeding

NOTE: The ability to assign numerical values or *color codes* to hazards is not the most important piece of the risk assessment. Team discussion is what is critical to understanding the risks and how they will be managed. Any category rated greater than five should receive specific mitigation.



RECONNAISSANCE FLIGHT INTELLIGENCE GATHERING

Mission Information

Case Number _____
Incident name _____
Location _____
Elevation _____
Date/Time of Occurrence _____
Date/Time Reported _____
Helicopter Type _____
Pilot _____
Spotter _____

Patient Medical Status (if known)

Trauma Score (12 or less is critical) _____
Est. Time to do Conventional Rescue _____
Est. Time to rescue with Short-haul _____

Weather

OAT C° _____
Wind Direction (degrees) _____
Wind Speed (mph/knots) _____
Gust Spread (mph/knots) _____
Pressure Altitude (feet) _____
Turbulence (circle one) _____

Pickup/Drop-off Site Characteristics

Technical Terrain _____
Vegetation _____
Slope (% slope) _____
Snow/Ice (describe) _____
Ground Travel Hazards _____
Distance to safe landing area _____
Rotor Clearances _____

Hover/Power Check

Torque _____
N1 _____
TOT _____
Fuel on Board (gallons/lb.) _____

Incident Conditions

Load Calculation done (circle one) YES / NO
Incident commander Approval (circle one) YES / NO
Procedure Used (circle one) Conventional / Short-haul



SHORT-HAUL RISK ANALYSIS

There are many subjective elements in this analysis. It is meant to be a guide through a thought process. Sound judgment is the key.

Elements	Go	Caution	No-Go
Wind Speed - knots			
0 to 24	✓		
24 to 30		✓	
30+			✓
Wind Gusts - knots			
0 to 12	✓		
12 to 15		✓	
15+			✓
Rotor clearance			
36+ feet	✓		
18 to 36 feet		✓	
0 to 18 feet		✓	
Visibility			
Greater than ½ statute mile	✓		
Less than ½ statute mile			✓
Turbulence			
None	✓		
Light to Moderate		✓	
Severe			✓
Helicopter Rescue Time Limits (SUNSET)			
3 to 14 hours	✓		
1 to 3 hours		✓	
0 to 1 hour		✓	
Helicopter Trained Personnel			
Well trained	✓		
Some helicopter training		✓	
Never been around helicopters			✓
Pilot Briefed and Trained in Mission Type			
Knows area, mission, and trained well	✓		
Knows mission, some training, told about hazards	✓		
Told about mission, limited training		✓+	
Ground Based Rescue Response			
12+ hours	✓		
3 to 12 hours		✓	
1 to 3 hours		✓+	

Elements	Go	Caution	No-Go
Patient Status			
Critical (Stat)	✓		
Delayed (non-stat)		✓	
Deceased	✓+		
Mission Planning			
Management Approved	✓		
Load calculation done	✓		
Within allowable payload	✓		
Have enough fuel for mission	✓		
Fuel truck is pre-positioned	✓		
Communications are acceptable	✓		
✓+ proceed with extreme caution. The risk/benefit ratio is extremely questionable.			
Additional Comments:			

HELICOPTER SHORT-HAUL RISK MANAGEMENT



INCIDENT NAME _____ CASE INCIDENT# _____ SAR # _____

LOCATION INCIDENT COMMANDER _____ DATE _____

PATIENT MEDICAL CONSIDERATIONS:

Time of Accident _____
Time Reported _____
Summary of Suspected Patient Injuries _____
Mechanism of Injury _____
Medical Control concurs with Short-haul: YES NO NOT APPLICABLE

RESCUE CONSIDERATIONS:

Short-haul Site Description (Technical Terrain; Non-Technical Terrain; Swift water; etc.) _____
Adequate Rotor Clearance (1.5 X Rotor disc diameter) YES NO

AIRCRAFT CONSIDERATIONS: (Reconnaissance check flight information relayed to IC)

Elevation of Staging Site: _____ FEET
Elevation of Accident Site: _____ FEET
Patient Weight (if known) _____ LB
Fuel on Board _____ GALLONS
Temperature (if known or estimated: -2° C/+1000 feet) _____ °C _____ °F
Load Calculation Completed: YES NO
Power Assurance Check Completed: YES NO

ALTERNATIVES:

Number of People for Ground Based Rescue _____
Estimated Time for Ground Based Rescue _____ HOURS
Risks with Ground Based Rescue Have Been Discussed YES NO
Move Patient to Alternate Location (Helispot) YES NO

ENVIRONMENTAL CONSIDERATIONS:

SUNRISE _____ AM SUNSET _____ PM
As reported from the short-haul site, if possible:
WIND SPEED (Not to exceed 30mph) _____ mph GUST SPREAD (Not to exceed 15mph) _____ mph
VISIBILITY (1/2 mile minimum) _____ mile(s)

ALTERNATIVES:

Delay Operation for Improved Conditions: YES NO
Predicted Weather _____

DECISION:

Decision to Short-haul made by Flight Crew: YES NO
Incident Commander Concurr: YES NO



SHORT-HAUL RISK MANAGEMENT CHECKLIST

1. SITUATIONAL AWARENESS

- Gather and verify available information.
- Develop an accurate “*mental image*” of the mission.

2. HAZARD ASSESSMENT

METHOD (Techniques and Methods How Mission Will Be Conducted)

- In the best interest of rescuer(s) and subject safety
- Alternate techniques adequately evaluated (*time required & hazards*)
- Adequate communications in place
- Check for omissions or deficiencies
- Backup plan prepared

MAN (Generic Reference to Incident Personnel)

- Personnel trained and qualified for the mission
- Personnel have provided for personal preparedness
- Flight crew duty limits
- Mental and physical condition of rescuers

MISSION (The Incident Assignment)

- Operational tempo is appropriate.
- Urgency is not driving the mission.

MEDIUM (Environmental Forces)

- Airspace conflicts/hazards
- Environmental hazards identified and considered in mission planning including
 - **Altitude, rotor clearance, slope, ice, snow, heat, loose rock, exposure, or over water**
- Current and predicted weather identified
- Sufficient daylight to complete the mission
- Operating within performance capabilities of man and machine

MANAGEMENT (Controls, Procedures, Oversight and Supervision)

- ICS established and communicated
- Compliance with policies and SOPs
- Safety openly promoted
- After-action review planned

3. HAZARD CONTROL

- Identify risks and implement controls to them.

4. DECISION POINT

- Form a GO/NO-GO decision based upon hazard mitigation.

5. TIME MANAGEMENT

- Do I have to act immediately?
- How much time do I have?
- What can I do in that time?
- Can I alter the time available?
- Should I?
- Tempo control?

6. EVALUATE

- Continually update your “*mental image*” of the mission.
- Continually measure how well the plan is working.
- Adjust the response as necessary.

APPENDIX E: EQUIPMENT

Equipment in use will vary between each NPS Unit who has an established short-haul program. Equipment type and configurations will vary depending on terrain, mission type, and helicopter make/model. A detailed configuration description should be included in each local short-haul plan.

New programs should contact the NPS Short-haul Working Group for further guidance on current vendors who provide equipment meeting the specifications stated in Chapter 4.1

Listed below are the NPS units with approved short-haul programs and the current Make/Model helicopter in use. The rigging configurations shown will be using these make/model helicopters.

DENA – AS350B3
NOCA – AS350B3
MORA – AS350B3
GRTE – AS350B3
YELL – AS350B3
MEVE – Bell 206 L4
YOSE – Bell 205 A++
SEKI – AS350B3
HAVO – MD 500
GRCA – MD 900

EXAMPLES OF HELICOPTER RIGGING

AS350B3 WITH CARGO HOOK SWING ARM ATTACHMENT



The fuselage design of the AS350 series helicopters will not support a belly band style secondary release system. Any weighted force on the band would cause structural damage to the fuselage. A sheathed cable extension on the 3-Ring release allows the stress of a weighted line to be placed between the cargo hook swing arm and approved attachment point under the belly of the helicopter.

APPROVED ATTACHMENT POINT — This is most commonly the cargo hook mount.

CARGO HOOK SWING ARM —



AS350B3 continued



Secondary Release handle is mounted behind the collective guard and accessible by Pilot and Spotter.

Approved attachment plates and mounts in use may vary between vendor aircraft.

MD 900



The MD900 uses a belly band style 3-ring secondary release system. The band wraps around the floor of the cabin and belly of the helicopter. The pull cable is sheathed along the band from an attachment point inside the cabin to the 3-Ring release located at the under belly portion of the band. The bottom of the 3-ring is attached by an auto locking carabiner to the primary release cargo hook.



Top of 3-ring release

Bottom of 3-Ring release is attached to the top end of the short-haul rope with an auto locking carabiner.

PRIMARY AND SECONDARY RELEASE

MD 500

The MD 500 uses the belly band style secondary release system.



VIEW OF THE PRIMARY AND SECONDARY RELEASE

The top of the 3-ring release is incorporated into the belly band anchor system.

The bottom of the 3-ring release is attached to the top ring of the rope using two steel carabiners. The top ring of the rope is then attached to the cargo hook.



SIDE VIEW OF BELLY BAND SECONDARY RELEASE



VIEW OF SECONDARY RELEASE HANDLE MOUNTED BETWEEN TWO FRONT SEATS. ACCESSIBLE BY BOTH PILOT AND SPOTTER.

BELL 205 A++

The Bell 205 A++ uses a belly band style secondary release system.



VIEW OF SECONDARY RELEASE BELLY BAND AND SPOTTER STATION

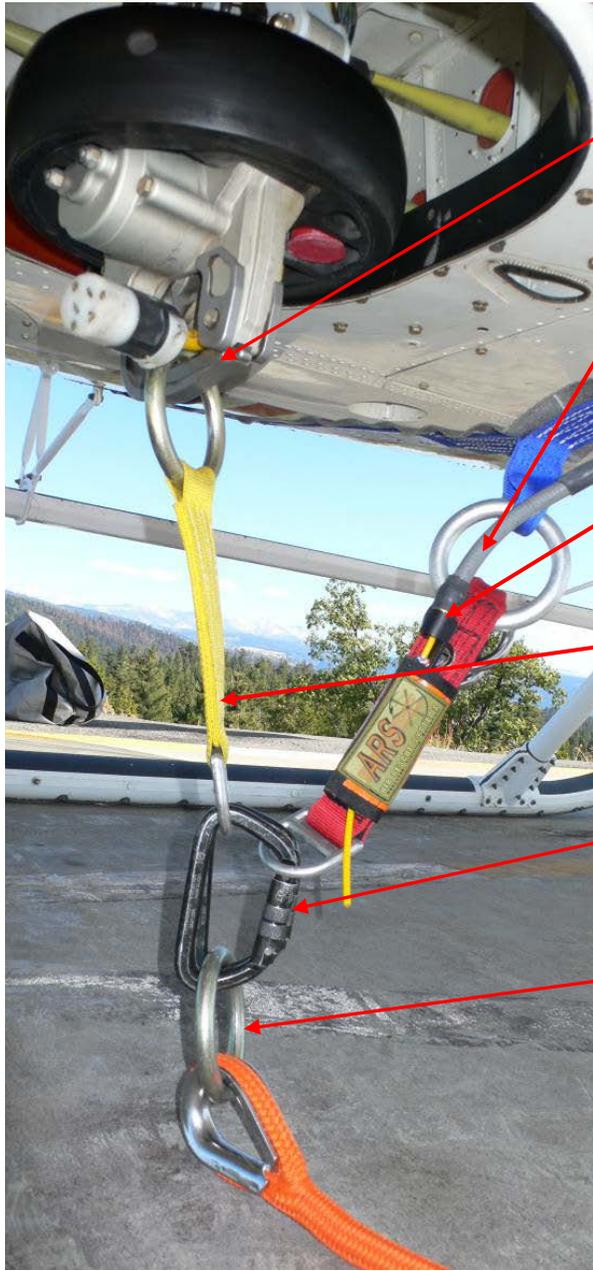


FRONT VIEW OF 3-RING SECONDARY RELEASE



VIEW OF RELEASE HANDLE UNSHEATHED

BELL 205 A++ continued



Cargo hook serves as primary (pilot) release

Secondary (spotter) release cable disconnects complete system below helicopter keeping belly band intact.

Three Ring release system (back view), assuring cable end is visible to spotter.

A cargo hook equalizer strap or yoke strap is used to prevent shock load when the primary is released.

2 steel Auto-lock carabineers link the cargo hook equalizer strap and belly band.

Short-haul anchor ring and rope to external load.

VIEW OF PRIMARY AND SECONDARY RELEASE

Bell 206 L4

The Bell 206 L4 uses the belly band style secondary release system.



EXTERNAL VIEW OF SHORT-HAUL ANCHOR RELEASE SYSTEM



**VIEW OF BELLY BAND ACROSS THE REAR FLOOR OF
206L4 CABIN**



VIEW OF THE PRIMARY AND SECONDARY RELEASE

NPS Short-haul New Equipment Testing Approval Request Form

Unit Name:
Name of Requestor:
Date of Request:

1. Describe the equipment submitted for approval.

2. Describe the advantage to your program by utilizing this equipment.

3. How was the item procured (commercially, custom, in-house)?.

4. How will the equipment be tested?

5. How will the results be measured?

6. Is this equipment currently in use for this purpose within another short-haul program? Where?

7. Using Severity, Probability, and Exposure (SPE) risk analysis format, describe how your program mitigated the risks of the equipment.

Severity:
Probability:
Exposure:

8. Describe the equipment submitted for approval.

APPENDIX F: DOCUMENTATION

The following documents are examples of training, currency, and operational short-haul tracking.

SAMPLE RE-CURRENCY EXCEL SPREADSHEET

Short-Haul Team Members Recurrency						
Name	Duty Station	EMS Qual	Role	Lieu Days	Currency Date	Date Next Due
Hawkeye Pierce	Paradise	Park Medic	Hauler	F/S	6/1/2016	8/30/2016
Major Houlihan	Korea	EMT	Hauler	T/W	6/12/2016	9/10/2016
Snoopy Beagal	Helibase		Pilot	2nd F/S	6/1/2016	7/16/2016
Mother Goose	Helibase		Relief Pilot		6/12/2016	7/27/2016
Red Baron	Helibase	FA/CPR	Spotter	T/W	6/12/2016	9/10/2016

Column headers can be manipulated to meet specific items that a program wants to track. For example, a column could specify whether re-currency was gained during a training session or on an operational short-haul.

Inserting a formula to populate the next currency due date into a shaded or highlighted column is an easy way to quickly identify which team members are nearing a currency expiration date.

NPS OPERATIONAL SHORT-HAUL REPORT

This report captures incident details, the tracking of personnel, and equipment used.

Incident Name:	Incident #:
Mission Type: SAR Fire MIG/LE	
Incident Location:	Incident Commander:

SUMMARY

Number of Patients:	Patient Condition/Injury:
----------------------------	----------------------------------

Patient Extraction Equipment used:

Description of Environment (Wx, Terrain, Altitude, Airspace):
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Personnel

Position	Name	Participated in GAR?	
		Yes	No

NPS OPERATIONAL SHORT-HAUL REPORT, cont.

Narrative/Sequence of Events:

Replacement Gear

Quantity	Item	Justification

IC Approval	Yes	No
Order Placed	Yes	No

Report Prepared By:	Date:
----------------------------	--------------

ANNUAL NPS SHORT-HAUL PROGRAM REPORT

Year:

Unit Name:

Unit Address:

Point of Contact:

- 1) TOTAL NUMBER OF TRAINING SHORT-HAUL EVOLUTIONS¹:
- 2) TOTAL NUMBER OF SAR SHORT-HAUL OPERATIONS:
- 3) TOTAL NUMBER OF SAR SHORT-HAUL EVOLUTIONS:
- 4) TOTAL NUMBER OF PEOPLE RESCUED BY SHORT-HAUL:
- 5) TOTAL NUMBER OF LIVES SAVED² USING SHORT-HAUL:
- 6) TOTAL NUMBER OF LE SHORT-HAUL OPERATIONS:
- 7) TOTAL NUMBER OF LE SHORT-HAUL EVOLUTIONS:
- 8) TOTAL NUMBER OF QUALIFIED SHORT-HAULERS:
- 9) TOTAL NUMBER OF QUALIFIED SHORT-HAULER SPOTTERS:
- 10) TOTAL NUMBER OF QUALIFIED SHORT-HAUL CHECK SPOTTERS:
- 11) SIGNIFICANT LESSONS LEARNED:

***This report will be submitted annually to the Short-Haul Working Group Lead.**

¹EVOLUTION: Movement of a short-haul load from one location to another. This can be either an insertion or extraction.

²LIVES SAVED: Without NPS Short-haul intervention, a life or limb would have been lost.

GLOSSARY AND ACRONYMS

ALSE:

Aviation Life Support Equipment.

Anchor, Primary:

An FAA approved cargo hook located underneath the helicopter. This term is also used to identify a location inside the aircraft to affix a short-haul spotter tether.

Anchor, Secondary:

An FAA approved belly band or attachment point.

ANSI (American National Standards Institute):

An American organization that establishes standards, including strength testing standards, for some equipment used in short-haul operations.

Belly Band:

A secondary anchor consisting of a belt which is secured around the fuselage of the helicopter through the aft cabin doors.

Carabiner:

An opening/closing metal link made of various metal alloys used to link one or more systems together.

Cargo hook:

Term commonly used to identify the load-carrying device mounted on the belly of the helicopter to which external equipment or cargo is attached. Cargo hooks usually have both manual and electrical quick-release mechanisms operated by the Pilot.

CE (European Conformity):

The CE marking on a product indicates the compliance with European Union standards,

Climbing Helmet:

Protective headgear used in rock climbing and technical rescue. These helmets have an internal suspension system to protect the head from a blow and a multipoint chin restraint system to prevent the helmet from being knocked off the user's head. Commercially produced helmets typically meet the standards of a certifying body such as ANSI, UIAA or CE.

EN:

European standard (market standards).

Evolution:

Movement of a short-haul load from one point to another.

Extraction:

The phase of a short-haul evolution involving transport of personnel from a short-haul site to a staging helispot/helibase.

FAA (Federal Aviation Administration):

An agency in the Department of Transportation that is responsible for the safety of civilian aviation.

FARs (Federal Aviation Regulations):

Rules prescribed by the FAA governing all aviation activities in the United States. The FARs are part of Title 14 of the Code of Federal Regulations (CFR).

GAR (Green Amber Red):

A risk assessment model that allows for time critical assessments and generates communication concerning the mission risks.

Hard Point(s):

An attachment point designed to carry a load.

Harness:

A commercially sewn climbing or rescue harness. Design elements typically include contrasting stitching to allow inspection for wear and double pass-through buckles to provide for security. Harness features may include extra padding, gear loops or hard connection points. Dependent upon agency preference and application, short-haul rescuers may either wear an independent seat harness, a seat and chest harness combination, or a full body harness. Commercially manufactured harnesses typically meet the standards of a certifying body such as ANSI, UIAA or CE.

Haul Bag:

Bag used for hauling equipment.

HEC:

Human External Cargo.

Hook Knife:

A J-shaped bladed knife designed to quickly cut through cordage or webbing. Used by a short-hauler for emergency cutaway from the short-haul rope or tether.

IHOG:

Interagency Helicopter Operations Guide.

IKAR:

International Commission on Alpine Rescue.

In-Flight Emergency:

A condition threatening the continued safe flight of the helicopter. This may include critical conditions such as loss of engine power, tail rotor failure or other major mechanical malfunction. Such situations will require an immediate autorotation to the ground.

Kilonewton (kN):

An international standard unit of force equal to 1000 newtons or 224.8 pounds. One newton is the force needed to accelerate one kilogram of mass at the rate of one meter per second squared.

Line:

Another term used for “rope”. May refer to synthetic rope, wire rope, or “haul-line”

Tether:

A commercially sewn webbing or cordage strap used to connect a short-haul harness to an anchor point.

OSHA:

Occupational Safety and Health Administration

PIC:

Pilot In Command.

Power Assurance Check:

The pilot will bring the helicopter to a stable hover and demonstrate a positive rate of climb prior to actual short-haul insertion. This check will be accomplished at actual altitude and temperature for initial insertion.

PPE:

Personal Protective Equipment.

Short-Haul:

To transport one or more persons suspended beneath a helicopter (HEC - Human External Cargo).

Short-haul Anchor System:

The points of attachment of the short-haul rope system to the helicopter.

Short-Haul Rescuer:

Personnel trained and qualified in short-haul procedures.

Short-Haul Site:

The location where personnel will be inserted to or extracted from during a short-haul evolution.

SPE (Severity, Probability, Exposure) Model:

A risk assessment model that is used to determine risk as a function of severity, probability, and exposure; i.e., $Risk = f(S, P, E)$.

This model uses this formula: $Risk = Severity \times Probability \times Exposure$.

Spotter:

Aircrew member who assists the pilot during a short-haul evolution.

Three-Ring Release:

A mechanism designed for parachute canopy release while under load.

Typical Terrain:

The anticipated environment in which operations may be conducted such as confined areas with features that may include steep slopes, cliff faces, tall trees, etc.

UIAA (Union International Alpine Association):

A European organization that certifies that equipment meets European mountaineering standards. The UIAA test fall is a laboratory simulation of the fall of a rock climber. The CE standard is replacing UIAA and new equipment may carry the CE label.

Weight Bag:

Weight suspended on a short-haul rope to prevent it from becoming entangled in the helicopter rotor system during forward flight when there are no personnel or equipment suspended on the rope.