



# INTERAGENCY HELICOPTER RAPPEL GUIDE

## IHRG



**May 2006**

***Helicopter Rappel Program***  
***1972 to present***

***The National Interagency Rappel Working Group has developed this information for the guidance of its member agencies and is not responsible for the interpretation or use of this information by anyone except the member agencies.***

***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 National Interagency Rappel Working Group of any product or service to the exclusion of others that may be suitable.***

***The following Interagency Helicopter Rappel Guide was produced by the Rappel Guide Task Group.***



## Interagency Aviation Management Council

300 E. Mallard Drive, Suite 200  
Boise, Idaho 83706-3991



To: Users of the Interagency Helicopter Rappel Guide (IHRG)  
From: Aviation Management Council  
Date:  
Subject: Availability of the Interagency Helicopter Rappel Guide

The IHRG has been revised and is available for downloading at the MTDC website: <<http://www.fs.fed.us/t-d/rappel/index.htm>>. The user name is "t-d" and the password is "t-d." The IHRG will be maintained and updated as a Web-based document. Published hardcopies will not be available.

All changes contained in the new guide are effective at this time. They include revisions proposed by the Rappel Working Group and approved by the Interagency Helicopter Operations Steering Committee.

The IHRG will be reviewed at a minimum of every 3 years and revisions will be made as warranted. Users are encouraged to send recommended changes to their aviation program managers at the State, regional, or national level. The current version of the guide is on the above website.

The IHRG is a dynamic document. With the issuance of this memo, the Rappel Working Group has the authority to update the IHRG, with the concurrence of the Interagency Helicopter Operations Steering Committee, as needed in matters relating to equipment and procedural issues. Changes to Chapter 2 and Appendix F require AMC approval.

A copy of this authorization will be included in the front of IHRG.

Mark L. Bathrick  
Associate Director  
Aviation Management Directorate  
National Business Center  
U.S. Department of the Interior

Larry Brosnan  
Assistant Director, Aviation  
Fire and Aviation Management  
U.S. Forest Service  
U.S. Department of Agriculture

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# 1 INTRODUCTION

## 1.1 Authority

Reference USFS, IHOG, and DOI Manuals and Directives that apply. Where requirements are not specific to a particular department or agency, it is so noted.

## 1.2 Objectives

The objective of the IHRG is to establish sufficient standardization in procedures and techniques to allow individuals or crews to be utilized for a variety of missions under varying conditions. To aid in this approach, methods are incorporated to cross-train personnel in more than one specific helicopter type.

## 1.3 Policies

All rappel operations must be in compliance with the IHRG.

**NOTE: If an agency chooses to incorporate the IHRG as policy within the agency’s directive system, it is essential that the user understand the use of language in the IHRG regarding mandatory or optional compliance. The use of verbs “must” and “shall” conveys required compliance, except for justifiable reasons; and use of “may” and “can” conveys optional compliance.**

Agencies having specific missions with technical requirements which cannot be met by this guide should provide a risk analysis and operations plan demonstrating need to utilize other methods or equipment. The plan shall be approved by the individual agency. All equipment and procedures will become the responsibility of that agency.

## 1.4 Responsibility

An Interagency Helicopter Rappel Working Group (RWG) has been established; its members include management representatives and specialists presently involved in the rappel program. The responsibility of the Working Group is to exchange ideas and techniques with all involved throughout the program. Any revisions to the IHRG shall be addressed through the Rappel Equipment and Procedures Committee to the RWG. The RWG shall maintain and approve operational procedures and equipment for this guide.

## **1.4.1 Rappel Working Group Charter**

### **1.4.1.1 Mission Statement**

The primary mission of the Interagency Helicopter Rappel Working Group is to promote the safety and well being of all personnel involved in rappel operations. The Working Group holds technical and operational decision making authority enabling it to provide guidance to the rappel community in an expedient manner. The Working Group will:

Foster a culture to promote reporting and sharing of problems as a positive means to increase overall safety.

Identify problems/failures; detect and correct them at an early stage, critical to program success.

Promote standardization within the entire rappel community to enhance safety and maximize efficiency.

Make decisions, implement and disseminate information promptly.

Continuously evaluate processes and procedures.

### **1.4.1.2 Purpose/Objectives**

The Working Group has been established under the Interagency Helicopter Operations Steering Committee (IHOPS) as an interagency group to administer interagency helicopter rappel operations.

Review and evaluate interagency helicopter rappel operations and issues. Solicit and address concerns with operations, personnel qualifications, safety, equipment and procedures.

Provide guidance, direction and oversight to assigned task groups for project development and completion.

Identify issues and develop training and procedures. Evaluate equipment and procedure proposals submitted by task groups and sub-committees. Make decisions on methods and processes for standardization of interagency helicopter rappel operations.

Screen, evaluate and make decisions regarding rappel platform suitability using the Interagency Rappel Helicopter Screening and Evaluation Process.

Disseminate Working Group decisions affecting rappel operations to the Interagency Rappel Community and the IHOPS Committee. The MTDC Helicopter Rappel

Equipment & Procedures Project Leader will post pertinent information on the “Helicopter Rappel” website that is listed at the beginning of Chapter 3.

Maintain, update and distribute the Interagency Helicopter Rappel Guide.

#### **1.4.1.3 Working Group Composition**

Working Group composition will consist of:

One representative from each of the following agencies with rappel program(s): Aviation Management Directorate, Department of Interior Bureaus, Forest Service Regions, and cooperating State agencies. Working Group members will be assigned by the respective IHOPS Committee member.

The Working Group will elect a Chair and Co-Chair from group members for a term of two years. At the end of the two year term the Co-Chair will become the Chair and a new Co-Chair will be elected.

Technical Advisors (e.g. Representatives from the Forest Service Technology and Development Program and the Helicopter Inspector Pilot group) will serve as non-voting participants of the Working Group.

#### **1.4.1.4 Working Group Meetings and Decision Making**

The Working Group will confer as often as necessary to accomplish assigned tasks but will meet at least once annually. Attendance shall be limited to Work Group representatives or approved designee and participating guests.

A quorum will consist of 70% of voting Working Group members. Any designee representing a Working Group member will have voting privileges. Consensus and voting decisions will be documented and maintained.

#### **1.4.1.5 Task Groups/Sub-Committees**

The Working Group may assemble task groups/sub-committees. Membership shall be selected by the Working Group. Funding requests will be coordinated through the IHOPS Committee.

The Working Group will provide direction and oversight to the task groups/sub-committees by clearly identifying the task to be completed, the scope of the task and time line for completion.

Individual agencies may request additional involvement of subject matter experts or specialists.

Sub-committees are permanent and maintain their own Working Group approved charter.

A task group will dissolve upon completion of task unless assigned additional work.

#### **1.4.1.6 Chair Responsibilities**

Facilitate the time and place for all group meetings and conference calls.

Request attendance of guest participants. Coordinate guest participation and attendance timeframes.

Ensure Working Group tasks are completed.

Monitor progress of task groups/sub-committees and ensure assignments are completed.

Represent the Working Group at IHOPS Committee meetings.

Assure meeting notes, decisions and information are disseminated to the Working Group, IHOPS Chair and other individuals as applicable, (e.g. Interagency rappel community).

#### **1.4.1.7 Co-Chair Responsibilities**

Assume duties of the Chair in their absence.

Assure notes, decisions and voting results are recorded for all meetings and conference calls.

Assemble, correlate, and prepare all material to be acted upon by the Working Group.

Coordinate with the Chair for delegation of work assignments.

#### **1.4.1.8 Charter Approval**

Prepared By:

Tom York  
Working Group Chair

January 18, 2005  
Date

Approved By:

Glenn Johnston  
IHOPS Chair

January 20, 2005  
Date



## 1.5 Acronyms

<b>AGL</b>	=	above ground level
<b>AMD</b>	=	Aviation Management Directorate
<b>BLM</b>	=	Bureau of Land Management
<b>DOI</b>	=	Department of the Interior
<b>FSH</b>	=	Forest Service Handbook
<b>FSM</b>	=	Forest Service Manual
<b>IHOG</b>	=	Interagency Helicopter Operations Guide
<b>IHRG</b>	=	Interagency Helicopter Rappel Guide
<b>MTDC</b>	=	Missoula Technology & Development Center
<b>NFPA</b>	=	National Fire Protection Association
<b>NPS</b>	=	National Park Service
<b>OSHA</b>	=	Occupational Safety and Health Administration
<b>REPC</b>	=	Rappel Equipment and Procedures Committee
<b>RWG</b>	=	Interagency Helicopter Rappel Working Group
<b>SDTDC</b>	=	San Dimas Technology & Development Center
<b>SPH</b>	=	Sound Protection Helmet (or flight helmet)
<b>TDC</b>	=	Technology & Development Center
<b>USDA</b>	=	United States Department of Agriculture
<b>USDI</b>	=	United States Department of the Interior
<b>USFS</b>	=	United States Forest Service

## 1.6 Definitions

**Anchor:** Means of attaching the rope to an object. For helicopter rappelling, the anchor is an approved, "fail-safe" attachment point for the rappel ropes, tethers, or other devices to the helicopter.

**Bight:** A V-shaped bend in a rope that comes back on itself, but does not cross.

**Booster Rappeller:** A qualified rappeller from another exclusive-use rappel base. Booster rappellers are used to augment the rappel crew capability at the host base when there is demonstrated need, or anticipated need.

**Challenge & Response:** One party presents a question (challenge) and another party must provide a valid answer (response) to validate the action.

**CWN Rappeller:** A qualified rappeller that is helitack qualified although is not a member of an exclusive-use helitack or rappel crew. Some examples would be members of engine crews or other fire personnel that have successfully completed training requirements for helitack and rappelling. CWN Rappellers are used to augment the rappel crew capability at a host exclusive-use rappel base when there is demonstrated need, or anticipated need.

***Descent Device or Descender:*** A metal device through which the rope passes; designed to create friction, as needed, during a rappel. Tension from the brake hand provides the device with friction to control the rate of descent or stop.

***Feed or Feeding:*** The act of pushing or sliding a rope through a decent device.

***Figure 8 Descent Device:*** A rappelling or descent device that resembles the numeral "eight" Available with ears. Other names include Rescue 8.

***Glaze or Glazing:*** Heat generated during rapid rappels can overheat an area on a rope or webbing to the point of momentarily melting the nylon sheath fibers, which cool into a hard crystalline coating. When glazing occurs, it should be a concern for rope or webbing retirement!

***Gunner Strap:*** A restraint that keeps the rappeller tethered to the helicopter (Typically Type II helicopters) during the period between removing their seat belt and hooking up to the Sky Genie. (Shall conform to MTDC Drawing MTDC – 984)

***Helicopter Rappel:*** Any rappel performed in a controlled environment where the purpose of the rappel is training or proficiency, and not operational in nature.

***Helicopter Rappelling:*** The deployment of personnel from a hovering helicopter by means of an approved rope, descent device and supplementary equipment. Rappelling is comprised of a smooth, controlled, expeditious descent to the ground.

***Internal Abrasion:*** Damage caused by internal friction from dirt and grit particles trapped between fibers inside a rope. Use of a rope filled with these particles can severely damage the rope from the inside out.

***Operational Rappel:*** Any rappel performed for the purpose of accomplishing a task once the rappeller is on the ground. This may include rappelling fire fighters, search and rescue, or law enforcement personnel to perform a specific task.

***Rappel Check Spotter:*** A qualified rappel spotter that has at least three (3) seasons experience as a qualified rappel spotter and has been approved by an agency specific Helicopter Operations Specialist to provide oversight in the rappel program and evaluate spotter candidates.

***Rappel Height(s):*** Rappels are generally categorized into three heights, as follows:

Low	Below 75 feet AGL
Medium	75 to 150 feet AGL
High	Above 150 feet AGL

***Rappel Spotter:*** A person trained and certified, in accordance with Agency-specific policy and direction contained in the IHRG. Responsible for directing and managing rappel operations, providing instruction for initial rappeller candidates, spotter trainees, certifying rappellers and ensuring compliance with the IHRG.

***Rappeller:*** A person trained and certified to rappel from a helicopter, in accordance with Agency-specific policy and direction contained in the IHRG.

***Trainee:*** A designation attached to any position that denotes a person who successfully meets the training requirements, but has not been certified to perform operational missions in that capacity without direct supervision of a qualified rappel spotter.

## 1.7 Utilization

**1.7.1** Rappelling expands the flexibility of the helicopter and crew and may enhance the safety of an operation. Rappellers can be considered a resource when formulating response plans for a Bureau, Region, Forest, Park, etc. Missions include:

1. Search and Rescue
  - a. Team Insertion
  - b. Equipment Deployment
2. Fire
  - a. Initial attack
  - b. Helispot Construction
  - c. Hot-Spot Suppression
  - d. Equipment Deployment
  - e. Rescue
3. Law Enforcement
  - a. Project Work

**1.7.2** Initial response on an incident can be expedited where travel time by conventional methods is time intensive and arduous. Rappelling can be utilized under a variety of conditions:

1. Continuous Timber
2. Steep Hillsides
3. Canyon Bottoms
4. Rock Slides
5. Pinnacles

## 2 RAPPEL QUALIFICATION

**NOTE:** The certifying official at each level may require additional training of pilot, rappeller, spotter, or check spotter.

### 2.1 Pilot

1. Meets the appropriate requirements of the contracting document.
2. Is qualified and approved by Agency Inspector Pilot for Long Line.
3. Qualified Spotter will brief, demonstrate, train, and familiarize the pilot on rappel operations and equipment.
4. Pilot will attend mock-up training. (Ground simulation of rappel operations utilizing aircraft)
5. Final approval for rappel operations will be based upon:
  - a. Completion of spotter provided briefing and training
  - b. Demonstrated ability to pilot the helicopter during a series of simulated rappels and cargo letdown operations
  - c. Demonstrated ability to coordinate with rappel spotter
  - d. Demonstrated knowledge of rappel emergency procedures during emergency procedures simulation and aircraft emergency procedures effect on rappel operations
  - e. Demonstrated ability to perform Weight and Balance computations (including Center of Gravity) for rappel configuration.
6. Upon meeting all of the above requirements, the pilot may be approved by a qualified agency Helicopter Inspector Pilot for rappel or cargo let down.

### 2.2 Check Spotter

**NOTE:** Check spotters may suspend spotter or rappeller qualifications pending review at the next higher certifying level. Revocations of spotter/rappeller qualification will be determined at the appropriate State/Regional office.

### 2.2.1 Duties

1. Initial spotter evaluation and certification.
2. Monitor and provide oversight for rappel training.
3. Monitor operations for standardization purposes.

### 2.2.2 Position/Prerequisites

1. Must have been a qualified spotter for three seasons.
2. Must have been previously qualified as a spotter in multiple makes and models.
3. Must have demonstrated ability as an instructor and assisted in training at least two spotters.

### 2.2.3 Training

Certification of check spotters shall be approved annually by a Regional Helicopter Operations Specialist for Forest Service rappel operations; by the State Aviation Manager for BLM operations; by the Area Manager for BIA operations; or by the Regional Aviation Manager for NPS. Other agencies and bureaus not listed above shall annually approve check spotters for their operations at a level in their organization commensurate with the positions above.

### 2.2.4 Proficiency

Each check spotter must make at least one error-free helicopter or simulator spot in any 14 consecutive days. If a simulator spot is used to maintain proficiency during any 14-day period, a helicopter spot must be completed during the next 14-day cycle. If proficiency is lost, an error-free simulator or mockup and helicopter proficiency spot must be completed prior to any operational spots. If two proficiency rappel periods pass (28 days), the Helicopter Operations Specialist or designee will insure the check spotter is capable of deploying rappellers through the use of mockups or training rappels.

**NOTE: Proficiency for check spotters shall refer to maintaining currency during the current season.**

**2.2.5 Recurrency:**

Each year, to re-qualify, a check spotter must:

1. Meet fitness standards as outlined in prerequisites for rappeller candidates.
2. Attend and/or participate as an instructor at annual helicopter rappel training. This shall include re-qualifying as a rappeller.
3. Complete deployment of three loads of rappellers with cargo from helicopter to the satisfaction of the appropriate agency certifying official (may be another spotter with experience in make and model being used). *Typical terrain shall be utilized for at least one of the three loads.*

**2.2.6 Model Specific:**

The check spotter will be briefed on and familiar with:

1. Rappel anchor and hard points for the specific model.
2. Seating arrangement for rappellers and spotters.
3. Rappel cargo placement/ location and deployment sequence and method.
4. Exit procedures, sequences, and emergency procedures.

The check spotter will, to the satisfaction of the certifying official:

5. Demonstrate proficiency using mock-ups in the helicopter model to be used including:
  - a. Preparing helicopter for rappel mission.
  - b. Deploying both rappellers and cargo.
  - c. Briefing by pilot on any peculiarities of the specific model.
6. Perform a minimum of three training rappel cycles (one low, one medium, and one high, see definitions Chapter 1.6) with a full load of rappellers and cargo deployment.

If conducting an evaluation from a new platform or one they have never been qualified in, the check spotter must complete model specific spotter training prior to evaluating the spotter candidate. If previously qualified in the make and model they are doing the evaluation in but not current, the check spotter must complete all of the items required for model specific training EXCEPT the 3 live rappels.

**NOTE: There is no expiration time on check spotter qualifications. To regain currency in a particular make and model, refer to model specific procedures.**

## 2.3 Rappel Spotter:

**NOTE:** Spotters may suspend rappeller qualifications pending review at the next higher certifying level. Revocations of rappeller qualification will be determined at the appropriate State/Regional office.

### 2.3.1 Duties

Monitor local rappel program, ensure compliance with fit to work and performance based rappel standards, provide instruction for initial rappeller candidates, spotter trainees, and certify rappellers.

### 2.3.2 Position/Prerequisites:

1. Meet the training, experience, and certification requirements for a helicopter manager as stated in their agency policy and have one season of rappel experience.
2. Must have had at least 20 live helicopter rappels, with four of those being operational.
3. Assist in instruction of rappel training.
4. For a new program initiated within a bureau or agency, it will be the responsibility of the certifying officials and local managers to designate initial spotter trainees.
5. Pass the “Work Capacity Test” at the arduous level. **Program managers are encouraged to have fitness programs that exceed the minimum standards.**

**NOTE:** Fire program spotters must meet the requirements for a fire helicopter manager as stated in their agency policy.

### 2.3.3 Training

1. Shall demonstrate and exhibit knowledge of proper utilization and care of rappel related equipment, including PPE.
2. Shall attain skill level and proficiency necessary to successfully spot and direct rappels at all levels of elevated platform training.
3. Shall spot 20 complete rappel cycles (e.g., if a simulator accommodates two rappellers, then that would count as one cycle) from the high tower or platform level. Five consecutive loads shall be accomplished without procedural error and shall include cargo letdown.
4. Shall spot a minimum of eight mock-up cycles without procedural error.

5. Under supervision of check spotter, shall spot a minimum of 10 live rappel cycles through the low, medium, and high (see definition Chapter 1.6) height progressions without procedural error. Five of these must be in typical terrain, and three shall include cargo.
6. Shall demonstrate ability to effectively communicate both verbally and non-verbally.
7. Shall demonstrate competency in the execution of all aspects of emergency procedures without error as outlined in chapter 6.
8. Shall ensure timely and accurate rappel documentation as outlined in Chapter 4.
9. Shall ensure compliance with all applicable agency and/or interagency policies and procedures.

#### 2.3.4 Proficiency

Each spotter shall make at least one error-free helicopter or simulator spot in any 14 consecutive days. If a simulator spot is used to maintain proficiency during any 14 days period, a helicopter spot must be completed during the next 14-day cycle. If proficiency is lost, an error-free simulator or mockup and helicopter proficiency spot must be completed prior to any operational spots. If two proficiency spot periods pass (28 days), a qualified and current spotter with experience in make and model being used will insure the spotter is capable of performing the spot through the use of mockups or training spots.

**NOTE: Proficiency for spotters shall refer to maintaining currency during the current season.**

#### 2.3.5 Recurrency

Each year, to re-qualify, a spotter must:

1. Meet fitness standards as outlined in prerequisites for rappeller candidates.
2. Attend and/or participate as an instructor at annual helicopter rappel training. This shall include re-qualifying as a rappeller.
3. Complete deployment of three loads of rappellers with cargo from helicopter to the satisfaction of the appropriate agency certifying official (may be another spotter with experience in make and model being used). *Typical terrain shall be utilized for at least one of the three loads.*



### 2.3.6 Model Specific

Trainees must be approved by an appropriate certifying official in each make and model of helicopter that will be utilized as an operating platform. Certifying officials (e.g. spotters, check spotters) must be current in the make and model of helicopter that they intend to certify trainees in.

The spotter will be briefed on and familiar with:

1. Rappel anchor and hard points for the specific model.
2. Seating arrangement for rappellers and spotters.
3. Rappel cargo placement/ location and deployment sequence and method.
4. Exit procedures, sequences, and emergency procedures.
5. Weight and Balance (including Center of Gravity Calculations) for the specific make and model of aircraft.

The spotter Shall, to the satisfaction of the certifying official:

6. Demonstrate proficiency using mock-ups in the helicopter model to be used including:
  - a. Preparing helicopter for rappel mission.
  - b. Deploying both rappellers and cargo.
  - c. Briefing by pilot on any peculiarities of the specific model.
7. Perform a minimum of three training rappel cycles (one low, one medium, and one high, see definitions Chapter 1.6) with a full load of rappellers and cargo deployment.

## 2.4 Rappeller

### 2.4.1 Position/Prerequisites:

To be considered as an appropriate rappeller candidate, all of the following minimum requirements must be met each year as a condition to perform the duties of the position:

1. Meet the training and experience requirements for a helitack crewperson as stated in their agency policy.

**NOTE: For exclusive-use helitack/rappel crews it is acceptable for first year helitack/rappeller candidates to be trained and qualified in both helitack and rappel with the approval of a USFS Helicopter Operations Specialist or appropriate equivalent DOI agency official.**

2. Pass the “Work Capacity Test” at the arduous level. This guide shall be adhered to as it is written. **Program managers are encouraged to have fitness programs that exceed the minimum standards.**
3. Perform the following performance based rappel procedures with the full weight of rope (or equivalent) suspended below the rappeller:
  - a. Perform 3 simulator exits.
  - b. Perform 3 simulator re-entries from the pre-rappel position on the skid/step.
  - c. Untie 3 knots during simulator rappels
  - d. Complete 3 emergency procedures (lock-off, tie-off)

### 2.4.2 Training

1. Ground Training:
  - a. Demonstrate the proper use of rappel equipment, including personal protective equipment.
  - b. Demonstrate the required skill level and proficiency in each phase of elevated platform training before proceeding to the next phase. Each rappeller will perform cumulatively a minimum of 15 low and high platform rappels. This will include five consecutive high platform rappels, including three demonstrating proper execution of emergency procedures without procedural error.
2. Helicopter Mock-Up:

Rappellers shall demonstrate proficiency in actual rappel simulations with full gear as directed by the spotter, with a partner present, in the helicopter, not running.
3. Helicopter Rappels:
  - a. First rappel should be at a low rappel height and in flat open terrain.
  - b. Second rappel should be at medium height and in flat open terrain.
  - c. Third rappel should be at medium height and in flat open terrain.
  - d. Fourth rappel will be at high rappel height and in flat open terrain.

- e. Fifth rappel will be at high rappel height and in flat open terrain, or typical terrain at the discretion of the spotter.
- f. Sixth rappel will be at high rappel height and in typical terrain.
- g. Seventh rappel will be at high rappel on a side hill in typical terrain.
- h. Eighth rappel will be at maximum allowable rappel height and in typical terrain.

**NOTE: A training emergency tie-off will be completed from the hovering helicopter during a rappeller's initial training. It is recommended that this be accomplished at low to medium rappel height, in flat open terrain during or after the third helicopter rappel.**

**NOTE: During initial training, the first four certifying rappels shall be accomplished in one specific model. The remaining four rappels may be accomplished in any other model providing appropriate tower training, mock-ups and safety briefings for each specific aircraft model have occurred.**

### 2.4.3 Proficiency

Each rappeller shall make at least one error-free helicopter or simulator rappel in any 14 consecutive days. If a simulator rappel is used to maintain proficiency during any 14-day period, a helicopter rappel must be completed during the next 14-day cycle. If proficiency is lost, an error-free simulator or mockup and helicopter proficiency rappel must be completed prior to any operational rappels. If two proficiency rappel periods pass (28 days), the spotter will insure the rappeller is capable of performing the rappel through the use of mockups or training rappels.

**NOTE: Proficiency for multiple aircraft type: If certified in multiple aircraft models, proficiency may be maintained from one model to another with mock-up and safety briefing review. The 1 in 14 day proficiency rappel must still occur from at least one model.**

**NOTE: Proficiency for rappellers shall refer to maintaining currency during the current season.**

#### 2.4.4 Recurrency

A rappeller who has qualified the previous year will:

1. Meet fitness standards as outlined in prerequisites for a rappeller candidate.
2. Attend basic helicopter safety refresher.
3. Participate in rappel ground training.
4. Demonstrate knowledge of rappel principles.
5. Utilize the training/ proficiency simulator without procedural error.
6. Complete the performance based rappel procedures as outlined in prerequisites for a rappeller candidate. (See Chapter 2.4.1)
7. Complete three helicopter rappels without procedural error. *Typical terrain shall be utilized for at least one of the three rappels.*
8. Identify emergency situations and perform corrective actions without procedural error.

#### 2.4.5 Model Specific

1. Trainees must be approved by an appropriate certifying official in each make and model of helicopter that will be utilized as an operating platform. Certifying officials (e.g. spotters, check spotters) must be current in the make and model of helicopter that they intend to certify trainees in.

The rappeller will be briefed on and familiar with:

- A. Rappel anchor and hard points for the specific model.
  - B. Seating arrangement for rappellers and spotters.
  - C. Rappel cargo placement/ location and deployment sequence and method.
  - D. Exit procedures, sequences, and emergency procedures.
2. The Rappeller will, to the satisfaction of the certifying official:

- A. Demonstrate proficiency as a rappeller using mock-ups in the helicopter model to be utilized.
- B. Perform a minimum of three training rappel cycles (one low, one medium, and one high, see Chapter 1.6) with a full load of rappellers and cargo deployment.

**NOTE: If the exit procedure for the model the rappeller is current in is similar to the model being cross trained in (i.e. both exits are over skid) the rappeller will need a minimum of one rappel cycle with standard load to assure complete cycle of rappel operation and cargo.**

### 3 RAPPEL EQUIPMENT

**NOTE:** Only approved equipment identified in the MTDC Wildland Fire Helicopter Rappel website (<http://www.fs.fed.us/t-d/rappel/index.htm> User Name: t-d, Password: t-d) shall be used in rappel operations. No alteration or modification of said equipment shall be made without the approval of the Interagency Rappel Working Group.

All equipment used in rappel operations will be approved by the Interagency Helicopter Rappel Working Group. Agencies having specific missions with technical equipment requirements which do not follow this guide shall operate according to their agency approvals. (See Chapter 1.3)

All equipment will be monitored during use for wear and stress related damage. Shortening the service life or removal from service of a special component may be done, as necessary, in order to maintain an adequate margin of safety in the program.

All proposed rappel aircraft shall be subject to a screening and evaluation process. All type III rappel rotorcraft must be certificated in compliance with 14CFR 27.143 paragraph (c).

#### 3.1 Rappel Platform Training Simulator

A rappel platform simulating the cabin area, seating positions, and skid heights of the helicopter utilized must be readily available to each rappel base, preferably at the rappel base. The purpose of the platform is to train rappellers and maintain proficiency in exit and emergency procedures.

Requirements for the simulator are:

1. A minimum height of 20 feet above ground level. Rappeller experience will be greatly enhanced from a higher platform.
2. Simulator should approximate the helicopter to be utilized as near as possible, i.e., cabin configuration, seating positions, skid height.
3. The tower, stairs, platform, handrails, rappel anchor, and spotter tether attachment point shall meet agency and OSHA requirements for construction (Walking-working surfaces/1910).
4. The rappel anchor and spotter tether anchor must meet OSHA standards for fall-arrest (Fall protection systems criteria and practices/1926.502, Safety belts, lifelines, and lanyards/1926.104).
5. Rappel tower should be inspected annually to ensure it meets OSHA standards.

**NOTE:** All rappel equipment that is removed from service (retired) must be destroyed to the point that it can no longer be utilized for its intended purpose. Any equipment that requires documentation must show retirement date on the “Equipment Log” when removed from service. Contact the Helicopter Equipment Specialist at MTDC to inform them of any serviceable excess rappel related equipment. Any questions relating to equipment reallocation and disposal should be directed to the same.

## 3.2 Individual Rappeller/Spotter Equipment

### 3.2.1 Helmets

Spotter and Rappeller Helmets must meet minimum standards for Interagency approved flight helmets and have avionics for intercom and radio communications.

### 3.2.2 Eye Protection

For any rappel operation, rappellers must wear agency-approved eye protection. The visor down on flight helmets meets this requirement.

### 3.2.3 Gloves

1. Spotters may wear any glove approved for flight operations in the IHOG. Spotters needing additional heat protection may wear a rappel type glove for cargo letdown. The Sullivan PV or PVG and the PMI GL-2200x rappel glove are approved for cargo letdown operations.
2. Rappeller's gloves shall be all leather with double-leather palm and fingers and provide sufficient heat protection for rappel descent. For wildland fire rappel operations the Sullivan PV (short) or PVG (gauntlet) Rappel Gloves are the approved gloves.

**Inspection:** Inspect stitching for abrasion and wear. Leather should be free from cuts or holes. Pay special attention to the area between thumb and forefinger. Leather should also be inspected for oils, pitch, or other contaminants. Hook and pile Velcro should adhere well when pressed together.

### 3.2.4 Belly Deployment (BD) Bag

BD bag must be designed in accordance with drawing # MTDC-1038. The female end of the Click lock buckle must be attached to the harness by a webbing loop manufactured in accordance with drawing #MTDC 1023. The webbing loops/buckles must be attached to the rappel harness below the rappel hook according to the directions in MTDC Rappel Equipment Bulletin 021103. Loose straps must be secured to prevent entanglement during the rappel process.

**NOTE: Maximum loaded weight of BD bags shall not exceed 30 lbs.**

### 3.2.5 Harnesses

1. Rappel and cargo letdown spotters shall wear a Helicopter Spotter Harness. The harness shall be manufactured in accordance with BLM Drawing #B49001 (Smokejumper style), or the Petzl C-76 Harness.
2. The HR-2 Wildland Fire Helicopter Rappel Harness shall be used by rappellers.

**Inspection:** Inspect stitching and webbing for abrasion, wear or other damage. Check snaps, v-rings, adjusters and descent device attachment points. Inspect the rappel hook for proper locking and release of spring loaded gate. On the HR-2 rappel harness, the Tri-link shall be installed so that it captures both soft loops and the locking nut is on the rappeller's left. A 'Kong Clip' or rubber 'O' ring shall be installed where the tri-link passes through the right soft loop of the HR-2 rappel harness. This keeps the tri-link oriented correctly. An additional Kong Clip or 'O' ring may be installed where the tri-link passes through the rappel hook.

### 3.2.6 Tethers

1. The Spotter tether for the smokejumper style harness and the Petzl C-76 harness shall be manufactured in accordance with drawing # MTDC-990 Heli-Ops Harness Restraint Tether.

**Inspection:** Inspect stitching and webbing for abrasion, wear or other damage. Metal adjuster should be free from cracks, dings, or other damage.

**NOTE: Tether for Spotter Harness:**

**Rappel spotters shall use a spotter tether manufactured in accordance with drawing # MTDC 1039 when working as a spotter for rappel and cargo letdown operations. One end of the tether must be attached to an approved hardpoint or tether attachment manufactured and installed in accordance with drawing # MTDC 946. The other end of the tether must be attached to the attach point of the Spotter Harness.**

2. For rappellers requiring a secondary restraint (example: Bell 212, S58T, and S61) a body belt hereafter referred to as the Rappeller Gunner Strap shall be used. It shall be manufactured in accordance with drawing #MTDC-984.

**Inspection:** Inspect stitching and webbing on belt and tether for abrasion, wear or other damage. Ejector snap, v-ring, and adjuster should be free from cracks, dings, or other damage. Ejector snap should release and reset to closed/ready position with minimal force. Spring loaded gate on ejector snap should open when pushed and return to closed position when released.



### 3.3 Rope and Descent Device

#### 3.3.1 Descent Control L4 Nylon Type 4 Rope

This rope manufactured by Descent Control, Inc. is one-half inch braided nylon manufactured in 250 foot lengths. Three metal swages, one inch apart, attach a metal eye (thimble) to each end of the rope. Information has been stamped on each of these swages. The type of rope and length is stamped on the first (closest to the thimble) swage. The date of manufacture is stamped on the second (middle) swage and a manufacturer's unique serial number is stamped on the third swage. This unique serial number will meet the intent of the identification for documentation purposes. A different "unit" number may also be engraved locally or stamped by manufacturer.

To increase each rope's operational life, rope ends will be rotated after each rappel sequence. To track this, each end shall marked A and B respectively.

Ropes that lay over a doorsill or pass through a carabiner shall have a rubber hose jacket, 18" in length, to provide protection. It must give sufficient protection to minimize direct right angles to rope and eliminate rope damage on door edges.

##### 3.3.1.1 Rope Damage

1. **Heat:** It is imperative to document any type of heat damage to rappel ropes. Although some ropes may be more tolerant to heat damage than others, it can be assumed that if a rappeller can smell a pungent odor of burning nylon, sufficient damage has been caused to create concern and necessitate close inspection and documentation in the rope log. During fast descents there is little friction developed while descending. As the rappeller nears the ground, friction is applied to slow the descent. This generates heat quickly. As the rappel device absorbs heat, it may become hot enough to glaze or melt the rope, especially when coming to an abrupt stop on a long descent.

For nylon rope, a critical temperature of 350° F will cause breakdown in fibers. At 480° F, melting will begin. A rapid rappel to minimize exposure under a hovering helicopter will inevitably cause heat damage, reduce rope life, and may require immediate rope retirement, even with a new rope. To minimize potential for heat damage, do not allow the descent device to heat to the point where it will melt the rope fibers. To accomplish this, vary the rate of descent or amount of friction applied to the descent device. This will decrease any steady heat buildup by allowing some cooling of the device between braking. After each rappel, visually check the rope for glazed areas or feel for hard, stiff areas that may indicate heat damage. If any damage is found document it on the rope log sheet. If there is any doubt concerning extent of rope damage, retire the rope.

2. **Dirt:** Any contaminant which works into the fibers and construction of the rope will cause deterioration. Mud, dirt, and sand have sufficient grit to cause abrasion to rope fibers. Because of the potential for fiber abrasion, ropes should not be stepped on. Look for excessive mud and dirt. Feel the rope for grit, cheat grass, or other particles that could possibly work into the rope. Avoid dragging the rope over the ground.
3. **Chemicals:** Contact with acids or bleach must be avoided. Chemical damage to ropes can occur and may not be visually detected. Because of this potential hazard, ropes should always be stored in a rope bag away from batteries and chemicals. Alkalis, oxidizing, and reducing agents (e.g., bleach, fire retardant, or foam) are all known to be damaging to nylon. Nylon is unaffected by hydrocarbons; however, additives in these agents may adversely affect the rope.
4. **Cross-Contamination:** Any surface that ropes or other rappel gear may potentially contact should be inspected for the presence of contaminants that can damage ropes, gloves, harnesses, and other gear. Textiles and leather can absorb and transfer contaminants to other gear. Petroleum products can reduce the friction between rope and Sky Genie, making a rappeller's descent harder to control. Pitch from coniferous trees can increase the friction between rope and Sky Genie, making it more difficult to descend. Fire retardant contains powerful corrosive agents that can damage metal hardware. Any source of contamination, including dirty fire shirts with chainsaw bar oil stains on the shoulder, dirty Nomex pants, and dirty/retardant covered line gear, must not be allowed to come into contact with ropes, gloves, harnesses, Sky Genies, carabiners, and other rappel gear. Ropes and rappel gear should always be stored in a clean, dry, chemical-free, rodent-proof locker or vehicle compartment when not in use. The interior seats and cabin of helicopters used for rappelling must be kept exceptionally clean.

### 3.3.1.2 Rope Inspection

Refer to San Dimas TDC Memo issued May 1990, "Time in Service and On Condition Guidelines" (following) and Aviation Tech Tips, June 1992, 5700-9257, 1306-SDTDC section on recommendations regarding rappel rope care. This document is available on the web at <http://fsweb.mtdc.wo.fs.fed.us/search/> and search with keyword "rappel". For rope documentation guidelines refer to chapter 4 of the IHRG. Nothing limits the discretion of either the spotter or the rappeller to retire a rope. Inspection of any rappel rope should be done carefully and methodically. At the time the rope is initially put in service it shall be thoroughly inspected and after every use of the rope. First, untangle the rope into a loose, knot-free or "flaked" pile on a clean surface. Next, inspect a short section at a time. Feel the rope, without gloves, for deformities or burrs, anything out of the ordinary. Look for visual indications of abuse: puffs; boogers; heat glazing or anything that may indicate rope damage. If damage is apparent, remove from service and document on the rope log sheet. Swages and thimbles shall be inspected for deformity, cracks, and sharp edges. Sharp edges on swages or thimbles may be smoothed using emery cloth or a fine file. Make sure metal filings do not drop into rope weave. Thimbles and swages should be snug. If not, return to manufacturer or retire it.

### 3.3.1.3 Rope Retirement

Ropes shall be removed from service when:

1. Any portion of the rope has been cut or severed in any way.
2. There are burns or significant wear marks over 50% of the rope length.
3. There is visible damage which would compromise its strength or safety.
4. When more than 25% of surface strands have been pulled out in a loop, and cannot be worked back into rope.
5. There is evidence of several bundles bonded together by heat.
6. The rope is contaminated with foam concentrate, retardant, or any petroleum product.
7. There is any damage which affects more than 25% of any woven strand of the rope.
8. Cracks or gross deformities appear on metal components.
9. No rope shall be used more than five years after its manufacture date.
10. No rope shall be used more than 100 rappels per end.

### 3.3.1.4 Rope Maintenance

If ropes accidentally become wet, the ropes should be air dried, away from direct sunlight. Do not lay ropes on a concrete floor, as acid is often used in concrete work and may last for years. Drying ropes on asphalt parking lots should also be avoided. Never dry a rope in a clothes dryer. The temperatures are hard to control and heat damage may occur.

### 3.3.1.5 Rope Use, Care and Storage

1. Prior to use a new rope should be attached to a swivel and stretched full length by hand. This will "untwist" the rope and minimize the kinks and coils associated with new ropes. Running the Sky Genie over the ropes a minimum of ten times per end is required to break the rope in. This must be documented in the rope log however it does not count toward the use life of the rope. All ropes shall be stored under clean, dry, cool conditions. Any rope stored in its original packaging in a cache or warehouse shall not be stored directly in contact with the floor. The ambient temperature shall be maintained between 0° F and 100° F. After placed in service, ropes may be stored in rope bags, provided that clean; cool, dry storage conditions prevail.
2. Ropes that lay over a doorsill shall have a rubber hose jacket to give protection. It must give sufficient protection to minimize direct right angles to rope and eliminate rope damage on door edges. All ropes used for rappelling shall be ordered with a protective hose.

3. Important care tips to be observed include
  - a. Never step on ropes.
  - b. Avoid prolonged exposure to sunlight; dry ropes in the shade.
  - c. Never expose ropes to rough surfaces.
  - d. Avoid dragging ropes on the ground.
4. After ropes have been released from helicopter, avoid dragging ropes across limbs and brush whenever possible. The fine nylon fibers that make up the Descent Control rope are very susceptible to snagging.
  - a. Avoid contact with all chemicals that may contaminate rope.
  - b. Keep ropes away from heat sources.
  - c. Avoid laying ropes on concrete or asphalt.
  - d. Avoid contact of the rope with Velcro.

### 3.3.2 Sky Genie

1. For helicopter rappelling, the one-half inch Sky Genie. (Model no. # 14G-O), manufactured by Descent Control, Inc., shall be used by all fire rappel operations. This is a two-piece descent device, shaft and cover. (Cover will have the Interagency Wildland Fire Helicopter Rappel Genie Decal on it). Users shall engrave identical identification numbers on both the Genie shaft section and cover to insure that these components remain together for the life of the Sky Genie. Engrave the number on the shaft section across the top of the lock-off horns. To prevent damage to ropes, insure that any engraving on shaft or cover will not contact the rope when properly rigged on the Sky Genie.
2. A standard of 2½ wraps around the shaft shall be used. The rope shall enter the front and exit the back of the cover and show two wraps in the cover window. Follow the arrow on the shaft for direction of wraps. It must be used only with the Descent Control, Inc., one-half inch diameter rappel rope (Type 4). The retirement life for the Sky Genie is based on the wear grooves on the shaft. Sky Genies shall be retired after a 1/16-inch deep wear groove is observed.
3. After each rappel, inspect for
  - a. Dents in cover.
  - b. Rough or sharp surfaces on cover and shaft
  - c. Scratches or excessive wear on shaft.
  - d. Faulty detent pin or locking screw.
  - e. Cracks or breaks.
  - f. Cover fitting on shaft.
  - g. Dirt, tree sap, etc.
  - h. Wear on cover, inside or out, at thumb screw slot or detent pin hole.

4. Take care to
  - a. Avoid rough handling.
  - b. Not drop or drag on ground.
  - c. Keep Sky Genie shafts with original covers.
  - d. Keep clean.

### 3.4 Ancillary Equipment

#### 3.4.1 Carabiners

Only the SMC Lite Steel carabiner is authorized for all rappel and cargo letdown use. (Exception: carabiners specifically identified by supplemental type certificate (STC) for direct attachment to anchor).

**NOTE: Carabiners are designed to be loaded longitudinally; if load occurs on the side(s), gate failure may occur.**

**Inspection:** Inspect to be sure that gates and locking mechanism function properly. If gate becomes sticky, remove from service. Look for abrasion, burrs, or rough edges. If there is any visual indication that raises question, retire it. When using carabiners make certain that: Gates are locked when in use. Pull is not on gate. Carabiners are not dropped on ground or hard surface. Rough handling is avoided. Carabiners are kept clean.

#### 3.4.2 Knife

All rappellers and spotters are required to have a hook knife, with lanyard, readily accessible for emergency use. The “Raptor” style knife is required for use by rappellers and spotters. The rappeller Raptor knife shall be enclosed within the MTDC rappeller Raptor sheath (MTDC drawing 1041) and attached to the rappel harness in the manner shown in rappel bulletin 021103. The spotter Raptor knife shall be enclosed within the MTDC rappel spotter Raptor sheath (MTDC drawing # 1042) and attached to the spotter harness in the manner shown in rappel bulletin 051005. Certain STC’s for rappel anchor installations require an additional “Raptor” knife be installed inside the aircraft.

**Inspection:** Inspect and ensure knives used for operational rappel have properly installed unused blades. Changing of blades will be closely supervised by a rappel spotter. Handle/body of knife should be free from damage, screws should be tight. Snap(s) should close/open with enough resistance to prevent inadvertent opening.

#### 3.4.3 Safety Snub Strap

An approved safety snub strap will be utilized as a backup device to securely connect rope(s) to the rappel anchor(s) or to one another. The snub straps shall be manufactured in accordance with MTDC drawing #958 for double rope capable anchors. Single anchor, single rope snub straps shall be manufactured in accordance with MTDC drawing #995 for overhead anchor.

**Inspection:** Inspect stitching and webbing for abrasion, wear or other damage. Body of static line snap(s) should be free from cracks, dings, or other damage. Detent button(s) should depress and reset to closed/ready position with minimal force. Sliding cover should open and return to the closed position easily. Inspect body and cover for burrs or sharp edges that could damage ropes.

## 3.5 Cargo Deployment Equipment

### 3.5.1 Figure 8 with ears

1. For wildland fire rappel operations the figure 8 is used for cargo letdown only. To rig: a loop of the line is passed through the center opening of the figure 8 and over the top. A technique referred to as a double wrap can be used for heavier loads. To perform a double wrap merely repeat original process.

**Inspection:** Inspect for grooves developing or flaking occurring in aluminum figure 8's. When a groove develops beyond the anodized surface of the aluminum figure 8, wear will rapidly occur. If the groove is beyond 1/16-inch deep, retire the figure 8. Inspect the figure 8 for aluminum flaking. This develops rough edges that could cause excessive wear on the line. If flaking is evident, remove the figure 8 from service. Although the acquisition cost is double, steel figure 8's have proven more durable and service life is considerably longer than aluminum, however, steel may cause heat damage more easily because it does not dissipate heat as readily as aluminum. Inspect for cracks or breaks. If cracks are evident, retire figure 8.

2. Take care to
  - a. Avoid rough handling.
  - b. Not drop or drag on ground.
  - c. Keep clean.

### 3.5.2 Cargo Letdown Line

The let-down line shall be a minimum of 250' in length and conform to Mil-W-5625K Webbing, Textile, Nylon, Tubular, 3/4". Webbing conforming to this standard has a minimum breaking strength of 2300 lbs. Letdown line will be inspected for wear and burns after cargo deployment, and the ends reversed for the next letdown sequence. A twenty-five foot section from each end of the letdown line shall be clearly marked in red and a ten foot section in the center of the line should be marked with a contrasting color. Use only Rit dye to mark lines. A letdown accordion pack will be constructed to accommodate a minimum of 250 feet of letdown line. The pack will conform to drawing #MTDC 974. The line will be packed in accordance with the Wildland Fire Helicopter Rappel Cargo Letdown Accordion Pack video produced by MTDC. Edge protection may be necessary along helicopter door edge or helicopter skids to prevent abrasion of the line.

**Inspection:** Inspect stitching and webbing for abrasion, wear, cuts, chemical contamination or other damage.

### 3.5.3 Cargo Let-Down Containers

1. Bags are to be manufactured with high strength abrasion-resistant materials. The attachment points on the bag must be reinforced to ensure there is not a failure during deployment. Sources for approved cargo letdown containers are also listed on the rappel website. Maximum allowable suspended weight per cargo let down container shall be 125 lb. The exceptions are the Tuna Net and the Klamath bag which may be used to a maximum of 300 lb. Maximum allowable suspended weight per cargo let down line shall be 300 lb. Approved cargo let down containers shall pass a static strength test with no failure or ruptured stitches when loaded to a minimum weight of 468.75 lb. (safety factor of 3.75 to 1).
2. Cargo letdown containers shall consist of the following:
  - a. Cardboard box with harness, the cardboard box shall consist of double wall construction with minimum burst strength of 275 lb. The box harness and attachment hardware shall have a minimum tensile strength of 1125 lb.
  - b. A-5/Metolius style Haul Bag
  - c. Tuna Net (NFES #0795).
  - d. Klamath Cargo Letdown Bag, which shall conform to drawing # MTDC 959.

**NOTE: Bags and other containers should be frequently inspected and not used if damaged.**

### 3.5.4 External Cargo Deployment (Break-away strap and Cargo Strap)

For external cargo deployment the break away strap which is the connecting line between the external load or cargo strap and cargo let down line shall conform to Mil-W-5625K and be 1” tubular nylon. The minimum breaking strength of 1” tubular is 4000 lbs. External cargo operations shall use the model specific Break Away and Cargo Straps manufactured in accordance with drawing # MTDC980 Helicopter Rappel External Cargo Break Away strap and drawing # MTDC982 Helicopter Rappel External Cargo Strap.

## 3.6 Rappel Anchors

Rappel anchors are evaluated for use by the Aviation Management Directorate (AMD) for DOI operations or the Missoula Technology and Development Center for USFS use. Each helicopter model will be evaluated for anchor hard points and design to determine the proper rappel bracket or brackets that may be used. The USFS and DOI helicopter program managers approve rappel anchors and rappel aircraft. Rappel anchors shall be inspected in accordance with the corresponding STC instructions. In addition an annual inspection shall also be conducted. The designer (or manufacturer) of the anchor is responsible for developing a maintenance inspection, which ensures the continued airworthiness of the anchor. The owner of the anchor is responsible for ensuring that the inspection(s) is conducted. Information regarding existing rappel anchors is available from MTDC.

### 3.6.1 Rappel Anchor Daily Inspection (Generic)

Prior to installation of the rappel anchor in the aircraft and prior to each day of use, the rappel anchor shall be visually inspected for general condition as follows:

1. Metal Rappel Anchor  
Assure plate identification tag with serial number is installed.
  - a. Inspect anchor for cracks, corrosion, and deep scratches, particularly around the carabiner and clevis holes.
  - b. Inspect for loose rivets.
  - c. Inspect clevises and attaching hardware for security and damage.
2. Cables
  - a. Inspect cable for damage, corrosion, fraying, and kinks.
  - b. Inspect Nicopress sleeves for signs of cable slippage.
3. Guards  
Inspect guards for proper installation and security.
  - a. Scuff plates on Bell 206 L-series.
  - b. Rope guards installed on skids.
  - c. Letdown line abrasion guard for 407 (#MTDC-977).
  - d. A-Star sliding door track guard.

## 3.7 Equipment and Procedure Development Process

### 3.7.1 Objectives

1. Increase the quality and efficiency of rappel equipment development work and reduce development costs.
2. Properly balance input and participation in the equipment development process by rappel bases, Technology and Development (T&D) Centers and State, Regional, and Washington Office management.
3. Identify priorities for T&D Centers' development work by systematically identifying priority rappel problems that can be solved by equipment development.
4. Clearly identify procedures and items of rappel equipment for standardization to facilitate interregional exchange of rappellers, increase safety, and maximize efficiency.
5. Clearly identify operational procedures and technical requirements for each item of equipment in advance of development work.



### 3.7.2 Approval Process

Outlined below is the formal process for obtaining the necessary approval and technical support for helicopter rappellers to propose new or improved equipment and/or procedures.

1. When a field user perceives a need for a new or improved piece of equipment or procedure, documentation of that need must be submitted to the Rappel Equipment and Procedures Committee (REPC) through the regional/area REPC representative using the Rappel Equipment /Procedures form, (Forms are available on the Helicopter Rappel Website listed at the beginning of Chapter 3, or through your Regional REPC Representative) where it will be evaluated based on the above objectives and the following criteria:
  - a. Critical Safety
  - b. National Focus
  - c. Priority
  - d. Probability of success
2. If the REPC agrees the proposal has potential merit and meets the above criteria and objectives, the proposal is forwarded to the Interagency Rappel Working Group. If the proposal does not receive further review, the REPC will notify the Chair of the RWG and the submitter of the disposition.
3. After evaluating the proposal, if the RWG concurs that the proposal has potential merit, the proposal is approved or forwarded to IHOPS who will have final authority to accept or reject the proposal.

**NOTE: Prior to any field evaluation, written approval must be obtained by the RWG from the appropriate agency official (example: USFS National Aviation Officer).**

4. If the proposal is accepted, it will follow one of the paths outlined below.
  - a. If the proposal is a change in procedure or an "off-the-shelf" piece of equipment that does not require extensive testing and development, it will receive the appropriate engineering test and/or review in coordination with equipment specialists from the Missoula Technology and Development Center.
  - b. If the proposal requires a major equipment development effort (i.e., engineering design, drawings, testing, etc.), with project funding from the Washington Office Fire and Aviation Management, it is then forwarded to the Working Group. They will evaluate the proposal based on the above-mentioned criteria and, if approved, assign the equipment development task to the Missoula Technology and Development Center. The design, engineering and development work is performed under the direction of the assigned MTDC equipment specialist. If necessary, a prototype design is manufactured for field evaluation.

5. Upon a successful evaluation the design may be finalized and formally approved.
6. Upon review of a proposal submitted to the RWG by the REPC, the submitter will be notified in writing as to the disposition of the proposal by the RWG.
7. Upon formal approval, the Rappel website and Rappel Guide will be amended to include the new or revised drawings, specifications, procedures, etc.

## 4 DOCUMENTATION

All rappel logs are official documents and are not to be destroyed. Historical logs may be archived as necessary.

**NOTE: All rappel equipment that is removed from service (retired) must be destroyed to the point that it can no longer be utilized for its intended purpose. Any equipment that requires documentation must show retirement date on the “Equipment Log” when removed from service. All rappel equipment retired remains government property and should be handled according to policy.**

### 4.1 Training, Certification, and Proficiency

#### 4.1.1 Rappeller

The rappel crewmember training record shall document each individual step in the training. Competency at each level of the training must be demonstrated by the trainee before the spotter shall permit advancement to the next step.

#### 4.1.2 Spotter

The spotter trainee record shall document each individual step in the training. Competency at each level of the training must be demonstrated by the trainee before the check spotter shall permit advancement to the next step.

**NOTE: In addition to the standard rappel crewmember/spotter training record, it is advisable that spotters maintain a separate comment sheet to document any training deficiencies that may potentially arise.**

### 4.2 Rappel Unit Log

1. All rappels must be entered into a rappel unit log. Unit logs shall be readily available for review. Information documented shall include:
  - a. Incident/Location
  - b. Spotter's name
  - c. Remarks/Problems
  - d. “N” number of A/C
  - e. Rappeller's name
  - f. Date of rappel(s)
  - g. Purpose of rappel
2. The spotter or rappel base manager will ensure information is entered into the logs in a timely manner and the logs are kept current.

### 4.3 Equipment logs

All equipment will be assigned a unique identification number. The number will be retired with the piece of equipment. The following equipment shall have a log assigned.

#### 4.3.1 Rope

1. Documentation must be maintained for all rappel ropes. A log shall be maintained from the date of purchase until the rope is removed from service. The rope log shall be readily available for review. Each rope must have an identification number and be marked at both ends, one end marked "A" and the other end marked "B" (reference Chapter 3.3.1).
2. The following minimum items shall be recorded in the rope log:
  - a. End used
  - b. Height of rappel
  - c. Date of rappel
  - d. Rappeller's name
  - e. Rope ID number
  - f. Manufacture Date
  - g. Purpose of rappel
  - h. Date retired
  - i. Remarks/Problems
  - j. Name of Inspector/Date inspected
  - k. Number of prior uses
3. All rope uses shall be documented. After inspection, any irregularities will be noted and brought to the attention of the spotter. Documented information will dictate when to retire a rope from service.

#### 4.3.2 Personnel Descent Devices

1. Use and inspection of any descent device shall be documented on a Descent device log. Cover and shaft shall have the same identification number and shall always be used together. Numbers shall be engraved according to Chapter 3.3.2.1. After each rappel, the descent device shall be inspected for wear or deformity and remarks noted. When a rappel device is retired, it shall be destroyed to eliminate further use.
2. The following minimum items shall be recorded in the descent device log:
  - a. Date put in service
  - b. Number of prior uses
  - c. Date of rappel
  - d. Rappeller's name
  - e. ID number
  - f. Date retired

- g. Remarks/problems
- h. Inspected by/inspection date

#### **4.3.3 Harness**

The following minimum items shall be recorded in the harness log:

- 1. Date put in service
- 2. Rappel issued to
- 3. ID number
- 4. Date retired
- 5. Remarks/Problems
- 6. Date of issue
- 7. Inspected by/Inspection date

#### **4.3.4 Cargo Letdown Line**

The following minimum items shall be recorded in the cargo letdown line log:

- a. Date put in service
- b. Date of use
- c. Name of Inspector/date inspected
- d. Identification number
- e. Spotter's name

All cargo letdown line use shall be documented. After inspection, any irregularities will be noted.

#### **4.3.5 Positive Locking Steel Carabiners**

Positive locking steel carabiners must be used, inspected and retired (if applicable) in accordance with manufacture's specifications. No records need be kept on carabiners.

#### **4.3.6 Rappel Anchor**

Use and inspection of rappel anchors (both helicopter and tower) shall be documented.

- a. Date put in service
- b. ID number
- c. Remarks/problems
- d. Type of use (Helicopter or tower)
- e. Inspector's name/date inspected

**NOTE: This is in addition to the annual inspections.**

## 5 RAPPEL OPERATIONS

### 5.1 Administrative Responsibilities

The spotter shall be responsible for coordinating all rappel activities (pre and post rappel).

### 5.2 Pre-Rappel Briefing

Prior to any rappel mission, the spotter must brief all personnel involved as to the nature of the mission and its location, and provide pertinent information to accomplish the rappel mission. The information should include environmental concerns (weather, wind, terrain landing areas, density-altitude, etc.), individual responsibilities and incident specific information.

**NOTE: The Spotter will assure the Pilot has completed the weight and balance (W&B) computations (including lateral and longitudinal center of gravity) for the rappel configuration.**

### 5.3 Pre-Flight Inspection

#### 5.3.1 Rappel Equipment Check

The spotter shall ensure completion of the following:

1. Cargo - remove on-board items not essential to the mission.
2. Cabin Configuration - as directed by pilot, set up for rappel mission.
3. Anchor Point - correctly installed and secure.
4. Rope(s) - attached to the rappel anchor with locked carabiners and both ropes securely attached with safety snub strap.
5. Rope abrasion protection, or pads - in place covering helicopter floor edge, if applicable.
6. Let-Down Lines and Friction Devices - sufficient number on board to deploy cargo. Secured but accessible.
7. Spotter's Harness/Tether - securely attached to a hard point, adjusted to provide sufficient movement in cabin but prevent falling out.
8. Maps and Mission Information - accessible and secured.
9. Communication Check - all radios operational and appropriate frequencies programmed.

**NOTE: Different helicopter models may require slight variations in inspection.**

### 5.3.2 Rappeller Personal Equipment Check

Rappellers must have equipment checked prior to boarding the helicopter. Rappeller equipment inspection (Buddy Check) will be a head-to-toe check, adapted for the specific rappel equipment utilized.

### 5.3.3 Buddy Check

1. Helmet - Chinstrap attached; no loose ends; microphone boom adjusted; long hair tucked in.
2. Eye protection in place and utilized.
3. Collar - turned up, buttoned to top; flight suit completely zipped.
4. Sleeves (Nomex®) - down.
5. Gloves - on (sleeves over gloves and fastened or gauntlets over sleeves and secure).
6. Harness - correctly fitted; loose straps secured with no twists.
7. Buckles - Attached correctly.
8. Rappel hook (for descent device) - Attached and locked.
9. Knife (with lanyard)- On left leg strap of harness, lanyard secured, out of way.
10. Boots - Leather, lace; tops covered by pants.

There may be other items specific to the program, such as BD/belly bags.

**NOTE: The rappellers must inspect rope attachment to the rappel anchor and spotter's equipment to include harness, knife, helmet, and tether point. Although redundant, it maintains the continuity of check/double-check, and minimizes the potential for human error.**

### 5.3.4 Spotter/Rappeller Check

The spotter must check each rappeller as follows:

1. Rope correctly attached to anchor.
2. Safety snub strap correctly in place.
3. Rope protector (model specific).
4. Descent device properly rigged.

5. Descent device properly attached to harness and attachment hardware functional (model specific).
6. Harness, properly fit, and hardware secure.
7. Knife readily accessible, lanyard secure.
8. Gloves - on (sleeves over gloves and fastened or gauntlets over sleeves and secure).
9. Helmet, chinstrap snapped and loose ends secure.
10. Seat belt properly fastened.

**NOTE: Different helicopter models may require a slight variation in the inspection checklist. See Model Specific Procedures.**

#### **5.4 In-Flight and Incident Approach Duties**

1. The spotter will initiate flight-following procedures upon departure, per agency policy. The spotter will assist the pilot in navigation and flight-following position reports and advise the pilot of any hazards along the flight route (use hazard map).
2. The following criteria should be used as a guide by the pilot and spotter when evaluating whether to rappel or land:
  - a. Is a good landing site available within reasonable distance of where you need to go? If so, land and walk.
  - b. Does the mission dictate getting someone to a site as quickly as possible? If not, land at the closest suitable landing site and walk.
  - c. Is the risk of traversing the terrain greater than the risk associated with rappelling? If not, land and walk.
3. If landing is not practical, the spotter and pilot will select a suitable rappel site. Before rappel operations begin:
  - a. The pilot shall perform an OGE power check prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established without exceeding aircraft limitations
  - b. Flight following and nearby ground personnel (to include IC if applicable) and/or aircraft notified of the beginning of the rappel operation.
  - c. Radio may be turned down, but must be left on.
  - d. Hot-mike activated.



## 5.5 Rappel Procedures (See Appendix B, Model Specific Procedures.)

### 5.5.1 Spotter

1. Prior to beginning rappel, confirm with pilot that rappel site is good and power is within limits.
2. Maintain position over rappel site by communicating with pilot.
3. Notify pilot of intent to drop rope(s).
4. Either spotter and/or rappeller(s) drop rope(s).
5. Check rope(s) are not hung up, free of knots, and rope(s) are on ground.
6. Inform pilot when rope(s) are on ground.
7. Signal rappeller(s) to (model specific); hook-up; release seat belts; exit cabin and establish pre-rappel position.
8. Notify pilot that rappeller(s) are in pre-rappel position.
9. Signal rappeller(s) to descend.
10. Inform pilot of rappeller's progress.
11. Notify pilot when rappeller(s) are off rope and clear.
12. Notify pilot of intent to drop ropes.
13. Disconnect ropes and drop to ground.
14. Advise the pilot ropes are clear.
15. Depart rappel site.

**NOTE:** During rappel sequence, the spotter shall maintain communications with the pilot on each phase of the rappel as it occurs.

### 5.5.2 Rappeller

1. Lock-Off A technique intended to temporarily attain a stationary position on the rope.
  - a. Place brake hand on running end of rappel rope approximately one foot below the descent device.

- b. Pull running end of rope up and over descent device, locking between fixed rope and descent device, loop running end around again--lock-off is accomplished.
2. Pre-Rappel (See Model Specific Procedures)
    - a. Helicopter approaches rappel site, rappeller(s) may assist in site selection.
    - b. If Rappeller is utilizing avionics system, Rappeller unplugs and secures avionics cords.
    - c. Helicopter approaches hover, rappeller(s) maintain eye contact with spotter.
    - d. A Lock-off will be in place prior to exiting the helicopter.
    - e. Rappeller releases seat belt, and establishes final pre-descent position.
    - f. Rappeller positions rope on brake-hand side of body, looks down rope to check for knots or entanglements and makes certain rope is on the ground.
    - g. Rappeller establishes pre-rappel position and makes eye contact with spotter.
    - h. Spotter gives rappeller signal to descend.
    - i. Rappeller leaves pre-rappel position, unlocks rope and descends.
  3. During Descent Rappeller will:
    - a. Watch landing area.
    - b. Maintain controlled rate of descent.
    - c. Maintain break hand on rope during descent until securely on the ground.
    - d. Prior to ground contact, look for undiscovered hazards (e.g., hidden logs, loose rocks, etc.)
    - e. Upon ground contact, when possible, go into a crouched position; this will give sufficient slack to disconnect from the rope without tension.
    - f. Disconnect descender from rappel harness.

## **5.6 Spotter Duties**

### **5.6.1 Cargo Delivery (See Model Specific Procedures)**

The Spotter will:

1. Inform pilot that cargo is to be deployed.
2. Secure accordion pack.
3. Attach letdown line to Figure “8”.
4. Attach Figure “8” to an anchor.
5. Attach letdown line to cargo with a positive locking steel carabiner.
6. Inform pilot when cargo is ready for deployment.
7. Coordinate cargo deployment with pilot.
8. Notify pilot of deployment progress.

9. Notify pilot that cargo is securely on the ground.
10. Inform pilot if additional cargo is to be deployed.
11. Disconnect let down line from Figure “8”.
12. Disconnect accordion pack, and make several wraps around the pack to eliminate any potential for excess line to spill out upon being dropped. Drop accordion pack.
13. Inform pilot letdown bag is clear of aircraft and mission is complete.

### **5.6.2 Post-Rappel (See Model Specific Procedures)**

The Spotter will:

1. Secure loose items in the helicopter.
2. Check to see seat belts are fastened.
3. Advise pilot forward flight may be initiated.
4. Determine status of rappeller(s) deployed.
5. Establish radio contact with ground personnel and flight following.

### **5.6.3 Administrative**

Complete necessary documentation, pertinent to the mission.

### **5.6.4 Post-rappel debriefing**

1. Spotter/pilot will critique the mission, and or discuss problems that may have occurred.
2. Upon rappellers return, spotter and rappeller(s) will critique the mission.

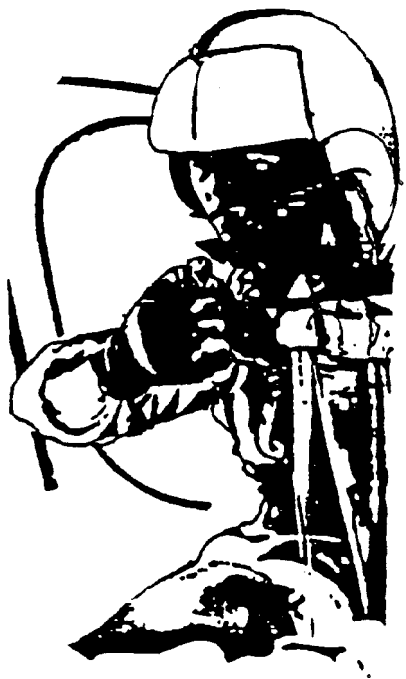
## **5.7 Hand Signals - General**

The following standard hand signals shall be used (order may change dependant on A/C type):

1. **Thumbs Up:** Used by rappellers and spotters to indicate, "I agree" or "I am O.K."
2. **Remove Seatbelt:** Imitate removing lap belt.
3. **Drop Ropes:** With outstretched arm(s) and index finger pointing down, move arms in a downward motion. Signal given by spotter to rappeller(s) to drop ropes.

4. **Move Into Position:** Hands clasped at chest level with elbows out. Given by spotter to rappellers to signal move to pre-rappel position.
5. **Begin Descent:** Arm(s) extended with open palms down, sweeping downward motion. Signal given by spotter to rappeller(s), indicating rappeller(s) to unlock and begin rappel.
6. **Spread Eagle:** Arms and legs outstretched while looking up to establish eye contact with spotter. Signal given by rappeller to spotter to indicate that rappeller has locked-off and further descent is not possible.
7. **Cut Rope:** Horizontal arm wave with outstretched arm. Signal given by spotter to rappeller, after rappeller has given spread eagle signal, indicating that rappeller should tie-off and cut rope below him/her and prepare to be lifted out.
8. **Lift Out:** Upward motion with outstretched arms. Given by rappeller to spotter to indicate that rope below rappeller has been cut and rappeller is ready to be flown out.
9. **Clear of Obstacles:** Both arms extended to front of body with palms together. Signal given by rappeller during lift out and fly away indicating that rappeller is clear of obstacles and pilot can begin forward flight.
10. **Bad Rope:** With one arm outstretched, slashing motion across outstretched arm with other arm. Signal given by rappeller to spotter to indicate there is something wrong with the rope and spotter should drop it.
11. **Discontinue Rappel:** Slashing motion across throat with one arm. Signal given by rappeller to spotter indicating bad rappel site, discontinue rappel.
12. **Stop, Hold Position:** Arm(s) extended toward signal recipient with fist clenched (palm toward recipient). Signal given normally by spotter to stop and hold rappeller in position prior to the “begin descent” signal.
13. **Return to Seat:** Give "Stop and Hold" signal [arm(s) extended, fist(s) clenched] then bring fists and elbows together [arms bent 90° and fist(s) in front of body]. Signal given by spotter to indicate rappeller(s) should return to seat and buckle seat belt.

SPOTTER HAND SIGNALS - GENERAL

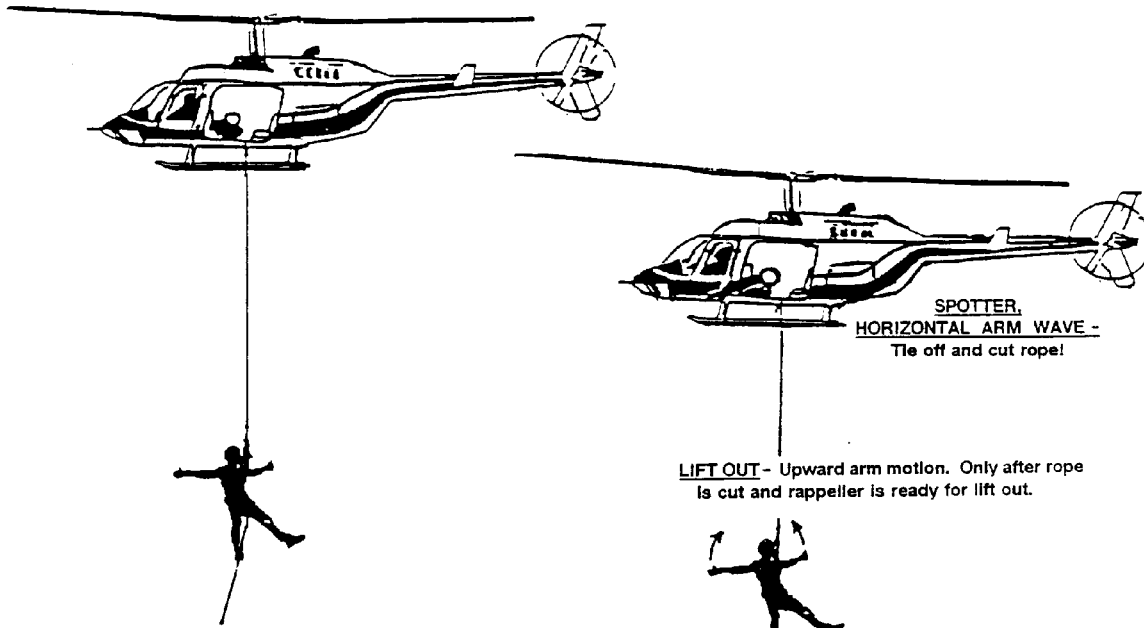


1. MOVE INTO POSITION - The rappeller moves into rappel position.



2. BEGIN DESCENT - Arm(s) extended and palm(s) down; the spotter makes a sweeping downward motion.

RAPPELLER HAND SIGNALS - EMERGENCY



**SPREAD EAGLE** - Descent is not possible.  
Rappeller waits for visual contact with spotter.

**LIFT OUT** - Upward arm motion. Only after rope is cut and rappeller is ready for lift out.

**SPOTTER, HORIZONTAL ARM WAVE** - Tie off and cut rope!



**SLASH ACROSS THROAT** - Discontinue Rappel!  
Bad rappel site.



**TAP ON THE HEAD** - Rappeller is O.K.



**SLASH ARM** - Bad rope!

## 6 RAPPEL EMERGENCY PROCEDURES

Emergency Procedures are defined as established methods prescribed to respond to a situation, serious in nature, developing suddenly or unexpectedly, and demanding immediate action.

### 6.1 Rappeller Procedures and Signals

1. If during a rappel the rappeller encounters a problem that will hinder their progress to the ground, the rappeller will attempt to clear the problem. The rappeller may initiate a Lock-Off to facilitate using both hands to correct the problem. If a Lock-off has been initiated, and the rappeller still cannot resolve the problem, the rappeller will return their attention to the spotter and give the Spread-Eagle Signal. If the spotter gives the signal (horizontal arm wave), the rappeller will initiate an Emergency Tie-Off (ETO) and cut the rope below. If no ETO signal is given, the rappeller will be lowered to the ground.
2. Emergency Tie-Off (ETO) is a procedure completed after locking-off, to permanently secure the rappeller's position on the rope. Some situations when a tie-off may be required are:
  - a. The rope becomes entangled, preventing the rappeller from descending or creates a hazard to the helicopter.
  - b. The rappeller cannot descend because of pitch (sap) on the rope.
  - c. A knot on the rope has become lodged in the descent device.
  - d. The rappeller has a descent device malfunction.

When a problem occurs and the helicopter has insufficient clearance from obstacles to lower rappeller to ground or; there is a problem with rappel site/landing area; the spotter will signal the rappeller to begin the Emergency Tie-Off procedure.

3. The Tie-Off procedure is as follows:
  - a. Bring running end of rappel rope through between the harness webbing and rappeller's body from right to left where the descent device is attached. Pull up three to four feet of slack to form a running loop.
  - b. Bring loop up and over descent device and form a half-hitch around the fixed-end (to helicopter) of rope. Pull half-hitch tight.
  - c. Form another half-hitch on top of the first one. Pull tight. At least a two foot looped tail should remain.
  - d. Cut the running end of rope approximately four to six feet below the descent device.

After the rope has been cut, the rappeller gives the spotter the 'Lift-Out' Signal. This indicates to the spotter that the rope has been cut and that the helicopter should climb until the rappeller is clear of obstacles. After all obstacles have been cleared, the rappeller will indicate this with the 'Clear of Obstacles' Signal. Then, the helicopter

transports rappeller to a safe landing site. Upon arriving at a safe landing site, the rappeller is lowered to the ground.

Once on the ground, circumstances will dictate how the rappeller will release from the rope. The rappeller should attempt to untie the rope and then disconnect the genie. However, cutting the rope may be the only safe option. In this case the rappeller shall wait for slack in the rope preventing possible snap back toward helicopter rotors.

## 6.2 Helicopter Emergency

**NOTE:** There are many circumstances that can constitute an in-flight emergency. Pilots, spotters and rappellers must understand that the consequences of an emergency change significantly once rappellers are committed to the rope. It is extremely important for a pilot and spotter to have a firm understanding of the situation and discuss up front as many circumstances as possible prior to operations. In the midst of an emergency is NOT the place to discover that, “What you heard is not what I meant.” This should be accomplished through briefings and on-ground emergency exercises.

### 6.2.1 Control and Power Maintained

This situation may be indicated by caution detector or chip light coming on, gradual oil pressure loss, hydraulic boost pump failure, etc. If the pilot determines the emergency is immediate and must deviate from the rappel sequence, the following procedures will be initiated:

1. Pilot shall declare emergency and identify problem to spotter. Spotter shall ready knife and cut ropes below metal swages as soon as rappeller(s) are on the ground.
2. As the rappellers may not be aware that there is a problem with the helicopter, their first knowledge of this will most likely be realized when the ropes come down prior to them disconnecting. If this occurs, rappellers shall immediately clear the area and seek protection until the aircraft has departed.
3. If a rappeller has an indication that something is wrong with the helicopter [may be indicated by hearing an unusual noise, pop or metallic grinding sound, or unexpected movement of the helicopter], they should maximize their rate of descent to the ground and clear the area as quickly as possible.
4. If emergency occurs during cargo let down operations, pilot shall declare emergency and, based on severity of the problem, direct the spotter to:
  - a. Immediately cut the line; or,
  - b. Continue deployment until load is on the ground, then cut line.



### **6.2.2 Emergency Requiring Immediate Transition to Forward Flight**

1. Pilot declares emergency and states fly-away intentions to spotter.
2. It may be necessary for the spotter to immediately cut ropes regardless of rappellers position or progress.
3. The pilot must continually keep spotter informed of the changing status of the emergency in order for the spotter to have sufficient information to make a potentially life or death decision.

### **6.2.3 Engine Failure or Major Component Failure**

A significant risk associated with rappel operations, regardless of the model of helicopter used, is if the helicopter is unable to maintain a hover while rappellers are on the rope (engine failure, tail rotor failure, etc.).

The possibility of in-flight emergencies shall be discussed in detail with all involved with the program during the rappel training and periodically thereafter.

If the helicopter is unable to maintain a hover with rappellers on the ropes due to a mechanical problem, it is unlikely that there will be sufficient time for the pilot to take any action other than perform a hovering auto-rotation to the rappel site. In this situation, the procedures are as follows:

1. Pilot shall key radio and make a "May-Day" call. (Spotter will be able to hear this through flight helmet.)
2. Spotter shall cut ropes then take seat, fasten seat belt and assume a crash position.
3. Rappellers, if possible, shall immediately move to side after landing, assume as low a profile as possible, and then immediately disconnect from rope.

### **6.2.4 Rappeller in Distress**

1. Emergency Descent Arrest

If the rappeller cannot control the rate of descent, rappeller should reach across body with left hand and grasp rope above right hand then use both hands for braking. A term referred to as "Double Braking." The rappeller may also, in addition to Double Braking, move the brake hand around to the back of the body in an attempt to use the added friction of the clothing to assist braking. A last resort effort can be made by kicking the leg on the same side as the brake hand in a circular motion and wrapping the rope several times around the leg. This maneuver is called a "Leg Wrap."

If one rappeller is having a problem and the other is on the ground, the rappeller on the ground should assist by belaying the other rappeller.

## 2. Problems After Rappel

For operations where multiple rappellers are deployed from a single rope, procedures are in place to allow the first rappellers to the ground to signal problem to the spotter.

- a. If a rope defect or problem is evident, the rappeller(s) will give the Slash-Arm Signal to indicate to the spotter the rope is unsafe and it should be dropped and the mission completed with a new rope.
- b. If a rappeller on the ground recognizes the rappel site is a safety problem, the rappeller will give the Slash-Across-Throat Signal to indicate to the spotter that site is unacceptable so the rope may be dropped and another location can be selected.

## 7 CARGO LETDOWN OPERATIONS

### 7.1 Introduction

"*Helicopter cargo letdown*" is defined as the deployment of cargo from a hovering helicopter by the means of an approved webbing, descent device, and auxiliary equipment.

The Helicopter Cargo Letdown Procedures consists of material compiled from the private sector, bureaus, and agencies within the Department of Interior and USDA Forest Service. This guide will allow the user to utilize helicopter cargo letdown to accomplish a wide variety of tasks or projects safely and economically. Cargo letdown was designed to augment helicopter rappel operations; *it is not a replacement for long-line operations*. Exposure and risk assessment must be addressed in the process of deciding which type of helicopter cargo delivery system to use.

#### 7.1.1 Objectives

The intent of this guide is to develop standardization in training of individual spotters and pilots in a variety of helicopters for the safe and efficient deployment of cargo.

#### 7.1.2 Applications

Cargo letdown operations expand the capability of the helicopter by delivering cargo on incidents and projects.

##### 7.1.2.1 Fire

1. Initial attack equipment can be deployed directly on the fire line.
2. Helispot construction equipment can be placed on site.
3. Equipment can be placed on the fire line without excessive nets, swivels, and lead lines to be packed out.
4. First aid and rescue equipment can be delivered on site rapidly and safely.
5. Long distance cargo delivery could be more cost-effective and expedient due to faster air speed allowed with internal cargo.
6. Cargo could be delivered under a variety of conditions:
  - a. tall timber
  - b. steep hillsides
  - c. snag patches
  - d. rock slides
  - e. wind conditions beyond paracargo limits
  - f. no helicopter landing site available

### 7.1.2.2 Projects

1. Nesting sites for raptors could be re-supplied more effectively.
2. Building supplies could be delivered to mountain sheep water development sites.
3. Wilderness rangers or trail crews might be re-supplied.
4. Additional tools or equipment could be delivered to any project site, without remote hook long-line capabilities.

## 7.2 Qualifications

### 7.2.1 Pilot

1. Pilots Requirements
  - a. Meets applicable contract requirements and may be required to perform an agency check ride.
  - b. Pilots must attend a familiarization session covering cargo letdown procedures, Deployment sequences, techniques, crew coordination and emergency procedures.
  - c. Demonstrate ability to operate helicopter during cargo letdown sequence.
  - d. Demonstrate ability to work with spotter.
  - e. Demonstrate ability to complete weight and balance calculations to include Center of Gravity for intended mission.

### 7.2.2 Spotter

1. Spotter Requirements

To be considered for spotter training, the trainee must be a qualified helicopter manager.
2. Spotter Training and Qualification
  - a. Successfully complete Interagency Helicopter Manager Training (S-372).
  - b. Demonstrate ability to rig helicopter and gear for cargo letdown operations.
  - c. Complete three (3) simulated deployments. Perform all of the duties of the spotter from the initial call through return to base.

- d. Simulate deployment without procedural error.
- e. Under the supervision of a qualified check spotter, must spot ten (10) loads from the helicopter, five (5) of which are in typical terrain.
- f. Show principles of inspection, care, maintenance, and repair of cargo letdown equipment.
- g. Identify the spotter's duties and responsibilities.

**NOTE: These are minimum requirements and the certifying official may request additional training due to the complexity of the expected operations, or an individual's needs for training in specific areas. If an individual cannot meet all of the above minimum requirements, the certifying official will not approve the spotter for cargo letdown operations.**

### 3. Spotter Proficiency

Individuals shall make at least one cargo letdown every 14 days. If a helicopter letdown is not completed within 14 days, the spotter may use a simulation. If a simulation is used to maintain proficiency during the 14 day period, an airborne deployment must be done in the following 14 day period.

### 4. Annual Spotter Re-qualification

- a. Must attend and successfully complete annual cargo letdown training.
- b. Simulate a deployment without error.
- c. Complete deployment of three loads of cargo without procedural error.
- d. Demonstrate knowledge of standard procedures of cargo letdown.

### 5. Check Spotter Requirements and Qualification

- a. Must have been a qualified spotter for two (2) years.
- b. Must have assisted in training of at least two (2) spotters.

**NOTE: New programs will be approved by OAS and state or regional aviation manager for DOI, or regional aviation officer for Forest Service.**

### 6. Annual Check Spotter Proficiency

- a. Demonstrate knowledge of standard procedures of cargo letdown.
- b. Simulate a deployment without procedural error.
- c. Deploy three (3) loads of cargo in a typical terrain without procedural error.

**NOTE: If currency is lost during the annual qualification period, the check spotter must complete the proficiency requirements to remain current. Regional Helicopter Specialist must qualify check spotters annually.**

### 7.3 Administrative Duties

1. The spotter will have sufficient training in helicopter service contract administration to ensure the following requirements are met:
  - a. Load calculations are being completed correctly.
  - b. Flight time and flight purpose is being documented for billing purposes.
  - c. Flight and duty hour restrictions are not being violated by pilot.
  - d. Accident/Incident/Safecom reports are completed when required.
  - e. Contractual problems are relayed to the contracting officer's representative or project inspector.
2. The spotter will coordinate all individuals involved. This includes:
  - a. Monitoring qualifications and training
  - b. Completed all necessary documentation and maintaining unit logs.
  - c. Spotter/pilot critiques are completed.
  - d. Problems and solutions are noted in the unit log.

### 7.4 Spotter Safety Checks

#### 7.4.1 Standard Procedures

All training and actual deployment missions will use the following steps and procedures. The intent is to standardize and maintain continuity between units.

1. Pre Deployment Briefing: Prior to any cargo letdown operation, the spotter will brief all personnel involved.
  - a. Brief pilot with pertinent information affecting deployment mission and environmental concerns (weather, wind, terrain, landing areas, density altitude, etc.)
  - b. Pilot/spotter will brief on emergency procedures and verbal communications during deployment sequence.
  - c. Clear and concise communication between the pilot and the spotter will take place during the entire cargo letdown process. Communication must be completely understood by both the pilot and spotter.
2. Pre-flight Inspection: Each spotter shall conduct an equipment check prior to boarding the helicopter.
  - a. Aviator's protective helmet is properly fitted and secured. Avionics are operational and cord is long enough to provide sufficient length to accommodate spotter's movement in the cabin without interfering with cargo letdown line.

- b. Collar turned up, fire shirt buttoned to top or nomex flight suit zipped up completely.
- c. Sleeves down and over gloves.
- d. Nomex/leather gloves on.
- e. Harness correctly fitted and loose straps secured with no twists.
- f. Buckles secure and attached correctly.
- g. Leather boots. (Nomex will extend below boot tops)
- h. Tether connected to an approved attach point.

**NOTE: Take special care in checking correct buckle attachments and looking for loose ends of straps that could become entangled in the line and/or descent device.**

### 3. Helpful Hints

- a. Maintain a taut letdown line at all times. DO NOT allow unarrested descent.
- b. Attempt to minimize contact with fuselage, step, skid, or basket when deploying cargo.
- c. Use center-of-line indicators to help determine whether splitting the load is an option (reference Chapter 3.5.2).
- d. The shadow from the load may be useful in determining height above ground.
- e. Keep helicopter control input to a minimum after descent begins to minimize load oscillations.
- f. Secure load behind rocks, logs, or bushes whenever possible on steep terrain to avoid rolling.
- g. If tight spin develops during letdown, accelerate letdown process as much as possible.
- h. All cargo containers must be manufactured with high strength, abrasion-resistant materials.
- i. Aircraft utilizing external cargo operations should minimize flight time with external cargo and maintain an air speed that allows for the external load to remain stable.
- j. Steel figure 8's will retain more heat than aluminum figure 8's. Excessive heat build up on the figure 8 could cause melting of letdown line during cargo deployment.

**NOTE: For external cargo operations, the cargo shall be deployed prior to the rappeller deployment.**

## 7.5 Emergency Procedures

“*Emergency procedures*” are defined as the standard established procedures used to respond to a situation, serious in nature, developing suddenly or unexpectedly, and demanding immediate action.

### 7.5.1 Helicopter Emergency

#### 7.5.1.1 In-Hover/Control and Power Maintained or Engine Failure, Power Loss

A problem may be indicated by a caution or chip detector light coming on, gradual oil pressure loss, hydraulic boost pump failure, etc. If the pilot determines the emergency is immediate and the deployment sequence must be deviated from, the following procedures will be initiated:

1. Pilot will declare the emergency to the spotter.
2. Spotter will cut line.
3. Spotter will fasten seat belt.
4. Spotter will report both actions to pilot.

#### 7.5.1.2 Deployment Problems

If the spotter is confronted with a problem during the descent (e.g., pitch on the line, a knot, line entangled in trees, etc.).

1. The spotter shall declare the emergency and state the problem.
2. The spotter and pilot will determine necessary action (i.e., cut line, lock off and fly away, lower load to ground by decreasing altitude, etc.).

#### 7.5.1.3 Lock Off and Fly Away Procedures

When the spotter and pilot jointly determine and agree that there is a need to lock off and fly away (like a sling load), the following procedures shall be followed:

1. Pilot will maintain hover.
2. Spotter will place brake hand on the running end of line, approximately one foot away from descent device.
3. Spotter will loop running end of line up and over descent device ears twice, locking between loaded line and descent device, locking off is accomplished. (Lock-Off Procedure.)
4. Spotter will notify pilot that load has been locked off and direct pilot to fly away.



**NOTE:** Spotter will maintain grip on line with brake hand and have knife ready during fly away.

5. Pilot will fly load, as a sling load, to nearest suitable landing area, lower to ground and detach.

## **7.6 Model Specific Procedures**

The model specific procedures are listed in Appendix B with the model specific rappel procedure.