



# Standards for Rappel Operations

2024



The USDA Forest Service National Rappel Working Team (NRWT) and National Rappel Operations Subcommittee (ROS) have developed this guide for agency employees conducting Forest Service helicopter rappel operations.

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## Review and Approval

The following signatures designate leadership roles in reviewing and approving the Standards for Rappel Operations.

*Table 0-1 Review and Approval*

Prepared by:

---

**ADAM KAHLER**, National Helicopter Operations Specialist, WO

Reviewed By:

---

**JOHN NELSON**, Branch Chief, Airworthiness, WO

Reviewed By:

---

**MICHAEL MCFARLANE**, Branch Chief, Fire Chemicals, WO

Reviewed By:

---

**BEAU DOBBERSTIEN**, Branch Chief, Rotor Wing, WO

Reviewed By:

---

**AARON SCHOOLCRAFT**, Branch Chief, Aviation Strategic Planning, WO

Reviewed By:

---

**LORI CLARK**, Branch Chief, Aviation Safety Management System, WO

Reviewed By:

---

**HEATHER CASTILLO**, Branch Chief, Aviation Business Operations, WO

Approved By:

---

**PAUL LINSE**, Assistant Director, Aviation, WO

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## Review and Revision

The appropriate Program Manager and Rotor-Wing Branch Chief will review and publish the Operations Plan on a 3-year cycle, with a change option annually.

Changes made during the cycle will be documented on a Digest Form (below), reviewed by the Washington Office Branch Chiefs, and approved by either the Assistant Director, Aviation (Operations Plans) or the Deputy Chief, State, and Private, and Tribal Forestry (Guides)

Modifications to this document may occur given the following:

- Proper analysis and recommendation made from Forest Service Aviation Staff.
- Proposed modification is approved by Forest Service National Aviation Office and remains within policy and FAA guidance.
- Any approved modification will be issued in writing identifying the changes.

Previous Edition: 2019

# Summary of Changes

This list summarizes the revisions made to the 2024 FS Standards for Rappel Operations. It does not include formatting changes, minor edits such as capitalization, punctuation, or spelling corrections, or rewording for clarity that does not change meaning or intent.

*Table 0-1 Standards for Rappel Operations Version Approval*

Date Approved	Version	Summary of Changes

Table 0-2 Significant Changes to the Standards for Rappel Operations

Location	Change
Various	Overall formatting change to align with 508 compliance and other agency documents.
Various	Remove National Rappel Operations Guide (NROG) and replace with Forest Service Standards for Rappel Operations (SFRO)
Various	Remove Rappel Training Subcommittee (RTS) from the document.
Various	Change <i>Helicopter Rappel Spotter Qualification Record</i> to <i>Helicopter Rappel Spotter Job Aid</i> to align with current title for helicopter rappel spotter training documents
2.1.2	Remove descriptions of positions, crew/size organizations; Added current national standard crew organization
3.0.0	Clarified certification and currency requirements for multiple platforms.
3.3.4	Added guidance to include that after four failed check rides, the trainees' status will be discontinued.
3.4.5	Provide clarification and guidance on mid-season rappeller errors and deficiencies
3.4.6	Provide clarification and guidance on lapse or failed annual rappeller certification
3.4.6 & 7	Update minimum content requirements to reflect changes of approved proposal
4.4.0	Clarify required minimum length for flagging on end of rappel rope
4.7.4	Update to add additional approved containers
Appendices	General: Re-organized appendices or to replace deleted or otherwise vacant appendices.
Appendix A	Removed Rappeller Training Syllabus and created a Job Aid available on the National Rappel Program SharePoint.
Appendix A	Added Rappel, Cargo, and Emergency Procedures for the Super Puma.
Appendix A	Adjusted expedite procedures for Bell medium emergency procedures to shut door prior to stating clear and then returning to seatbelt.
Appendix B	Removed Rappeller Spotter Training Syllabus and created a Job Aid available on the National Rappel Program SharePoint.
Appendix C	Removed Form and created a Job Aid available on the National Rappel Program SharePoint.
Appendix D	Combined Equipment, Procurement, and Evaluation Protocols and Equipment Irregularities into single appendix.
Appendix J	Replace plan with current and updated document; new base startup will have base review QA annually for the first three years.
Appendix K	Removed the Rappel Training Subcommittee charter. Revised Rappel Operations Subcommittee Standard Operating Guidelines. Revised National Rappel Working Team Standard Operating Guidelines. NRWT Charter to be Standard Operation Guidelines and reflect the NRWT being under the HOSC.
Appendix O	Removed <i>Rappel Program Crew Status Report</i>

# Chapter 1. Introduction

## 1.1 Objective

This guide provides standards for the administration of all rappel units regarding personnel qualifications, organization, certification, standardization, training, equipment, and operating procedures. Managers, specialists, and technicians shall use this guide in planning, administering, and conducting rappel and cargo letdown operations.

## 1.2 Scope

The procedures contained in this guide apply to rappel operations conducted by Forest Service rappel bases. The level of standardization is determined by the Forest Service National Rappel Working Team (NRWT).

## 1.3 Policy

All Forest Service rappel bases have similar administrative technical requirements for rappel and cargo letdown operations. Operations and procedures shall comply with agency policy, procurement documents, and this operating guide.

## 1.4 Authority

This guide has been submitted by the Rappel Operations Subcommittee (ROS) to the NRWT for review and concurrence.

This guide has been approved by the Director, Fire and Aviation Management. Host regions and forests are responsible for ensuring rappel bases, spotters and rappellers, under their management, meet national standards for rappel training and operations.

Line officers shall ensure that only qualified personnel supervise and administer rappel operations. Rappel base managers shall ensure operational safety and compliance with standards, equipment, and procedures.

## 1.5 Standardization of Equipment and Procedure

The total mobility and the interchange of personnel and equipment between units (“boosting”) dictates that personnel qualifications and training, equipment, rappel and cargo letdown delivery methods, and operating procedures must be uniform and standardized. This guide lists standardized training, equipment and procedures for uniform, service-wide application. The Washington Office will have the final approval for new equipment and procedures before they are adopted for service-wide use.

## 1.6 Review and Revision

Users are encouraged to recommend changes to this guide through their respective rappel base manager via written proposal. The rappel base manager submits the proposal to the National Rappel Specialist for review, concurrence, and recommendation with the ROS, and where applicable, forwarding to the NRWT.

The NRWT may approve proposals and make minor edits to the SFRO at any time without further approval if it does not change meaning or intent. Formatting, grammar, and spelling changes are examples of minor changes. Interim “like and kind” equipment changes may be made with the approval of the National Rappel Working Team and concurrence from the National Technology and Development Program Equipment Specialist.

Edits deemed significant, that change meaning or intent, shall be tracked on the revision form of this guide.

Interim revisions (those that occur within the revision cycle) may be necessary. Interim revisions are available on the National Rappel Program SharePoint site and from the Publications portion of the US Forest Service Fire and Aviation website.

The SFRO shall receive a complete review every three years. The NRWT forwards recommendations to the Branch Chief for review and the Assistant Director of Aviation for approval. Revisions will be distributed by the Forest Service National Aviation Office.



## Chapter 2. Administration

### 2.1 Organization, Personnel, Staffing and Standards

The rappel program shall maintain a high operating standard led by competent and qualified personnel. It is essential that program leaders are supported locally to ensure staffing levels are aligned with standards set forth in this chapter.

#### 2.1.1 Unit Organization

While rappel crews and their aircraft are national, shared resources, they shall be managed and supervised by the local unit. This supervision should be provided from a forest-level fire manager or aviation officer rather than from a district-level manager.

Each rappel base shall be staffed to effectively supervise the base's activities. The staff at permanent bases shall include one base manager, and one or more persons to oversee the following functional areas: operations, equipment, and training.

The base organization shall be structured to provide an adequate ratio of managers and assistant managers to squad leaders and squad leaders to rappellers. Each unit requires a minimum of one squad leader for every five rappellers. Depending on the size, workloads, and responsibility of each unit, additional positions should be established to ensure that all areas of responsibility receive the necessary supervision. Some or all these positions may require full-time employees to obtain the skill levels necessary to accomplish the job.

The number of qualified spotters should be sufficient to staff the available aircraft fleet. Two spotters per rappel helicopter is the recommended minimum with three or more as the desired target. Organization structures should also strive to provide a clear and attainable career ladder whenever possible.

#### 2.1.2 Crew Organization

##### **Crew Size**

Current approved crew size is 15 personnel. Crew size shall be budgeted for the current national standard per rappel helicopter. Rappel module size may increase above the minimum recommended levels depending on funding, size of facilities, local management, and regional/national needs.

##### **Crew Configuration**

*Expansion of crew size from 15 to 22 must be coordinated with regional and national fire and aviation leadership in the current flat budget cycle. If funding becomes available expansion will be coordinated to maintain crew size, organization and capability across the entire rappel system, The table below shows the future 22-person crew configuration. Fifteen personnel is the current approved staffing for all Type 2 rappel and helitack programs. Because span of control is influenced by the size, complexity, and specific hazards of the incident or operation, this module configuration is for single helicopter rappel crews and was developed with the target span of control and operational complexity in mind. The National Rappel Program supports the Fire*

*Apprenticeship Program however, it is recommended that apprentices be in addition to the rappel crew baseline staffing structure. Table 2-1 National Standard 15-Person Crew Module*

<b>Position Description</b>	<b>Grade</b>	<b>Minimum Tours</b>	<b>Number of Positions</b>
Helitack Manager FS1920	GS-09	26/0	1
Helitack Asst. Mgr. FS1918/FS1919	GS-07/GS-08	18/8	1
Squad Leader FS1986/FS1987	GS-06/GS-07	13/13 Minimum	4
Senior Firefighter FS0200	GS-04/GS-05	13/13 Minimum	3
Temp. Firefighter TF0003/TF0200	GS-04/GS-05	Temporary/ 1039 hours	4

*Table 2-2 National Standard 22-Person Crew Module*

<b>Position Description</b>	<b>Grade</b>	<b>Minimum Tours</b>	<b>Number of Positions</b>
Rappel Base Manager FS2878/FS2879	GS-10/11	26/0	1
Helitack Manager FS1920	GS-09	26/0	2
Helitack Asst. Mgr. FS1918/FS1919	GS-07/GS-08	26/0	3
Squad Leader FS1986/FS1987	GS-06/GS-07	18/8 Minimum	5
Senior Firefighter FS0200	GS-04/GS-05	18/8 Minimum	5
Temp. Firefighter TF0003/TF0200	GS-04/GS-05	Temporary/ 1039 hours	6

## Chapter 3. Rappel Position Standards

**IMPORTANT NOTE:** Check spotter, spotter, and rappeller certifications and currencies are specific to each platform individually (e.g., Bell Medium and Super Puma AS332L1). Pilot certifications and currencies are specific to each Make/Model/Series individually (e.g., Bell 205/210/212 Single Engine, Bell 212 Twin Engine, Bell 412, AS332L1, etc.).

### 3.1 Pilots

Pilots must meet the appropriate requirements of the contracting document and shall receive training on rappel operations and equipment as listed below. Pilots needing initial rappel certification shall attend a consolidated training session. Vendors may request approval from their designated base contracting officer representative or base manager if an alternate date is necessary for a pilot who is unable to attend a consolidated rappel session for an initial rappel evaluation, i.e., emergency or illness.

The pilot will be evaluated and approved by an agency helicopter inspector pilot for rappel and cargo letdown in accordance with the Interagency Helicopter Pilot Practical Test Standards.

#### 3.1.1 Pilot Rappel Training Syllabus

Crew resource management discussion with rappel program-specific emphasis

- Review of operational risk management concepts and tools e.g., GAR model
- Orientation of unit and agency fire suppression organization, dispatch organization, and communications
- Briefing and familiarization on rappel anchor and hardpoint for specific model including maintenance inspection procedures
- Briefing and demonstration of rappel equipment, accessories, and PPE
- Seating arrangements for rappellers and spotters
- Standard IA configuration and deployment procedures
- Cargo placement, loading, securing, rigging and letdown procedures
- Helicopter mockup training to include cargo letdown, rappel sequence, rappel emergency procedures simulation, and helicopter emergency procedures
- Expectations for pre-rappel mission briefing
- Pilot and spotter protocols and responsibility to cancel any mission deemed unsafe or too high risk
- Review rappel site selection criteria including:
  - Personnel
  - Safety zones
  - Fire behavior

- Emergency fly-away site, helicopter clearance, and ability to land rather than rappel

### 3.1.2 Approval

Pilot's final approval for rappel operations will be based upon:

- Completion of spotter-provided briefing and training
- Demonstrated ability to pilot the helicopter during a series of rappels and cargo letdown operations. Pilot's focus will be on spotter direction and aircraft health and stability, not on vertical reference placement of the rappellers
- Demonstrated ability to coordinate with rappel spotter
- Demonstrated knowledge of rappel emergency procedures during emergency procedures simulation and the aircraft emergency procedures' effect on rappel operations
- Demonstrated ability to perform weight and balance computations (including center of gravity) for rappel configurations

### 3.1.3 Pilot Currency

To maintain currency, each pilot must fly at least one error-free helicopter rappel sequence within the preceding 21 days. If currency is lost, an error-free mockup and helicopter rappel sequence flight must be completed prior to any operational rappel. If a total of 28 days pass, the spotter, with the concurrence of the helicopter inspector pilot (HIP), will ensure the pilot can deploy rappellers using mockups and currency rappel flights.

## 3.2 Rappel Check Spotter

### 3.2.1 Rappel Check Spotter Duties

- Initial spotter evaluation and certification
- Annual spotter evaluation and certification
- Monitor and provide oversight for rappeller and spotter training
- Monitor operations for standardization purposes

### 3.2.2 Rappel Check Spotter Prerequisites

- Must have been a qualified spotter for three seasons
- Must have demonstrated ability as a lead instructor at a national initial rappeller training

### 3.2.3 Rappel Check Spotter Designations

Approval of check spotters shall be designated annually by the National Rappel Specialist as requested by the regional NRWT representative.

### 3.2.4 Rappel Check Spotter Proficiency

To maintain currency, each check spotter must maintain currency/proficiency as a rappel spotter.

### 3.2.5 Rappel Check Spotter Annual Certification

Each check spotter must be certified as a rappel spotter.

## 3.3 Rappel Spotter

### 3.3.1 Rappel Spotter Duties

- Safely deploy rappellers according to policy outlined in this guide
- Ensure only standard procedures and equipment found in this guide are used and followed
- Provide training in accordance with the SFRO.

### 3.3.2 Rappel Spotter Prerequisites

#### **Trainee rappel spotter prerequisites:**

- One fire season (90 days) on a helicopter rappel crew
- Currently qualified as a helicopter manager
- Completion of 20 live rappels, with four of those being operational
- Other recommended training: M-410 or equivalent, contracting officer representative training, and operational risk management training
- Ride-along on rappel and/or cargo missions
- It will be the responsibility of the base manager, with concurrence of a check spotter, to designate initial spotter trainees

#### **Rappel spotter certification prerequisites:**

- Currently qualified as a helicopter manager
- Currently qualified as an incident commander type 4
- Has assisted in instruction of rappel training
- Completion of Forest Service-certified CRM course in accordance with FSH 5709.16

### 3.3.3 Rappel Spotter Training

Rappellers meeting the spotter prerequisites are encouraged to submit a nomination for the annual National Rappel Spotter Immersion Academy and request initiation of a Helicopter Rappel Spotter Job Aid through a check spotter. A spotter trainee is not required to attend the spotter immersion academy; however, they shall follow the same training curriculum.

Complete the Helicopter Rappel Spotter Job Aid and pass a final evaluation administered by a qualified check spotter. A spotter trainee will have no more than two opportunities to pass a

check ride per season. Trainees' future status will be determined (i.e., continue or discontinue training) and documented by majority of available check spotters. Check spotters shall notify candidate's base manager prior to evaluation and ROS post evaluation.

### 3.3.4 Rappel Spotter Initial Certification

The spotter trainee shall recertify as a rappeller, complete all training requirements as a spotter, be recommended for certification by a check spotter, be reviewed by their regional NRWT representative, and be certified by the local unit official. The National Rappel Specialist shall be notified upon certification. After four failed check rides, the trainees' status will be discontinued.

### 3.3.5 Rappel Spotter Annual Certification

Annual spotter certification requires training and demonstration of competency. Each year, to obtain annual certification, a spotter must:

- Obtain annual certification as a rappeller
- Maintain Forest Service CRM currency in accordance with FSH 5709.16
- Complete annual certification as outlined in the Annual Spotter Certification Training Record
- A spotter will have no more than two opportunities to obtain annual certification. After the second failed check ride, a spotter will not be an active spotter for that operational season.

### 3.3.6 Spotter Trainee Annual Certification

Spotter trainees need to meet all annual certification requirements as a rappeller.

- If trainee is approved to spot live after their initial year, they must complete annual certification as outlined in the Annual Spotter Certification Training Record
- Spotter trainees who are not approved to spot live will continue as directed in the Helicopter Rappel Spotter Job Aid

### 3.3.7 Rappel Spotter Currency

To maintain currency, each spotter shall make at least one error-free helicopter spot in any 14 consecutive days. If a simulator or mockup spot is used to maintain currency during any 14-day period, a helicopter spot must be completed during the next 14-day cycle. If currency is lost, an error-free mockup and helicopter spot must be completed prior to any operational spots. If two currency periods pass (28 days), a qualified spotter will ensure the spotter can perform the spot using mockups or training spots.

### 3.3.8 Rappel Spotter Lapsed Annual Certification

If a spotter has lost their annual certification for a period of two operational seasons (skipped two seasons of certification), the individual shall complete rappel spotter annual certification requirements and will operate under direct supervision of a qualified spotter for a period determined by a check spotter. A check spotter may use past performance and experience to determine an acceptable period.

After performing under supervision for the prescribed period, a formal check ride will be conducted utilizing the Spotter Training Handbook Final Sign-Off Sheet. It is recommended that the check ride occur on an operational rappel. If the individual fails the check ride, they will be required to begin spotter training as an initial spotter candidate.

If a previously qualified spotter has not been certified in the three previous operational seasons, the individual will begin spotter training as a new spotter candidate.

## 3.4 Rappeller

### 3.4.1 Rappeller Prerequisites

For consideration as a rappeller, a rappeller candidate must meet the requirements for a helicopter crewmember trainee as stated in Forest Service policy.

### 3.4.2 Rappel Initial Training

All components of initial rappel training must be completed in accordance with this guide and shall be documented on the Initial Rappeller Training Record.

### 3.4.3 Rappeller Annual Certification

All components of the annual rappel training must be completed in accordance with this guide and shall be documented on the Annual Rappel Certification Record.

- Participate in an equipment and procedures review
- Demonstrate knowledge of rappel principles
- Complete the performance-based requirements:  
If a veteran rappeller commits a major penalty during live rappels in a vet re-certification, the rappeller will be removed from that consolidated training session. Based upon past performance, the error committed, and spotter/check spotter discretion, the rappeller may be given a second opportunity at the next available consolidated training session. This will be the last opportunity to recertify for a given year. If a second major is committed, the rappeller will not be certified to rappel that season.

### 3.4.4 Rappeller Currency

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

### 3.4.5 Rappeller Mid-Season Deficiencies and Errors

If during the operational season a rappeller shows deficiency or commits an error as defined in the Rappeller Training Syllabus, the spotter will determine the severity and follow one of the courses of action listed below.

**Rappel Qualification Suspension:** If it is determined that a rappeller should be suspended from rappel activities for safety purposes, that decision will be made by a check spotter. A spotter can immediately remove the rappeller from rappel activities until a check spotter can be conferred. Rappeller's base manager or supervisor will be notified.

**Rappel Qualification Revocation:** Based upon the rappeller's demonstrated ability and record of errors, a check spotter may suspend a rappeller's qualifications pending revocation review. Revocations of rappeller qualifications will be determined at the appropriate Regional and National Aviation Office. Revocation officials should minimally include the regional NRWT member, a check spotter, and the National Rappel Specialist. If a rappeller's qualification is revoked, the rappeller's supervisor will be notified and the rappeller will not be eligible for reinstatement during that calendar year. The certifying official will be notified, and the qualification will be revoked from the individual's qualification record (red card). The rappeller



may only regain certification by attending annual certification training in a subsequent year as determined by the revocation officials.

#### **Mid-season Major:**

If a rappeller commits a major error, the spotter will not allow the rappeller to continue. The rappeller will be debriefed and placed in loss-of-proficiency status.

Any major error committed during rappel activities will place the rappeller in loss-of-proficiency status and must be reviewed by the rappeller's supervisor and a check spotter. The rappeller may regain operational status once proficiency performance elements are met (this may include additional live rappels).

#### **Mid-season Minor:**

Occasional minor errors should be handled at the crew organizational level (spotter/direct supervisor) and only be elevated to a check spotter if it becomes habitual and cannot be rectified otherwise.

### **3.4.6 Rappeller Lapsed or Failed Annual Certification**

If two or more consecutive seasons elapse since the individual's last certification as a rappeller, the individual shall complete rappeller initial training requirements at a consolidated rappel training.

If a recertifying rappeller fails during the rappeller annual certification training, the individual may attend the next available annual certification event. (see Chapter 3.4.3).

### **3.4.7 Rappeller Fitness Standards**

All rappellers must meet Office of Personnel Management Qualification Standards Handbook requirements for positions under the General Schedule. In addition, these individuals must meet the following annually:

- Current requirements for medical standards
- Rappeller candidates must pass the Work Capacity Test at the arduous level

### **3.4.8 Desired Fitness Goals**

Physical fitness is a core value of the rappel program. Training to build strength and cardiovascular endurance should be a component of preseason and seasonal training.

All rappel personnel shall maintain a high fitness level and be able to perform all physical tasks that are necessary to accomplish the rappel and firefighting mission.

It is recommended that all personnel perform the elements listed below as a way to measure cardio-respiratory endurance and muscular fitness.

- 1.5-mile run in 11 minutes

- 25 push-ups in 60 seconds
- 7 pullups
- 3-mile, level terrain, pack-out with 85 lbs. in 90 minutes or less

## Chapter 4. Rappel and Cargo Letdown Equipment

### 4.1 Equipment Standards

**IMPORTANT NOTE:** Approved rappel equipment is identified on the National Technology & Development Program website: <https://fsweb.wo.fs.fed.us/ntdp/program/quick-reference/rappel-short-haul-cargo-letdown-aerial-ignition-helicopter-restraints>.

All equipment used in rappel operations will be approved by the National Rappel Working Team. All equipment will be monitored during use for wear and stress-related damage.

Shortening the service life or removing a component from service may be done as necessary to maintain an adequate margin of safety within the program.

A Rappel Equipment Inspection Form shall be maintained for the life cycle of the rappel rope, descender, rappeller tether, rappel harness, spotter harness (including extendable tether), spotter anchor, and cargo letdown line.

Any equipment irregularities must be reported in accordance with Appendix D—Equipment, Procurement, Development, Evaluation Protocols, and Irregularities.

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. All rappel equipment that has been retired remains government property and should be handled according to policy.

All proposed rappel aircraft shall be subject to a screening and evaluation process, to be completed by following the policy outlined in the FSH 5709.16.

### 4.2 Rappel Platform Training Simulator

**IMPORTANT NOTE:** See NTDP Tech Tip 0857–2354P–MTDC for more information on tower design and construction.

A rappel platform simulating the cabin area, seating positions, and skid heights of the helicopter will be utilized to train rappellers. Elevated simulators (towers) are not required for annual recertification.

#### 4.2.1 Tower and Simulator Requirements

1. Elevated simulators must utilize a minimum height of 20 feet above ground level. Rappeller experience will be greatly enhanced from a higher platform.
2. The tower, stairs, platform, and handrails shall meet agency and OSHA requirements for construction (Walking-Working Surfaces/1910).

3. The rappel anchor and spotter tether anchor must meet OSHA standards for fall arrest (Safety Belts, Lifelines and Lanyards/1926.104).
4. Rappel tower should be inspected annually and daily before any use. A program manager may delegate inspections.

### 4.3 Individual Rappeller/Spotter Equipment

**IMPORTANT NOTE:** The following equipment must have a date stamp or tag and will have a life cycle of 10 years from the date of manufacture:

- Extendable spotter tether (NTDP-1132)
- HR4 Rappel Harness, Miller Revolution spotter harness
- Cargo letdown lines (MTDC-983)
- Cargo restraints (NTDP-1156)
- Cargo box harnesses and loops (NTDP-1087, NTDP-1088, NTDP-1112).

The following equipment will have a life cycle of 5 years from the in-service date. If the in-service date is unknown, use the date of manufacture.

- ARS Spotter Anchor
- Yates Rappeller Tether
- Bluewater Rope

Any equipment item with lifetime retirement criteria shall be retired once it meets that time limitation. If manufacturer's date stamps become illegible, damaged, or lost, the equipment shall be retired and documented. Any equipment with a lifetime limitation that cannot be age-verified shall be retired.

#### 4.3.1 Nomex Clothing and Boots

Spotters and rappellers shall wear a Nomex shirt and Nomex pants or a Nomex flight suit for rappelling operations. If wearing a Nomex flight suit while rappelling, clothing under the flight suit shall be dictated by mission requirements (e.g., fireline PPE).

Boots shall meet National Fire Protection Association (NFPA) standards for fireline operations (see FSH 6709.11 for boot standards).

#### 4.3.2 Helmets

Rappel personnel shall comply with the standards set forth in the 2021 Interagency Aviation Life Support Equipment Guide (ALSE) and USFS/DOI 2019 Aviation Helmet Standard.

### 4.3.3 Eye Protection

For any rappel operation, rappellers must wear eye protection that meets ANSI Z87.1. A flight helmet with the visor down meets this requirement.

### 4.3.4 Gloves

Spotters shall, at a minimum, wear approved flight gloves. For additional heat protection, spotters may wear a rappel-type glove for cargo letdown. The Sullivan PV (short) glove, the Sullivan PVG (gauntlet) glove, the PMI GL2200 Lightweight Rappel Glove, and the Metolius Climbing  $\frac{3}{4}$  and Full Finger Glove are approved for cargo letdown operations. The Metolius  $\frac{3}{4}$  Finger Glove shall only be used in conjunction with a flight glove.

Rappellers gloves shall be leather and provide sufficient heat protection during a rappel descent. The Sullivan short and PVG (gauntlet), and Metolius full finger belay gloves are approved for rappel operations.

#### **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 be inspected for oils, pitch or other contaminants.
- Hook and loop Velcro should adhere well when pressed together.
- Gloves must be inspected by user prior to each use.

### 4.3.5 Belly Deployment (BD) Bag

#### **Criteria:**

- BD bag must be constructed in accordance with drawing #MTDC-1115.
- The maximum weight of the BD bag shall not exceed 30 pounds.
- 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 according to the directions in Appendix E - Specified Equipment Attachment Standards.
- Loose straps must be secured to prevent entanglement during the rappel process.

## Inspection:

- BD bags must be inspected by user prior to operation
- Inspect stitching and fabric for abrasion and wear
- Zipper should function properly and store completely in pocket
- Check to ensure all buckles function properly

### 4.3.6 Required Minimum Personal Rappel Equipment

The following items are essential and must be carried on each rappeller during any rappel operation. These items are to provide essential safety and survival equipment in the event cargo equipment delivery is delayed.

- Fire shelter
- Hard hat
- Leather gloves
- Headlamp w/ spare batteries
- 2 quarts of water
- First-aid kit
- Space blanket and/or sleeping bag
- Food (1 meal)
- 1 fusee
- Line gear
- BD bag

The remaining items must be carried with each stick (2) of rappellers:

- Compass
- Map of the response area (paper or digital download)
- GPS enabled device (capable of area calculation)
- Radio with spare battery pack

#### 4.3.7 Required Minimum Rappeller Initial Attack Cargo Equipment List

In addition to the items carried by each rappeller, the following items shall be packed into an approved container and delivered to each stick of rappellers:

- Food for 36 hours
- 3 gallons of water
- 2 hand tools
- 1 tent fly (9'x10')
- 1 roll of toilet paper
- 4 trash bags
- 2 fusees
- 1 first-aid kit
- 2 pack-out bags
- 1 water treatment
- 1 package (24) AA batteries
- 1 roll of flagging
- 100 ft. of parachute cord
- 1 roll of fiber tape
- IC kit/paperwork, with pen

A power chainsaw, crosscut saw, fuel, oil, necessary accessories, and additional water may be packaged in approved cargo containers and delivered to rappellers.

Potable water and other small items may also be packaged in an approved 5-gallon cube that is harnessed (#MTDC-1087) or another approved container and delivered along with the cargo and chainsaw equipment containers.

### 4.3.8 Spotter Harness

Rappel spotters shall wear the Miller Revolution Harness during all helicopter rappel/cargo letdown and tower operations. The harness shall be issued and tagged with a unique identifier that corresponds with the date of manufacture.

Harness tags from the manufacturer may be used.

Two harness sizes are available:

- The small/medium size model RDT-QC/S/MBK will fit most spotters
- A larger size harness model RDT-QC/UBK is also available

#### **Inspection:**

- The spotter harness must be inspected by the user prior to use. A Rappel Equipment Inspection Form shall be maintained for the life of the spotter harness at a minimum, annual pre-use inspections must be documented. The extendable spotter harness tether shall be inspected with the spotter harness prior to operation. A shared Rappel Equipment Inspection Form may be utilized to document both the harness and tether.
- Inspect stitching and webbing for abrasion, wear, or other damage.
- Inspect fall arrest indicators adjacent to the dorsal D-ring.
- Check leg strap buckles, chest strap buckles, dorsal D-ring and adjusters for correct adjustment and function.
- Check pivot link connectors for correct function.

### 4.3.9 Extendable Spotter Harness Tether

The extendable spotter harness tether is the interface between the spotter harness's dorsal attachment point and an approved hardpoint. The extendable spotter tether for the Miller Revolution Harness RDT-QC/S/MBK and RDT-QC/UBK will be manufactured in accordance with drawing #NTDP-1132.

- The harness tether in its non-extended configuration shall be adjusted to an overall length of 27 inches (Bell Medium) to prevent the harness dorsal attachment point from extending past the door sill of the helicopter. The tag end of webbing that locks the adjuster shall be tacked onto the webbing loop that passes through the dorsal D-ring using nylon 'Super Tack' cord or a ¼" bar tack as shown in Appendix E.
- The Rock Exotica rockD Lanyard Pin Carabiner (C2S LPAA) is attached to the free end of the spotter tether connecting to an installed anchor (STC or manufacturer- approved helicopter hardpoint, tower hardpoint, or other approved tether attachment point).



- The tether is designed to extend an additional 18 inches in length, as necessary, to assist a rappeller in distress or to clear a letdown operation. To extend the tether, the spotter will depress the two side-release buttons while putting slight pressure on the tether, making sure the buckle halves release. The additional tether webbing will deploy as tension is added to the tether. There is no need to manually deploy or unfasten the pull-the-dot snap straps when deploying the tether extension. When the extended length is no longer required, the spotter will reconnect the ISC buckle as soon as practical. The extendable section of webbing will be re-secured by refastening the pull-the-dot snap straps when the mission has ended.
- If a spotter releases the extendable section of the tether to assist a rappeller or cargo letdown problem during tower training, a proficiency rappel, or an operational rappel, that action is considered a reportable event. The SAFERAP system will be used to report such deployments whenever they occur.
- Each spotter harness tether shall have a tag and will have a life cycle of 10 years from the date of manufacture.

**Inspection:**

- The tether shall be inspected with the spotter harness prior to operation. A shared Rappel Equipment Inspection Form may be utilized to document both the harness and tether.
- Inspect stitching and webbing for abrasion, wear or other damage
- Metal hardware should be free from cracks, dings or other damage
- Extendable tether material must be stowed and captured by the pull-the-dot snap straps
- Meets lifetime criteria for use (10 years)

#### 4.3.10 Rappel Spotter Anchor

**Bell Medium Platform**

The means for attaching the rappel spotter tether to the Bell Medium Platform will be the Air Rescue Systems (ARS) Anchor (18”).

The ARS Anchor will be installed in the aircraft as outlined in Appendix A of this guide in accordance with the ELAM STC installation instructions.

Each ARS Anchor shall have a date stamp or tag and will have a life cycle of 5 years from the date placed in-service. If the in-service date cannot be verified, then the date of manufacturing will be utilized for age-based retirement. A unique base identifier must be added to the tag, which will correspond to an ARS Anchor Rappel Equipment Inspection Form.

**Inspection:**

- Inspect stitching and webbing for abrasion, wear or other damage
- Attachment ring and oval links should be free from cracks, dings, or other damage. When installed, the oval links shall be wrench tightened.

- Meets lifetime criteria for use (5 years from in-service date)
- Rappel Equipment Inspection Form shall be maintained for the life cycle of the ARS anchor. At a minimum, annual pre-use inspections must be documented in a Rappel Equipment Inspection Form.
- Spotter Anchor is a component of a daily rappel rigging check, performed by a qualified spotter.

### **Super Puma Platform**

The means for attaching the rappel spotter tether to the Super Puma platform will be the NTDP steel cable restraint.

The cable restraint will be installed in the aircraft as outlined in Appendix A of this guide.

#### **Inspection:**

- Inspect cable end crimps for damage or evidence of slippage. Inspect cable assembly for broken strands or visible damage.
- Inspect ring for wear, damage, or deformation.
- If installed, inspect safety pin engagement and confirm stud fitting is properly seated in floor track.
- Cable restraint retirement is based on inspection with no age-based limitations.

### **4.3.11 Rappel Harness System**

The Rock-N-Rescue HR-4 Wildland Fire Rappel Harness System is comprised of several components, each requiring special consideration. This harness is the only harness approved for wildland-fire rappel missions.

HR4 Rappel Harness: This harness shall be issued and tagged with a unique identifier. Harness tags from the manufacturer may be used.

#### **Harness inspection:**

- The harness and connecting hardware must be inspected by the rappeller prior to operation. A Rappel Equipment Inspection Form shall be maintained for the life of the rappel harness. Annual inspections shall be documented to include inspection of knife/knife sheath. Regular pre-use inspections should be documented thereafter.
- Inspect stitching and webbing for abrasion, wear or other damage.
- Check buckles and adjuster hardware for damage and correct function.
- Each harness shall have a life cycle of 10 years from the date of manufacture.

The Rock Exotica rockD Lanyard Pin Carabiner (C2S LPAA) will be attached to the webbing bridge of the HR4 harness with the lanyard pin installed (FIGURE 4-1).

Figure 4-1



**Carabiner inspection:**

- Check all parts for cracks, deformation, corrosion, wear, etc.
- Verify that the gate and sleeve close, lock and function properly in every respect. The key slot must not be impaired by dirt, corrosion, etc.
- Ensure that the lanyard pin is in place and secured by the locking setscrew.
- Fully open the gate of the carabiner, then release. Ensure that the gate locks upon closing.

### 4.3.12 Rappeller Tether

**Bell Medium Platform**

The means for secondary restraint of rappellers in the Bell Medium Platform will be the Yates Rappeller Tether (part #569TL).

The rappeller tether will be installed in the aircraft as outlined in Appendix A of this guide.

Each rappeller tether shall have a date stamp or tag and will have a life cycle of 5 years from the date placed in-service. If the in-service date cannot be verified, then the date of manufacturing will be utilized for age-based retirement. A unique base identifier must be added to the tag, which will correspond to a Rappel Equipment Inspection Form for the tether.

**Inspection:**

- Inspect tether for cuts, wear, or abrasion.
- Hardware must be free from cracks, and other damage
- Check snap shackle for proper function
- Inspect “shock stop” for wear or evidence of deployment
- Oval links shall be wrench tightened
- Meets lifetime criteria for use (5 years from in-service date)
- Rappeller tether is a component of a daily rappel rigging check, performed by a qualified spotter.

- A Rappel Equipment Inspection Form shall be maintained for the life cycle of the rappeller tether. At a minimum, annual pre-use inspections must be documented on a Rappel Equipment Inspection Form. Daily rappel rigging checks need not be documented.

## 4.4 Rappel Rope

### 4.4.1 Rope Standards

The only rope approved for helicopter rappel operations is the 11mm Bluewater Armortec Rope. This is an aramid, polyester, and nylon kernmantle rope with a breaking strength of 8200 pounds (sewn terminations rated at 5000 pounds). Each rope end will be terminated using a dual sewn termination and metal thimble. Rope lengths of 250' and 300' are approved for helicopter rappel operations. For easy identification, 300' ropes will be designated with a black tracer stitch running the length of the rope. Ropes of other lengths may be utilized for tower and training purposes.

The rope length, serial number, part number, and date of manufacture are listed on both ends of the rope under the plastic termination protectors. Each rope end protector must be marked "A" or "B". These identifiers will be used to track rope end usage.

### 4.4.2 Procedures for Putting New Rappel Ropes into Service

1. Remove new rope from packaging and randomly flake into a pile on a clean, dry surface (not concrete or asphalt).
2. Carefully inspect the entire rope, including terminated ends and thimbles, for defects or abnormalities.
3. Mark each end with an "A" or "B", create a new Rappel Equipment Inspection Form documenting the pre-use inspection, and enter the rope serial number into RapRec.
4. Secure the rope to a properly sized rope bag utilizing a rubber band, tie a section (minimum of 6 feet) of high visibility flagging to the thimble, and flake the rope into the bag.
5. Place an Ok tag on the thimble.

### 4.4.3 Rope Care

#### **Drying wet ropes:**

If ropes become wet, the ropes should be air dried away from direct sunlight. Do not dry ropes on concrete or asphalt surfaces; chemicals in concrete and asphalt can contaminate and damage ropes. Never dry a rope in a clothes dryer. Ropes shall be inspected once dry.

#### **Rope cleaning:**

Ropes may be washed using a mild soap and cool water bath. Rope specific soaps are available from multiple manufactures (examples of acceptable cleaners are Edelweiss Rope Wash, Beal Rope Cleaner, Sterling Rope Wash, and PMI Rope Soap). Completely submerge the rope in

soapy water and agitate to remove dirt particles. Rope brushes may be used (examples are CMI or PMI Rope Washers). Rinse well in several baths of clean water. It is extremely important to remove all soap residue, as leftover soap will attract dirt. After rinsing, loosely coil the rope and air dry in the shade. Never use cleaners with bleach or bleach substitute. Never wash or dry a rope in the washing machine or dryer. Once dry, inspect rope, and return to service.

#### **Extending service life:**

- Avoid stepping on ropes
- Avoid prolonged exposure to sunlight - dry ropes in the shade
- Avoid exposure of ropes to rough surfaces
- Avoid dragging ropes on the ground
- After ropes have been released from helicopter, avoid dragging ropes across limbs and brush whenever possible
- Avoid contact with all chemicals that may contaminate rope
- Keep ropes away from heat sources
- Avoid laying ropes on concrete or asphalt

#### **Storage:**

All ropes shall be stored under clean and dry conditions. After being placed in service, ropes may be stored in rope bags, provided that clean, dry storage conditions prevail.

#### **4.4.4 Rope Use**

Rope use and inspection criteria have been developed based on manufacturer recommendations along with guidelines from the Cordage Institute regarding the inspection of kernmantle ropes.

- No rope shall be used for more than five years from the date placed in-service. If the in-service date cannot be verified, the date of manufacturing will be utilized for age-based retirement.
- Helicopter rappel rope-use information shall be kept for each rope utilizing the RapRec system. Information entered RapRec shall include:
  - The length, date, type, and location of rappel
  - The name of the rappeller(s) that used the rope
  - The end of the rope that was attached to the anchor
- No rope shall be used if it shows evidence of overheating, visible damage that would compromise its strength or safety, or contamination with foam concentrate, retardant, or any petroleum product.

#### 4.4.5 Rope Inspection

- A Rappel Equipment Inspection Form shall be maintained for the life of the rappel rope. Ropes shall be inspected and documented after each use and at the beginning of each season.

The strength of a kernmantle rope resides in the core of the rope. Because you cannot see the core, it is important that inspections thoroughly evaluate the core by feeling the rope. The core of the rope should be uniform when felt by hand. Any abnormalities must be brought to the attention of a spotter. Additionally, if the core or inner sheath fibers can be visually seen through the aramid (outer) sheath, the rope should be removed from service.

- To inspect, 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, sheath creep, burrs, or anything out of the ordinary. Look for visual indications of abuse, such as cuts, core damage, or heat glazing. If damage is apparent, remove the rope from service and document it on the Rappel Equipment Inspection Form. The entire length of the rope should be inspected regardless of the length of rope rappelled.
- Thimbles and sewn terminations shall be inspected after each use. Inspect thimbles for deformities, cracks, and sharp edges. Sharp edges of thimbles may be smoothed using an emery cloth or a fine file. Make sure metal filings do not drop into the rope weave. Visibly inspect the sewn terminations through the plastic protective cover. Any rope with termination threads that appears to have been broken, cut, pulled, or damaged in any way, should be retired.
- After the rope has been inspected and OK'd for service, a tag will be placed through the thimble to signify the rope is ready for use (see FIGURE 4-2).

Figure 4-2



To maintain even wear and to maximize each ropes' useful life, rope ends will be rotated after each rappel sequence. To track this, each end shall be marked "A" and "B" respectively.

#### 4.4.6 Rope Service Life Factors

- **Dirt:**

Any contaminant that works into the fibers and construction of the rope can cause deterioration. Mud, dirt, and sand can cause abrasion damage to rope fibers and descenders. Because of the potential for fiber abrasion, ropes should not be stepped on. Look for excessive mud and dirt and wash the rope as needed. Feel the rope for particles that could possibly work into the rope. Avoid dragging the rope over the ground.

- **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 damage ropes.

- **Cross-Contamination:**

Any surface that ropes or other rappel gear may contact should be inspected for the presence of contaminants. Textiles and leather can absorb and transfer contaminants to other gear. Petroleum products can reduce the friction between the rope and the descender. Pitch from coniferous trees can increase the friction between the rope and the descender, making it more difficult to descend. Fire retardant contains powerful corrosive agents that can damage ropes and metal hardware. Any source of contamination, including dirty fire shirts, chainsaw bar oil stains, dirty Nomex pants, and dirty/retardant-covered line gear, must not be allowed to contact ropes, gloves, harnesses, descenders, carabiners, and any other rappel gear. Ropes and rappel gear should always be stored in a clean, dry, chemical-free, rodent-proof lockers or vehicle compartments when not in use.

- During operational hours ropes and rappel gear may be placed in ready-lockers or up-load racks if they are out of direct sunlight. The interior seats and cabin of helicopters used for rappelling must be kept exceptionally clean.

## 4.5 Descender

The ISC D4 Endurance Work/Rescue Descender, shall be used for all rappel operations. This is a bobbin/cam squeeze-type descender. The descender shall only be used with 11mm Bluewater Armortec Rope. Each descender will have a unique serial number factory stamped on the cover of the descender.

- Helicopter rappel use information shall be kept for each descender utilizing the RapRec system. Information entered into RapRec shall include:
  - The length, date, type, and location of the rappel
  - The name of the rappeller that used the descender

### 4.5.1 Configuration

**IMPORTANT NOTE: Improper rigging of the descender can lead to serious injury or death.**

There is only one correct configuration for this descender. The rope attached to the anchor of the tower or helicopter will be routed around the cam in the direction of the engraved arrow and pass between the bobbin and cam as shown in Figure 4-3. The cover must be closed with the button out. The attachment carabiner must be securely captured. All rappellers will demonstrate proficiency in descender rigging prior to rappelling from towers or helicopters.

Figure 4-3



### 4.5.2 Care and Inspection

To extend service life of equipment, be sure to:

- Avoid rough handling
- Do not drop or drag on the ground
- Keep clean



## **Descender inspection:**

A Rappel Equipment Inspection Form shall be maintained for the life of each descender. Descenders shall be inspected and documented after each use and at the beginning of each season. There is no age-based retirement for the descender.

1. Visually inspect the entire descender for damage and irregularities. Look for cracks, corrosion, sharp edges, and deformation. Sharp edges caused by carabiner contact can be smoothed out using an emery cloth or a small file. If the long axis of the carabiner attachment hole exceeds 1.25", retire the device.
2. Measure the gap as outlined below
  - i. Close the cover and place the handle in the locked position.
  - ii. Using your thumb, apply firm pressure to the cam in a clockwise direction (when viewed from the front).
  - iii. Attempt to insert a no-go gauge between the cam and bobbin.
  - iv. If the no-go gauge can be inserted, retire the device
3. Check for loose fasteners/components
4. Verify that the cam, when in primed position, moves freely
5. Ensure that the side plates align correctly. Pay attention to the push button to ensure it engages fully into the moving side plate when the cover is closed. You will hear an audible "click" when the frame seats correctly.
6. Verify that the handle rotates freely and that there are three audible "clicks" during a full handle rotation. Check that the interaction of the cam and handle is fully functional. To do this:
  - i. Move the handle to primed position
  - ii. Open the moving side plate to expose the cam
  - iii. Apply and maintain pressure to the cam in the direction of the anchor
  - iv. Pull the handle through rappel position and into panic position. When steps iii and iv are performed, the function of the handle and cam should move together. When the handle reaches the panic position, the cam must snap forward in the direction of the applied pressure.

## **Cleaning and lubrication:**

If the device has been heavily soiled, pay close attention to the motion of the parts to ensure that dirt and foreign objects have not entered and compromised the mechanism. If there is any doubt about the function of the device, retire it. If the device becomes dirty, it is acceptable to wash and lubricate the device following these manufacturer recommendations:

1. Using warm (< 85 degrees F) water and mild household detergent, wash the device using a soft cloth or nylon brush. Do not submerge the device completely in the detergent/water. Rinse the device thoroughly in clean water, and allow to dry naturally, turning the device several times during drying to ensure that trapped water is allowed to drain.

2. Apply a small amount (1-2 drops) of light oil such as 3-IN-ONE oil to the push button, moving side plate rivet head, and handle. Cycle the device a few times to distribute the oil.
3. Complete a descender inspection prior to returning to service and include comments regarding the cleaning on the Rappel Equipment Inspection Form.

## 4.6 Ancillary Equipment

### 4.6.1 Carabiners

**IMPORTANT NOTE:** Carabiners are designed to be loaded longitudinally – if loading occurs on the side or gate, failure may occur.

The only carabiners approved for life bearing use shall be the Rock Exotica rockD Carabiner (C2S AA), and Rock Exotica rockD Lanyard Carabiner (C2S LPAA).

For cargo letdown operations, the SMC Lite Stainless-Steel Locking (Bright) Carabiner or the Black Diamond Rocklock Screwgate Carabiner will be used. Ensure that the SMC Lite Stainless-Steel Carabiners are stamped “*MEETS NFPA 1983 (2001 ED)*” or newer.

#### **Inspection:**

1. Check all parts for cracks, deformation, corrosion, and wear.
2. Verify that the gate and sleeve close, lock, and function properly in every respect. The key lock slot must not be impaired by dirt or corrosion.
3. Carabiners shall be inspected prior to each use.
4. Retire from service and destroy if the equipment:
  - Arrests a fall or is exposed to other extreme loading.
  - Does not pass inspection or there is any doubt about its reliability.
  - Is misused, altered, damaged, or exposed to harmful chemicals.

#### **For programs wishing to identify their equipment, the following information is offered:**

It is only acceptable to use a hand-held, electric-type engraver to place identifying marks on hardware. DO NOT strike with a hammer and stamps or use other similar methods.

Once the marking process has been completed, ALWAYS inspect the product for proper fit and function PRIOR to returning it to service. For carabiners, it is recommended to mark along the spine of the frame. DO NOT mark on or near the lock or pivot tabs of the frame and stay away from rope bearing areas. DO NOT mark on the gate. For steel and stainless-steel products, use a medium setting with medium to heavy pressure. For aluminum products, use a low setting with light to medium pressure. Depth of engraving equal to the thickness of a piece of paper should be enough to last the life of the product.

### 4.6.2 Knife/Knife Sheaths

All rappellers and spotters are required to have an approved knife with lanyard readily accessible for emergency use. The only approved emergency knife is the Raptor Knife (dual blade).

- The rappeller knife shall be enclosed within the NTDP rappeller knife sheath (#MTDC-1041) and attached to the rappel harness in the manner shown in Appendix E.
- The spotter knife shall be enclosed within the NTDP rappel spotter knife sheath (#MTDC-1042) and attached to the spotter harness on the left shoulder strap as shown in Appendix E.

**IMPORTANT NOTE:** Spotter and rappeller will independently verify the work performed and document their inspection by signing off in the Rappel Equipment Inspection Form (harness).

### **Inspection:**

Knife sheaths are to be inspected during a harness inspection. Inspect fabric and stitching for cuts and abrasion. Inspect bar tacks and attachment loops for damage.

- At a minimum, knives shall be inspected annually prior to field season and prior to being installed on a harness. Inspections shall be documented on the Rappel Equipment Inspection Form (harness).
- Ensure knives used for rappelling have properly installed blades. Knife blades shall be replaced after any use.
  1. Handle/body of knife should be free from damage; screws should be tight.
  2. Ensure the lanyard is stowed and attached as shown in Appendix E.
  3. Pull snap(s) should close/open with enough resistance to prevent inadvertent opening.

### **4.6.3 Cargo Restraints**

Rappel cargo within the aircraft cargo area shall be restrained by one of the following cargo restraints:

- Davis Aircraft Products Part #FDC6400-569-1-080-80-10
- NTDP-1156 Helicopter Cargo Restraint (Bell Medium Platform only)
- Cargo Systems TSO-C172 cargo restraint straps
- Cargo Systems CS-AS332-8 floor type net
- Cargo restraints and nets shall be retired 10 years from the date of manufacturing.

### **4.6.4 Cargo Area Barriers**

Cargo area barriers shall isolate the passengers from the cargo area (transmission wells) in Bell Medium Platforms. The contracting document provides specifications for approved cargo area barriers. Barriers shall be provided by the helicopter vendor.

## 4.6.5 Rappel Anchors

**IMPORTANT NOTE:** Contact USFS aerospace engineer to obtain electronic versions of the installation and inspection standards for the External Load Attach Mechanism (ELAM), including the ring and stud fittings.

The approved anchor for USFS Bell medium helicopters is the USDA Forest Service External Load Attach Mechanism (ELAM) Rappel Anchor, STC #SH261WE. The anchor shall be inspected and documented daily by the vendor in accordance with the ELAM Rotorcraft Maintenance Manual Supplement (RMMS).

## 4.7 Cargo Deployment Equipment

### 4.7.1 Figure 8 with Ears

For wildland fire rappel and cargo letdown operations, the steel or aluminum CMC Rescue 8 with ears are the only approved letdown device. To rig the figure 8, a loop of the letdown 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, repeat the original process.

#### To extend the service life:

- Avoid rough handling
- Not drop or drag on the ground
- Keep clean

#### Inspection:

1. Inspect for grooves developing in figure 8. When a groove develops beyond the anodized surface of the aluminum figure eight, wear will rapidly occur. If the groove is beyond 1/16” deep, retire the figure 8
2. 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 eight from service
3. Inspect for cracks or breaks. If cracks are evident, retire figure 8
4. Figure 8 must be inspected by a spotter prior to each use

### 4.7.2 Carabiners

Only the SMC Lite Stainless-Steel Locking D Carabiner (bright) or the Black Diamond Rocklock Screwgate Carabiner are authorized for cargo letdown use.

### 4.7.3 Cargo Letdown Lines

Letdown lines are available in lengths of 250 feet or 300 feet. Both letdown lines shall conform to military specification, Mil-W-5625K, for ¾” woven nylon tubular webbing. Webbing conforming to this standard has a minimum breaking strength of 2,300 pounds. Each letdown line will be identified by a unique base identifier, with all letdown uses being tracked through the RapRec system. Identifiers shall be marked on each end of the line.

#### **Letdown Lines**

- Letdown lines of 250 feet in length will be of ¾” white tubular nylon webbing. Letdown lines of 300 feet in length will be of ¾” yellow tubular nylon webbing, and both lines will conform to drawing#MTDC-983.
- To maintain even wear and maximize each lines useful life, line ends will be rotated after each use. To track equipment usage, each end shall be marked “A” or “B”.
- A 25-foot section from each end and a 10-foot section in the middle of each letdown line shall be clearly marked with black dye. Use only Rit Dye to mark lines.

#### **Accordion Packs**

- Accordion packs will be constructed as to easily identify a 250-foot letdown line from a 300-foot letdown line.
- Accordion packs for 250-foot letdown lines will be constructed of white cotton duck cloth with black seam tape. Accordion pack construction will conform to #MTDC-974.
- Accordion packs for 300-foot letdown lines will be constructed from white cotton duck cloth with yellow seam tape. Accordion pack construction will conform to #MTDC-1037.
- To further identify accordion packs, 1-inch stencils will be used to mark the outside surface of accordion packs with the length of letdown line to be used.

#### **Letdown line Packing:**

- Letdown lines will be packed in accordance with the “Wildland Fire Helicopter Rappel Cargo Letdown Accordion Pack” video produced by NTDP. Edge protection may be necessary along helicopter door edge or helicopter skids to reduce abrasion of the line.

#### **Inspection:**

- A Rappel Equipment Inspection Form shall be maintained for the life cycle of the letdown line. Letdown lines shall be inspected and documented annually prior to field season, and after every use.
- RapRec will be used to track letdown line use history.
- Letdown lines will be inspected for wear and burns after cargo deployment and have the ends reversed for the next letdown sequence.

- Inspect stitching and webbing for abrasion, wear, cuts, chemical contamination or other damage.
- No letdown line shall be used for more than 10 years from date of manufacture.

#### 4.7.4 Cargo Containers and Box Harnesses

Bags used for cargo deployment 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.

Cargo boxes shall be constructed from double-wall, 1/4”-thick cardboard with a minimum burst-strength rating of 500 pounds and shall be certified by the manufacturer as having passed the edge crush test of 71 pounds (71-ECT). Cargo boxes must be girded with an approved box harness for deployment.

The maximum allowable weight per IA cargo letdown container shall not exceed 100 pounds. Maximum allowable weight for non-IA letdown containers shall not exceed 125 pounds. Maximum allowable weight for cubee boxes shall not exceed 50 pounds. Weight limits are imposed to assure that container-rated load limits are not exceeded and to expedite deployment from the helicopter.

Approved cargo letdown containers shall pass a static-strength test with no failure or ruptured stitches when loaded to a weight of 468.75 pounds (safety factor of 3.75).

The following cargo letdown containers are approved for letdown operations:

Cargo box – side closure cardboard box with exterior dimensions of 12.5” x 16.25” x 36”

Standard 5-gallon cubitainer (cubee) (NFES 0048) box for delivery of potable water and other small items

Metolius El Cap, Half Dome, Quarter Dome, and Sentinel Haul Bags

Klamath Bag

NTDP Medical Bag (Brown Bag)

Procurement sources for approved cargo letdown containers, harnesses and cargo loops are listed on the NTDP rappel website.

Approved cargo box and cubee box shall each require an approved harness and cargo loop for cargo letdown. Letdown equipment shall conform to the following drawing numbers and have a life cycle of 10 years from the date of manufacturing.

Cargo box harness #MTDC-1088

Cubee harness #MTDC-1087

Cargo loop #MTDC-1112

**Inspection criteria for cargo boxes:**

- Inspect interior and exterior of the empty box for punctures, rips, cuts, severe abrasion, or failure of glued overlap sections
- Inspect for water damage, which may weaken the integrity of the cardboard or weaken the internal glue that attaches the corrugation to the exterior panels
- Inspect for chemical contamination

**Inspection criteria for box harnesses and cargo loops:**

- Prior to installing, inspect bar tacks and stitching for worn, cut or broken threads
- Prior to installing, inspect inner and outer sides of webbing for extensive wear, cuts, abrasion, burns, mold and chemical contamination
- Inspect metal closure buckles on harnesses for proper function and for cracks, bends, and sharp or rough spots that may snag or cut webbing

**Inspection criteria for Metolius El Cap Haul Bag, Klamath Bag, and NTDP Medical Bag:**

- Inspect stitching for worn, cut or broken threads that may compromise bag integrity
- Inspect container material for extensive wear, punctures, rips, cuts, abrasion, burns, mold or chemical contamination
- Inspect sling webbing for wear, cuts, severe abrasion, burns, mold, and chemical contamination

Cargo boxes, box harnesses, cargo bags, and cargo loops shall be retired if inspection reveals damage or anomalies in accordance with the inspection criteria.



## Chapter 5. Rappel And Cargo Letdown Operations

### 5.1 Aircraft Models

The following platforms are currently utilized for USFS helicopter rappel operations:

- Bell Medium
- Airbus Super Puma

See Appendix A for model-specific procedures and operations.

### 5.2 Operational Responsibilities

The spotter shall be responsible for coordinating all rappel activities (pre- and post- rappel). Before departure, the spotter must consider the operational factors that may influence whether the aircraft should depart from the base of operations either rappel- configured or rappel- equipped.

The spotter will provide coordination with incident management teams, local units for smaller incidents, and IA staging.

The rappel module will complete a GAR Risk Assessment for all rappel operations. The GAR Risk Assessment model creates a GO/NO-GO decision tool. The assessment may be completed at the beginning of an operational period. This completed assessment must be reviewed and updated if the team or mission changes or other mission-specific information becomes available.

Incident management teams shall allow for rappel proficiencies while rappel helicopters are assigned to their incident. The rappel spotter should work with the helibase manager to find a time and location for proficiency rappels that will have the most efficient means and have the least impact on helibase operations. The helibase manager shall inform air operations (AOBD) of the planned rappel proficiency prior to the next day's operational shift. Inputting the action on the ICS-220 is at air operation's discretion.

## Chapter 6. Documentation

### 6.1 Records and Reports—General

**IMPORTANT NOTE:** The rappel report will be entered into RapRec by the base that administers the contract for the aircraft used for the rappel or cargo letdown.

Record keeping is mandatory for administering rappel operations. Accurate records and reports on rappel activities, equipment use, training and injury statistics shall be maintained.

All rappel reports will be entered into RapRec within 14 days of the rappel activities. To reduce duplication errors, rappel reports will be entered into RapRec by the base that administers the contract for the aircraft used for rappel or cargo letdown, regardless of the equipment or personnel involved. For this reason, it is important for each base to keep its RapRec equipment and personnel rosters up to date. During consolidated training, rappel reports will be entered into RapRec by the documentation unit.

All Rappel Equipment Inspection Forms are official documents. Rappel Equipment Inspection Forms will be archived for a minimum of seven years.

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 a retirement date on the Rappel Equipment Inspection Form when removed from service. Additionally, the retired status must be updated in RapRec.

#### 6.1.1 Unit Records

Each unit shall maintain records documenting training for rappellers and spotters and records documenting the use and inspection of specified equipment. See Sections 6.1.4 through 6.2.6 for specific information and requirements for each record.

#### 6.1.2 Rappel Injury Reporting

All rappel related injuries (rappel sequence) shall be reported through established local protocols, local helicopter operations specialist, and entered into the SafeRap system.

#### 6.1.3 Rappel Program Proposal Form

Users are encouraged to recommend changes to this guide through their respective rappel base manager via written proposal.

#### 6.1.4 Rappel Unit Log

All rappels, spots, and related information must be entered onto the Rappel/Spotter Log and into RapRec and shall be readily available for review. The spotter or rappel base manager will ensure information is entered in a timely manner and that RapRec is kept current.

#### 6.1.5 Rappeller Training Records

The Rappeller Training Record for initial training and recertification of rappellers 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. Each rappeller will maintain a record of training, proficiency, and operational rappels in the Rappel/Spotter Log and RapRec.

#### 6.1.6 Spotter Training Records

The Helicopter Spotter Training Record for returning spotters and Qualification Record for initial training 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. Each spotter will maintain a record of training, proficiency and operational spots of rappellers and cargo in the Rappel/Spotter Log and RapRec.

### 6.2 Equipment Master Records

All equipment requiring documentation will be assigned a unique identification number. The number will be retired with the piece of equipment. The following equipment shall have a Rappel Equipment Inspection Form assigned.

#### 6.2.1 Cargo Letdown Line

Cargo letdown lines shall be inspected annually and after each use. After inspection, any irregularities will be noted. Use the Rappel Equipment Inspection Form to document inspection and RapRec to document use.

#### 6.2.2 Harness

Harness and knife shall be inspected annually, and harness shall be inspected after each use. Any deficiencies during inspections, repairs and/or component replacement will be noted. The Rappel Equipment Inspection Form must be used for harness documentation.

#### 6.2.3 Descender

Descenders shall be inspected pre-season annually and after each use. After inspection, any irregularities, deformities, or excessive wear will be documented and brought to the attention of a

spotter. When a descender is retired, it shall be removed from service to eliminate further use. Use the Rappel Equipment Inspection Form to document inspection and RapRec to document use.

#### 6.2.4 Rappel Rope

Documentation must be maintained for all rappel ropes. A Rappel Equipment Inspection Form shall be maintained from the time the rope is placed in service until the rope is removed from service. The form 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 4, Rappel Equipment).

All rope uses shall be documented. After inspection, any irregularities will be noted and brought to the attention of a spotter. Documented information will dictate when to retire a rope from service. Use the Rappel Equipment Inspection Form to document inspection and RapRec to document use.

#### 6.2.5 Rappeller Tether

Documentation must be maintained for all rappeller tethers. A Rappel Equipment Inspection Form shall be maintained from the time the rappeller tether is placed in service until the tether is removed from service. At a minimum, annual pre-use inspections must be documented in the Rappel Equipment Form. Inspection should follow guidelines in Chapter 4. Use the Rappel Equipment Inspection Form.

#### 6.2.6 Rappel Tower

Inspection of rappel tower shall be documented annually and daily before each use.



## Appendix A—Rappel and Cargo Letdown Standard and Emergency Procedures



The Standards for Rappel Operations—Appendix A describes the technical procedures required for Forest Service Helicopter Rappel Operations

# Chapter 1. Pre-Rappel Procedures

## 1.1 Pre-Rappel Briefing

Prior to any rappel mission, the spotter must brief all personnel involved as to the nature of the mission and its objectives. The information should include environmental concerns such as weather and fire behavior (if known), individual responsibilities, incident-specific information such as location (e.g., division assignment), radio frequencies, name of communication center, and any other relevant information.

Prior to any rappel operation, the pilot-in-command (PIC) and spotter will identify the performance limitations for the aircraft. These limitations will ensure the performance is in the maximum-continuous range.

**IMPORTANT NOTE:** Weight and balance (W&B) calculations will be performed for standard rappel configurations and emergency rappel scenarios prior to the commencement of rappel operations each season.

The purpose is to ensure the center of gravity (CG) will remain within limits. Because of the dynamic environment of the rappel operation where rappellers and spotters move inside and outside of the aircraft in flight, it may be possible to exceed the aircraft's CG limitations during rappel operations.

In cases where it may be possible to exceed a CG limit during normal or emergency situations, W&B calculations will be performed prior to each rappel mission accounting for actual rappeller, spotter and cargo weights.

If a mission-specific W&B calculation indicates the CG could be exceeded during any phase of the rappel operation, the load configuration must be adjusted, or the mission aborted. Calculation documentation must be maintained at the base of operations.

## 1.2 Personnel Equipment Checks

### 1.2.1 Rappeller Pre-Flight Buddy Check

**IMPORTANT NOTE:** A buddy check will be completed prior to a rappeller preparing to board the aircraft. All steps of the buddy check are to be performed visually and/or tactilely for thoroughness. The rappeller being checked will be attentive to each step of the buddy check process. If a discrepancy is found, this check needs to be started over from the beginning.

Items noted below in bold typeface must be checked both visually and tactilely. *Italicized words in parentheses are for instructing/information purposes only.*

#### 1. Flight Helmet

- In good condition (*no cracks or damage*)
- Visor down or up with approved eye protection (*that meets ANSI Z87.1*)
- Mic boom up (*multiple mic booms exist and can be visually inspected for correct placement*)
- Chin strap in place (*adjusted for snug fit, with no loose ends*)
- Avionics cord secured (*inside Nomex shirt or flight suit*)

#### 2. Nomex Shirt

- Shirt collar up, buttoned to the top and tucked in, or flight suit fully zipped
- Pockets secured
- Sleeves down
- Rappel gloves
- **Gloves in good condition** (*free of pitch or contaminants, stitching and padding intact with no holes in palms, between fingers, flap, thumb/forefinger gusset*)

#### 3. Harness

- Risers
  - Snug fit
  - Webbing and stitching in good condition
  - No twists
  - Loose ends secured
- Lat straps
  - Snug fit
  - Webbing and stitching in good condition

- No twists
  - Loose ends secured
- Webbing Bridge
  - No twists
- Carabiner and Descender
  - Gate is closed and locked
  - Lanyard pin in place
  - Descender attached
- 4. BD bag
  - Click locks secured, horns out
  - Top straps through handle, buckles secured
  - Side straps tight
  - Zipper closed
  - Double tap on BD bag to indicate rappeller to lift bag
  - Bottom of BD bag in good condition
- 5. Leg straps
  - Buckles attached, no fabric caught
  - Snug fit
  - Webbing and stitching in good condition
  - No twists
  - Loose ends secured
- 6. Raptor knife
  - In sheath
  - Snaps secured
  - Lanyard stowed
  - Horn facing aft
- 7. Nomex pants and boots
  - Pockets secured
  - Pants over boots
- 8. Single tap on BD bag to indicate rappeller to turn around
- 9. Helmet in good condition (*No cracks or damage*)
  - Hair tucked in



10. Harness

- Webbing and stitching in good condition
- No twists
- Loose ends secure
- Tag pouch secure

11. Nomex

- Waist belt clear
- Pockets secured

12. Indicate rappeller to turn around with a single tap on the left shoulder

13. Exchange thumbs-up indicating a complete buddy check

## 1.2.2 Spotter Check by Rappeller

**IMPORTANT NOTE:** Spotter being checked will be attentive to each step of the equipment check process. If a discrepancy is found, this check needs to be started over from the beginning. Italicized words in parentheses are for instructing/information purposes only.

1. Flight helmet
  - In good condition (*no cracks or damage, avionics in place, no eye protection required*)
  - Chin strap in place
2. Nomex shirt
  - Shirt collar up, buttoned to the top and tucked in, or flight suit fully zipped
  - Sleeves down
3. Gloves
  - In good condition (*Nomex flight glove, PMI GS2200, Metolius full-finger, or Metolius climbing ¾-finger with Nomex flight gloves. Gloves shall have no holes and be free of contaminants*)
4. Harness
  - Chest and leg straps buckled
  - Snug fit
  - Webbing and stitching in good condition
  - No twists
  - Loose ends secured
5. Nomex and boots
  - Pants over boots
6. Raptor knife
  - In sheath
  - Snap secured
  - Lanyard stowed
  - Horn facing to the left
7. Signal spotter to turn around with a tap on the knife sheath
8. Helmet in good condition

## 9. Harness

- Webbing and stitching in good condition
- No twists
- Loose ends secure

## 10. Spotter tether attached to dorsal D-ring and tacked

- Extendable tether locked, and snaps secure
- Carabiner in place at end of tether

## 11. Signal spotter to turn around with a single tap on left shoulder

## 12. Exchange thumbs-up, indicating a complete spotter check

### 1.3 Pre-Rappel Procedures

All communications between spotter and PIC related to the deployment of rappellers and cargo will be done in the form of challenge and response. Spotter shall provide constant feedback to the PIC regarding the position and movement of the aircraft, proximity to hazards, and progress of the rappellers and cargo descent.

During deployment of rappellers and cargo, the PIC shall maintain the hover utilizing horizontal, vertical, or a combination of reference points that provide a stable rappel hover. Pilots should not attempt to maneuver the rappellers on the rope as they would with longline cargo procedures.

#### 1.3.1 Pre-Flight Briefing and Administration

Prior to departure, the PIC and involved personnel shall receive a briefing on mission objectives, communications, known hazards and any special mission information.

Load calculations and manifests complete and posted.

### 1.3.2 Pre-Rappel Sequence

**IMPORTANT NOTE:** The standard load of rappellers is four, seated in the aft- facing bench seat. Loads less than four are acceptable. Normal deployment of rappellers shall occur from both doors, two rappellers, simultaneously. Two-door operations and simultaneous deployment of rappellers reduces overall hover time and unloads weight from the aircraft more quickly. A single rappeller may be deployed as necessary to meet specific mission and personnel needs.

The safety of personnel and aircraft must be the primary consideration when the spotter and PIC select rappel or landing sites. The PIC shall be the final authority on flight procedures. Fire behavior and safety shall also be considered prior to deploying rappellers.

PIC flies a high-level reconnaissance of the area. The spotter works with the PIC to select an appropriate rappel site, identify hazards and an emergency site.

Contact appropriate flight-following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel operation. Spotter communicates with flight following authority and PIC regarding number of rappellers to be deployed.

Adjust radios as needed to ensure PIC and spotter communication will not be compromised by excessive radio traffic. Radios must remain on and dialed to the appropriate flight-following frequency.

Where possible, helicopter should maintain at least a 50-foot clearance above any obstacles before starting a rappel. If this is not possible and the helicopter must descend below the canopy, rotor clearance must meet the current standards in the NSHO.

Before starting rappel operations, a HOGE power check is accomplished at an altitude comparable to the rappel site or greater. A positive rate of climb must be established without exceeding aircraft limitations. PIC states, "Hover established, positive rate of climb, power is good."

Spotter responds, "Power is good."

Spotter directs rappellers to unplug and stow ICS communications.

## Chapter 2. Bell Medium Platform Pre-Flight Procedures

**IMPORTANT NOTE:** The aft-facing bench seat positions are the only approved seating for rappellers when conducting rappel operations. Specific seating arrangement for each helicopter must be approved in the helicopter flight manual or STC.

### 2.1 Configure Helicopter

For rappel operations, aircraft shall be set up in the following configuration:

1. Remove the right side, two-place, forward-facing bench seat (right of center spotter seat)
2. Ensure passenger cabin door posts are secure
3. Install approved cargo restraints in right-side transmission well
4. Ensure cargo barriers (e.g. netting) around right-side transmission well are secure.
5. Install two sets of rappeller tethers at the seatbelt rings on the aft-facing bench seat: one set on the ring between the first and third rappeller positions, and one set on the ring between the second and fourth positions (see FIGURE 2-1 and FIGURE 2-2).

Figure 2-1



Figure 2-2



## 2.1.1 Cargo Loading

**IMPORTANT NOTE:** During rappel missions, IA letdown cargo shall be carried in the right transmission well. Cargo may be deployed from either side of the aircraft if a W&B calculation performed by the pilot assures that the CG limits will not be exceeded at any phase during the flight.

Cargo shall be loaded and secured under the supervision of a qualified rappeller.

1. Load standard rappel cargo (IA fire equipment, chainsaw, cubee) in approved containers in right transmission well cargo area.
2. Restrain cargo utilizing approved cargo restraints.
3. Secure cargo behind approved cargo area barrier (e.g., netting).

## 2.1.2 Spotter Anchor

Install the spotter anchor above the spotter seat on the upper half of the transmission housing.

Each end of the tether shall be connected to the provided and mounted ring and stud fittings.

The two ring and stud fittings shall be installed by the helicopter operator on the outside edge of the transmission housing, one on each one of the two approved installation point waterlines (WL 62.2 or 68.9, see FIGURE 2-3) in accordance with the USFS ELAM STC installation instructions.

*Figure 2-3*

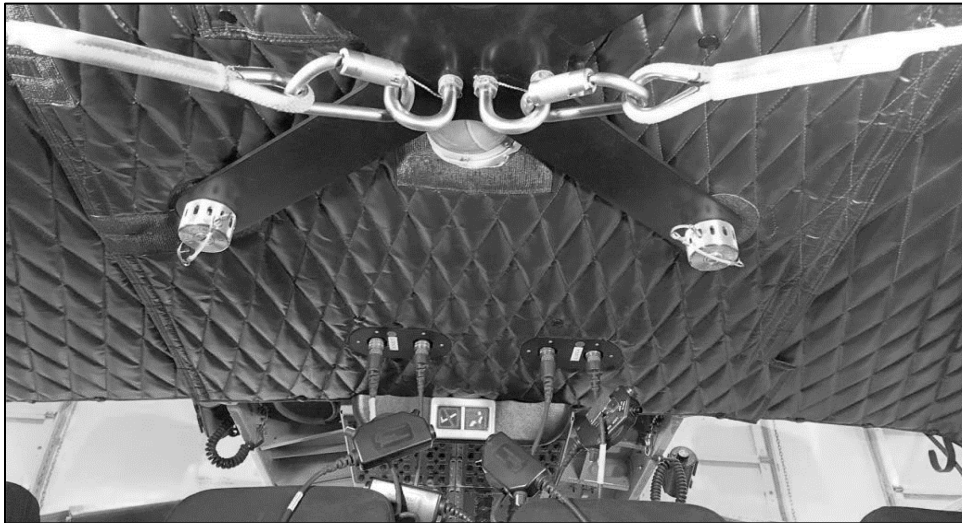


### 2.1.3 Rigging Rappel Anchor

The rappel anchor (ELAM) shall be rigged in the following manner under the supervision of a qualified spotter:

1. Install rockD carabiners to overhead anchor hardpoints, with wide-end down, gates facing aft (see FIGURE 2-4)

*Figure 2-4*



2. Install rockD carabiner at the forward slot of each door bracket, barrel down, gate facing inboard (FIGURE 2-5)

*Figure 2-5*



3. Install a second rockD carabiner to each upper carabiner, barrel down, gate facing aft
4. Thread each rope through the lower carabiner at the door bracket
5. Attach each rope end thimble to the carabiner on the overhead anchor
6. Secure rope bag
7. Spotter shall then inspect all rappel rigging once installed

## 2.2 Boarding Sequence

1. Once the buddy check has been completed, rappellers organize into proper rappel order and prepare to board the aircraft. Rappellers load from inboard seats out.
2. Starting with rappellers boarding on the right side of aircraft then moving to the left side, the spotter performs an equipment check on each rappeller, replicating the steps for a buddy check. If all is correct, a thumbs-up signal is exchanged. If a discrepancy is identified, it will be immediately corrected, and the spotter will restart the equipment check from the beginning.
3. Once complete, each rappeller boards the aircraft and takes a pre-assigned seat. The first rappeller boarding on each side will perform visual and tactile checks on equipment (door bracket carabiners, rope routing, and rope attachment at ceiling bracket). Move into seat, fasten rappeller tether to inboard side of the webbing bridge with release handle facing downward (tether shall not cross rappellers body), and then attach seatbelt (under descender and tether).
4. The rappeller plugs into the ICS system if appropriate.
5. The last rappeller to be loaded performs spotter check and gives thumbs-up (see 1.2.2) prior to boarding the aircraft. If all is correct, a thumbs-up signal is exchanged, then the rappeller boards the aircraft.
6. Spotter completes the preflight walk around.
7. Spotter enters aircraft, ensures aircraft doors are closed, checks carabiners, rope routing, and that the ropes are attached. Spotter taps inboard rappellers and points to rigging. Thumbs-up signal between spotter and inboard rappellers indicates inspections have been performed.
8. Spotter checks the rappellers' seat belts and rappeller tethers.
9. Spotter connects tether, plugs into radio system, takes seat, fastens seat belt, displays tether showing that the carabiner is attached to spotter anchor and seat belt is secure. If all is correct, a thumbs-up signal is exchanged with all rappellers on board.
10. Outboard rappellers secure rope bags



### 2.2.1 Rope Security

Prior to flight, spotter will ensure rope bags are secured in the aircraft. Spotter will ensure outboard rappellers have rope control prior to opening aircraft doors.

### 2.2.2 Preparing for Flight

Prior to flight, spotter and pilot establish communication through intercom and ensure the following steps are accomplished:

1. Ensure all mission-specific items have been addressed
2. Set radio frequencies as appropriate
3. Confirm coordinates are entered into GPS if applicable
4. Spotter states to pilot, **“OK to depart”**
5. Once in flight, contact appropriate flight-following authority (ATGS, HLCO, dispatch, etc.)

## Chapter 3. In-Flight Bell Medium Platform Procedures

### 3.1 Rappel Sequence

1. Pilot states to spotter, “One minute out, airspeed below 40 knots.”
2. Spotter responds, “One minute out, airspeed below 40 knots, coming out of my seatbelt.”
3. Spotter activates hot mic if not already activated.
4. Spotter states to pilot, “Opening aircraft doors.” Once spotter has opened aircraft doors, spotter states to pilot, “Reset master caution.”
5. Pilot responds, “Master caution reset.” Spotter/pilot communicate adequate rotor clearance, power assessments, and rappel spot status throughout the rappel sequence using pilot’s perspective (left, right, forward, back, and up or down relative to altitude above the ground). **Spotter must visually and verbally clear main and tail rotor from obstacles prior to giving directions to move the aircraft.**
6. Once over the rappel site, spotter states to pilot, “Ready to drop ropes, how is the power?”
7. Pilot confirms power. If within limits, pilot responds to spotter, “Power is good, drop ropes.”
8. Spotter drops the rope to the outside of the skid and ensures it is free of knots and rope bag is on the ground. Spotter repeats process for second rope. If the spotter identifies a knot or other problem on the rope, this must be communicated to the rappeller and pilot. The rappeller and pilot must acknowledge.
9. Spotter states to pilot, “Rappellers hooking up.”
10. Pilot responds, “Rappellers hooking up.”
11. Spotter then gives the Remove Seat Belt hand signal to each rappeller.
12. Rappeller removes seat belt, slides to outboard position on the bench seat, grasps rope, rigs descender with foot trap utilizing outboard foot, inspects rigged descender and presents to spotter with outboard hand on rope to the ground, and inboard hand on rappeller tether.
13. Spotter inspects rigged descender and rappeller tether.
14. Spotter states to pilot, “Rappellers to the skids.”
15. Pilot responds, “Rappellers to the skids.”
16. Spotter gives Move to Skid hand signal to each rappeller. Rappeller moves to the skid, squares up with rope on right side of body, with left hand moves descender handle to “primed position”, visually clears rope to the ground, visually checks descender, places right hand on rappeller tether release, returns eyes to spotter in ready position. If a rappeller identifies a knot or other problem on the rope, this must be communicated to the spotter. The spotter must acknowledge.
17. Spotter states to pilot, “Ready to send rappellers, how is the power?”
18. Pilot verifies power. If within limits, pilot responds to spotter, “Power is good, send rappellers.”

19. Spotter responds, "Sending rappellers" and gives Begin Descent hand signal to each rappeller.
20. Rappellers release rappeller tether, begins transitioning off skid looking at the anchor. Continue transition to an inverted state.
21. Once off skid, stop, ensure rope is over the lip, and descend to ground while maintaining on-rope situational awareness.
22. Spotter keeps pilot apprised of the helicopter positioning, rappel site, and rappellers' progress down the rope; states to pilot, "Rappellers off the skid ... halfway ... on the ground."
23. Once on the ground, rappeller manipulates cam with thumb to gain slack, opens cover, removes rope to derig descender, and moves to a safe area away from the rappel site. Rappellers must use appropriate hand signal (or radio if quickly accessible) to inform spotter if there is a bad rope or rappel site.
24. Once rappellers move to a safe area, spotter may repeat rappel process from Step 9 to deploy additional rappellers.
25. Once complete, spotter states to pilot, "De-rigging rope(s)."
26. Spotter states to the pilot, "Right side/left side rope away, right side/left side door shut."
27. Spotter states, "Clear to depart."
28. Pilot responds, "Clear to depart?" Spotter states, "Affirmative, clear to depart."
29. The spotter, with concurrence from the pilot, may initiate the cargo deployment procedures at this time. Pilot may elect to maintain hover or circle until cargo is prepared. (See Chapter 4, for cargo deployment procedures.)
30. Once rappel and cargo deployment operations are complete, spotter will:
31. Return radio to normal operational mode and establish radio contact with ground personnel
32. Inform flight-following authority that rappel operation has been completed
33. Secure loose items in the helicopter
34. Fasten seat belt
35. The helicopter shall remain in the area until rappellers have positive communication with dispatch, division, etc.

### 3.1.1 Rigging Ropes in Flight

After the completion of the first mission and prior to landing, there may be a need to deploy additional rappellers at a different location. In this case ropes must be rigged in flight. Remaining rappellers must perform a visual check after the spotter completes the rigging process. Once complete, a thumbs-up is exchanged and the rappel sequence will resume at Section 3.1.1.

## Chapter 4. Bell Medium Platform Cargo Deployment Procedures

### 4.1 Cargo Deployment Procedures

The deployment of cargo generally occurs as part of the rappel operation following the deployment of rappellers. When cargo is deployed as part of the rappel mission, sections 4.1.2, 4.1.3, and 4.1.3 are incorporated in the pre-flight procedures with Chapter 2. Sections 4.1.2, 4.1.3, and 4.1.4 provide detail not directly addressed in the rappel procedures and should be reviewed and followed.

Cargo may also be deployed independently of the rappel mission for the purpose of resupplying firefighters or supporting other operational missions. The following procedures encapsulate the cargo delivery operation.

#### 4.1.1 Pre-Flight Procedures for Cargo Deployment Missions

1. Prior to departure, the pilot and involved personnel shall receive a briefing on mission objectives, communications, known hazards and emergency procedures.
2. Spotter puts on harness, ensures safety knife is attached to harness.
3. Load calculations and manifests complete and posted.
4. Spotter completes necessary pre-flight inspections.
5. Prior to flight, the spotter must receive a spotter equipment check. When ground personnel are unavailable, the spotter shall have the pilot perform this check. Positive communication between the spotter and pilot must occur to ensure spotter has attached their tether to the spotter anchor.

#### 4.1.2 Rigging and Loading Cargo

1. Spotter will configure helicopter to meet the needs of the specific cargo mission.
2. Spotter rigs cargo with carabiners and secures in helicopter in accordance with Chapter 2 section 2.1.2.
3. Spotter checks cargo delivery equipment to ensure proper number of letdown lines, extra carabiners, and figure 8 are available and secured in accessible location.
4. Spotter visually inspects anchor in accordance with the ELAM STC.
5. Spotter boards aircraft, connects tether, fastens seat belt, and plugs into avionics.
6. Spotter tells pilot, "Tether attached, OK to depart." Pilot responds, "Tether attached, departing."

### 4.1.3 Pre-Cargo Delivery Sequence

1. Pilot flies a reconnaissance of the area to look for hazards and works with spotter to select an appropriate cargo delivery site.
2. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the cargo operation. Spotter communicates with pilot regarding number of loads to be deployed.
3. Inform ground personnel to stay clear of cargo during deployment.
4. Adjust radios as needed to ensure pilot and spotter communication will not be compromised by excessive radio chatter. Radios must remain on and dialed to the appropriate flight-following frequency.
5. Where possible, helicopter should maintain at least a 50-foot clearance above any obstacles before starting a cargo operation. If this is not possible and the helicopter must descend below the canopy, rotor clearance must meet the current standards in the NSHO.
6. Before starting cargo operations, A HOGE power check is accomplished at an altitude comparable to the cargo site or greater. A positive rate of climb must be established without exceeding aircraft limitations. Pilot states, "Hover established, positive rate of climb, power is good."
7. Spotter responds, "Power is good."
8. Spotter activates hot mic if not already activated.
9. If not previously performed, spotter removes restraining straps from cargo, ensures remaining cargo is secure, and positions cargo in doorway.
10. Spotter rigs figure eight with cargo letdown line and attaches figure eight using one carabiner in the aft slot of the anchor bracket, barrel down, gate facing inboard. Spotter attaches end of letdown line to cargo with an approved cargo carabiner and locks carabiner. Spotter relays to pilot when rigging is complete.
11. Cargo letdown pack must be connected to a hardpoint in the aircraft.
12. Pilot reduces forward airspeed on approach to cargo site. The pilot states to spotter,  
13. "One minute out, airspeed below 40 knots."
14. Spotter responds, "One minute out, airspeed below 40 knots, opening aircraft doors."  
Once spotter has opened aircraft door, spotter states to pilot, "Reset master caution."
15. Pilot responds, "Master caution reset."

#### 4.1.4 Cargo Deployment Sequence

Spotter/pilot communicate adequate rotor clearance, power assessments, and cargo delivery spot status throughout the operation using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground). **Spotter must visually and verbally clear main and tail rotor from obstacles prior to giving directions to move the aircraft.**

1. Once established over the cargo delivery spot, spotter states to pilot, "Ready to send cargo, how is the power?"
2. Pilot confirms power. If within limits, pilot responds to spotter, "Power is good, send cargo."
3. Spotter states to pilot, "Sending cargo," then eases cargo out the door over the flight step and skid.
4. Spotter begins lowering cargo with positive control of letdown line; does not allow un-arrested descent of cargo. Spotter keeps pilot informed of actions and progress of cargo descent, "Cargo is out the door ... halfway down ... cargo is on the ground."
5. When cargo is on the ground, spotter unhooks figure 8 from carabiner and removes letdown line. Spotter holds slack in line to prevent billowing and unhooks letdown line bag from hardpoint. Spotter wraps excess letdown line around bag and throws it clear of aircraft.
6. Spotter informs pilot if more cargo is to be lowered. Pilot/spotter will determine whether to hold hover or orbit area until cargo is ready for subsequent deployment.
7. When cargo deployment is complete, spotter states to pilot, "Derigging line, line is away, door shut, clear to depart." Door may remain open for mission needs, however the spotter will close the door prior to leaving area of operation and/or before airspeed above 40 knots, then returns to seat and fastens seat belt.
8. Pilot responds, "Clear to depart?"
9. Spotter states, "Affirmative, clear to depart."
10. Radio returned to normal operational mode and flight-following authority is informed that cargo operation has been completed.

## Chapter 5. Super Puma Procedures

### 5.1 Preflight Super Puma Procedures

#### 5.1.1 Configure Helicopter

For rappel operations, aircraft shall be set up in the following configuration:

- Ensure Hoist Arm is installed
- Install rappeller tethers
- Insure RockD carabiners are attached to ropes

#### 5.1.2 Cargo Loading

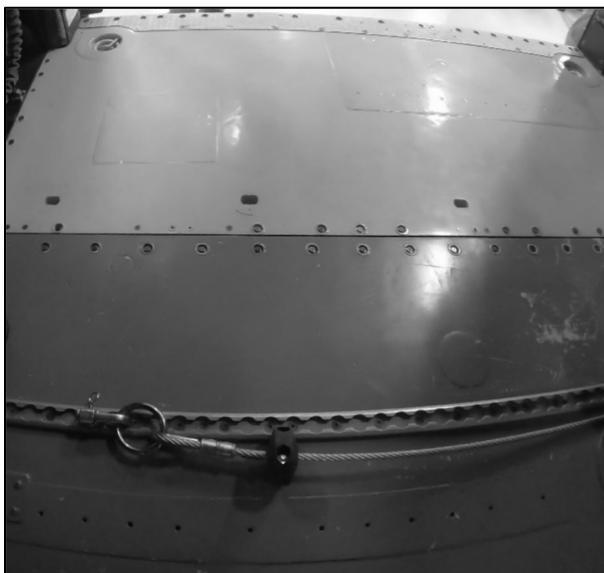
Cargo shall be loaded and secured under the supervision of a qualified rappeller

- Load standard rappel cargo (IA fire equipment, chainsaw, cubee) in approved containers in cargo area
- Restrain cargo utilizing approved cargo restraints

#### 5.1.3 Spotter Anchor

- Install the spotter cable assembly stud fitting to the floor track and install safety pins and retainers (Figure 5-1).
- When properly installed, there will be minimal side to side movement in the cable providing for adequate fall restraint.

*Figure 5-1 Spotter Anchor Assembly*



#### 5.1.4 Rigging Rappel Anchor (Hoist Bracket)

Rigging of the rope on the Super Puma bracket occurs in flight.

#### 5.1.5 Boarding Sequence

1. Once the buddy check has been completed, rappellers organize into proper rappel order and prepare to board the aircraft.
2. The spotter performs an equipment check on each rappeller, replicating the steps for a buddy check. If all is correct, a thumbs-up signal is exchanged. If a discrepancy is identified, it will be immediately corrected, and the spotter will restart the equipment check from the beginning.
3. Once complete, each rappeller boards the aircraft and takes a pre-assigned seat. The rappeller moves into their seat, fastens rappeller tether to the webbing bridge with release handle facing downward and then attaches their seatbelt (under descender and tether).
4. The rappeller plugs into the ICS system if appropriate.
5. The last rappeller to be loaded performs spotter check and gives thumbs-up prior to boarding the aircraft. If all is correct, a thumbs-up signal is exchanged, then the rappeller boards the aircraft.
6. Spotter completes the preflight walk around.
7. Spotter enters aircraft, ensures aircraft doors are closed (if necessary).
8. Spotter checks the rappellers' seat belts and rappeller tethers.
9. Spotter connects tether, plugs into radio system, takes seat, fastens seat belt, displays tether showing that the carabiner is attached to spotter anchor and seat belt is secure. If all is correct, a thumbs-up signal is exchanged with all rappellers on board.

#### 5.1.6 Rope Security

Prior to flight, spotter will ensure rope bags are secured in the aircraft. Spotter will ensure outboard rappellers have rope control prior to opening aircraft doors.

#### 5.1.7 Preparing for Flight

Prior to flight, spotter and pilot establish communication through intercom and ensure the following steps are accomplished:

1. Ensure all mission-specific items have been addressed
2. Set radio frequencies as appropriate
3. Confirm coordinates are entered into GPS if applicable
4. Spotter states to pilot, "OK to depart"
5. Once in flight, contact appropriate flight-following authority (ATGS, HLCO, dispatch, etc.)



## 5.2 In-Flight Super Puma Procedures

### 5.2.1 Rappel Sequence

1. PIC states to spotter, “One minute out, airspeed below 40 knots.”
2. Spotter responds, “One minute out, airspeed below 40 knots, coming out of my seatbelt.”
3. Spotter activates hot mic if not already activated.
4. Spotter states to pilot, “Opening aircraft door(s).” Once spotter has opened aircraft doors, spotter states to pilot, “Reset master caution.”
5. PIC responds, “Master caution reset.” Spotter/PIC communicate adequate rotor clearance, power assessments, and rappel spot status throughout the rappel sequence using pilots’ perspective (left, right, forward, back, and up or down relative to altitude above the ground). Spotter must visually and verbally clear main and tail rotor from obstacles prior to giving directions to move the aircraft.
6. Once over the rappel site, spotter states to PIC, “Ready to drop rope(s), how is the power?”
7. PIC confirms power. If within limits, pilot responds to spotter, “Power is good, drop rope(s).”
8. Spotter connects rope to external anchor drops the rope to the outside of the step and ensures it is free of knots and rope bag is on the ground. Spotter repeats process for second rope if necessary. If the spotter identifies a knot or other problem on the rope, this must be communicated to the rappeller and PIC. The rappeller and PIC must acknowledge.
9. Spotter states to pilot, “Rappeller(s) hooking up.”
10. PIC responds, “Rappeller(s) hooking up.”
11. Spotter then gives the Remove Seat Belt hand signal to each rappeller.
12. Rappeller removes seat belt, slides to outboard seat, grasps rope, rigs descender with foot trap utilizing outboard foot, adjusts descender to appropriate rope length, locks handle, inspects rigged descender, and presents to spotter with outboard hand on rope to the ground and inboard hand on rappeller tether.
13. Spotter inspects rigged descender and rappeller tether.
14. Spotter states to PIC, “Rappeller(s) to the step(s).”
15. PIC responds, “Rappeller(s) to the step(s).”
16. Spotter gives Move to Step hand signal to each rappeller. Rappeller moves to the step, squares up with rope on right side of body, with left hand moves descender handle to “primed position”, visually clears rope to the ground, visually checks descender, places right hand on rappeller tether release, returns eyes to spotter in ready position. If a rappeller identifies a knot or other problem on the rope, this must be communicated to the spotter. The spotter must acknowledge.
17. Spotter states to PIC, “Ready to send rappeller(s), how is the power?”
18. PIC verifies power. If within limits, PIC responds to spotter, “Power is good, send rappeller(s).”

19. Spotter responds, "Sending rappeller(s)" and gives Begin Descent hand signal to each rappeller.
20. Rappeller releases rappeller tether, ensures rope is over the lip, and descends to ground while maintaining on-rope situational awareness.
21. Spotter keeps PIC apprised of the helicopter positioning, rappel site, and rappeller(s)' progress down the rope; states to PIC, "Rappeller(s) halfway ... on the ground."
22. Once on the ground, rappeller manipulates cam with thumb to gain slack, opens cover, removes rope to derig descender, and moves to a safe area away from the rappel site. Rappeller(s) must use appropriate hand signal (or radio if quickly accessible) to inform spotter if there is a bad rope or rappel site.
23. Once rappeller(s) move to a safe area, spotter may repeat rappel process from Step 9 to deploy additional rappeller(s).
24. Once complete, spotter states to PIC, "De-rigging rope(s)."
25. Spotter states to the PIC, "Right side/left side rope away, right side/left side door shut."
26. Spotter states, "Clear to depart."
27. PIC responds, "Clear to depart?" Spotter states, "Affirmative, clear to depart."
28. The spotter, with concurrence from the PIC, may initiate the cargo deployment procedures at this time. PIC may elect to maintain hover or circle until cargo is prepared. See Chapter 4, for cargo deployment procedures.
29. Once rappel and cargo deployment operations are complete, spotter will:
30. return radio to normal operational mode and establish radio contact with ground personnel.
31. inform flight-following authority that rappel operation has been completed
32. secure loose items in the helicopter
33. fasten seat belt
34. The helicopter shall remain in the area until rappellers have positive communication with dispatch, division, etc.

## 5.3 Super Puma Cargo Deployment Procedures

### 5.3.1 Pre-deployment

1. Spotter removes cargo restraints, ensures remaining cargo is secure, and positions cargo near doorway.
2. Spotter rigs figure eight with cargo letdown line, attaches end of letdown line to cargo, and connects letdown to a hardpoint in the aircraft.
3. Spotter states: “Ready to rig cargo, establish hover”
4. PIC responds: “Hover established, rig cargo”
5. Spotter attaches figure eight to anchor and locks off load.
6. Spotter continues to attach additional cargo if necessary and locks carabiner.
7. Spotter states: “Cargo rigged, proceed to site”
8. PIC responds: “Proceeding to site”

### 5.3.2 Cargo Deployment

Spotter/pilot communicate adequate rotor clearance, power assessments, and cargo delivery spot status throughout the operation using pilot’s perspective (left, right, forward, back, and up or down relative to altitude above the ground). **Spotter must visually and verbally clear main and tail rotor from obstacles prior to giving directions to move the aircraft.**

1. Once established over the cargo delivery spot, spotter states to PIC, “Ready to send cargo, how is the power?”
2. PIC confirms power. If within limits, PIC responds to spotter, “Power is good, send cargo.”
3. Spotter states to PIC, “Sending cargo,” then eases cargo out the door over the step.
4. Spotter begins lowering cargo with positive control of letdown line; does not allow un-arrested descent of cargo. Spotter keeps PIC informed of actions and progress of cargo descent, “Cargo is out the door ... halfway down ... cargo is on the ground.”
5. When cargo is on the ground, spotter unhooks figure 8 from carabiner and removes letdown line. Spotter holds slack in line to prevent billowing and unhooks letdown line bag from hardpoint. Spotter wraps excess letdown line around bag and throws it clear of aircraft.
6. Spotter informs PIC if more cargo is to be lowered. PIC /spotter will determine whether to hold hover or orbit area until cargo is ready for subsequent deployment.
7. When cargo deployment is complete, spotter states to PIC, “Derigging line, line is away, door shut, clear to depart.” Door may remain open for mission needs, however the spotter will close the door prior to leaving area of operation, then returns to seat and fastens seat belt.
8. PIC responds, “Clear to depart?”
9. Spotter states, “Affirmative, clear to depart.”

10. Radio returned to normal operational mode and flight-following authority is informed that cargo operation has been completed.

## **Chapter 6. Post-Rappel**

### **6.1 Administrative/Debrief**

- Complete necessary documentation pertinent to the mission.
- Spotter(s)/pilot(s) will critique the mission and/or discuss problems that may have occurred.
- Upon return of rappellers, spotter and rappellers will critique the mission.

## Chapter 7. Rappeller Emergency Procedures and Signals

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

### 7.1 Rappeller Emergency Tie-Off (ETO) Procedure

ETO is a procedure completed to permanently secure the rappeller's position on the rope. Some situations when a tie-off may be required are:

- The rope becomes entangled, preventing the rappeller from descending or creating a hazard to the helicopter.
- A knot on the rope has become lodged in the descent device.
- The rappeller has a descender malfunction.

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

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 execute a midline stop to correct the problem.
2. If a rappeller still cannot resolve the problem, the rappeller will lock the handle, return attention to the spotter, and give the **Spread-Eagle** signal.
3. If the spotter gives the **Begin ETO** signal (horizontal arm wave), the rappeller will initiate an emergency tie-off (ETO) and cut the rope below them. If no ETO signal is given, the rappeller will be lowered to the ground (see Chapter 9 for hand signal descriptions).

**The ETO procedure is as follows:**

1. Bring running end of rappel rope through the harness between the webbing and rappeller's body from right to left where the descender is attached. Pull up 3-4 feet of slack to form a running loop.
2. Bring loop up and over descender in a clockwise direction going behind the rappel rope and form a half hitch around the fixed end (to helicopter) of rope. Pull half hitch tight.
3. Form another half hitch on top of the first one. Pull tight. A 6 to 18-inch looped tail should remain.
4. Move rope to left side of body, remove knife, cut the running end of rope approximately 3-4 feet below the descender.
5. After the rope has been cut, the rappeller stows knife and 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 to Fly Away** signal. The rappeller will protect half hitches during flight. Then, the helicopter transports the rappeller to the

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

6. Once on the ground, the rappeller shall untie half hitches, derig descender and clear the area. If this isn't possible the rappeller will wait for slack in the rope, preventing possible snap back towards the helicopter rotors. Then the rappeller removes the Raptor knife and cuts the rappel rope above the half hitches and clears the area.

## 7.2 Rappeller in Distress

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 a problem to the spotter.

- If a rope defect or problem is evident, the rappeller will give the **Bad Rope** signal (See Chapter 9, figure 9-9), indicating to the spotter the rope is unsafe and the mission should be completed with a new rope.
- If a rappeller on the ground recognizes the rappel site is a safety problem, the rappeller will give the **Discontinue Rappel** signal (See Chapter 9, figure 9-10), indicating to the spotter that site is unacceptable, and another location should be selected.

## Chapter 8. In-Flight Emergencies

**IMPORTANT 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.

During an emergency is NOT the appropriate time and place to discover that, “what you heard is not what I meant.” This should be accomplished through briefings and on- the-ground emergency exercises.

### 8.1 Emergency Communications and Categories

In the rappel environment, clear and concise communication culminating in a coordinated response between the spotter and pilot is critical to a successful outcome.

During rappel operations, there are two basic categories of in-flight emergencies:

- Those that require an **immediate** response (land as soon as possible)
- Those that permit a **delayed** response (land as soon as practicable)

#### 8.1.1 Immediate Response Emergencies (Land as Soon as Possible)

There are a limited number of emergencies that fall into this category. In the rappel environment, these emergencies are characterized by a need to depart the rappel hover without delay. In this type of emergency, the possibility of affecting a positive outcome will be impacted by the ability to jettison ropes quickly.

##### **Examples of possible emergencies:**

- Engine failure
- Tail rotor failure
- Hard-over of controls
- Engine over speed/driveshaft failure
- Compressor stall (single engine)
- Governor failure low side (twin engine)
- Governor failure (single engine)



## 8.1.2 Delayed Response Emergencies (Land as Soon as Practicable)

**IMPORTANT NOTE:** The example of possible problems listed below note delayed responses and may not require immediate action other than communication and monitoring; response actions can vary in time from seconds to minutes.

There are a number of events, typically mechanical or environmental, that fall into this category. In the rappel environment, these events are characterized by an ability to delay the departure from the rappel hover. In events of this nature, there is typically time to complete a rappel or cargo deployment prior to departing the hover.

Examples of possible problems:

- Transmission/engine/tail rotor gear box chip light
- Hydraulic failure
- Oil temperature/oil pressure light
- Hydraulic temperature or pressure light
- Unknown master caution
- Fire light (requires pilot check of controls and for fire on board)
- Stuck pedal
- Fuel control or governor failure high side (twin engine)
- Electrical failure
- Fuel/air filter clog
- Fuel pump failure
- Decrease in rotor RPM
- Compressor stall (twin engine)
- Severe up or down drafts

## 8.2 Rappel Immediate Response (Land As Soon As Possible)

**IMPORTANT NOTE:** The “Abort, Abort” and the subsequent actions taken by the pilot and spotter will occur almost simultaneously. The pilot will attempt to gain forward flight, if possible, which will require that the spotter clears ropes without hesitation. The pilot is not expected to wait for the “Clear” from the spotter before taking action to appropriately respond to the emergency. Any failure to immediately clear the aircraft of ropes may pose a threat to the aircraft and personnel on board, as well as increase the risk to rappellers on the ropes.

### PILOT DUTIES

It is imperative that the pilot diagnose this emergency accurately and without delay. Additionally, the pilot must simultaneously alert the spotter by stating “**ABORT, ABORT.**”

### SPOTTER DUTIES

The spotter’s response must be immediate; however, actions will vary depending on the phase of the rappel when the emergency occurs. It is critical that spotters understand the sequence. Unnecessary delay may result in a catastrophic outcome for the aircraft and crew.

Figure 8--1 Rappel Immediate Response (Land As Soon As Possible)

RAPPEL PHASE	PILOT STATES	SPOTTER ACTION/RESPONSE
Rappellers secure, ropes secure	“ <b>ABORT, ABORT</b> ”	<b>SPOTTER:</b> State “ <b><u>CLEAR</u></b> ”, Immediately take seat and fasten seatbelt. Doors and other cabin duties should not take priority over getting to a seat and into seatbelt.  <b>RAPPELLERS:</b> Secure rope bags due to cabin doors remaining open throughout descent and landing.
Rappellers secure, ropes deployed	“ <b>ABORT, ABORT</b> ”	<b>SPOTTER:</b> <b><u>CUT ROPES</u></b> , state “ <b><u>CLEAR</u></b> ”, Immediately take seat and fasten seat belt. Doors and other cabin duties should not take priority over getting to a seat and into a seat belt
Rappellers out of seat belt, ropes deployed	“ <b>ABORT, ABORT</b> ”	<b>SPOTTER:</b> Give rappellers <b><u>RETURN TO SEAT BELT SIGNAL, CUT ROPES</u></b> below descender, state “ <b><u>CLEAR</u></b> ”. Immediately take seat and fasten seat belt
Rappellers on skids	“ <b>ABORT, ABORT</b> ”	<b>SPOTTER:</b> Give rappellers <b><u>RETURN TO SEAT BELT SIGNAL, CUT ROPES</u></b> below descender, state “ <b><u>CLEAR</u></b> ” Immediately take seat and fasten seat belt
Rappellers in descent (off skids)	“ <b>ABORT, ABORT</b> ”	<b>SPOTTER:</b> <b><u>CONFIRMS THE EMERGENCY</u></b> (Either by the obvious flight profile of the aircraft or by challenge and response with the pilot) <b><u>CUT ROPES</u></b> , state “ <b><u>CLEAR</u></b> ”. Immediately take seat and fasten seat belt.
Rappel complete, derigging aircraft	“ <b>ABORT, ABORT</b> ”	<b>SPOTTER:</b> <b><u>CUT ROPES</u></b> , state “ <b><u>CLEAR</u></b> ”. Immediately take seat and fasten seat belt. Doors and other cabin duties should not take priority over getting to a seat and into a seat belt.

### 8.3 Rappel Delayed Response Actions (Land As Soon As Practicable)

**IMPORTANT NOTE:** Events of an environmental nature may be resolved by waiting for the event to subside or relocating to an alternate rappel site. An event of this nature requires that the pilot inform the spotter of the actions required to address the event. If at any point continued flight is hazardous due to environmental conditions, the pilot will state **“Expedite, Expedite.”**

#### PILOT DUTIES

When experiencing a delayed response emergency, **“EXPEDITE, EXPEDITE,”** is intended as the initial alert for the crew - communicating that the rappel must be halted due to an aircraft malfunction or environmental condition. It should not be the only communication passed.

As the situation allows, the pilot should advise the crew of the aircraft status and the intended duration of the flight. It must be understood if rappellers have left the skids, the aircraft will remain stable until the rappel is complete and ropes have been cut.

#### SPOTTER DUTIES

Unnecessary delays should be avoided due to the critical nature of the flight profile. The only time there should be an excessive delay is when rappellers are in the descent; the spotter should advise the pilot as to the amount of time needed to get the rappellers on the ground and cut ropes.

*Figure 8--2 Rappel Delayed Response Actions (Land as Soon as Practicable)*

RAPPEL PHASE	PILOT STATES	SPOTTER ACTION/RESPONSE
Rappellers secure, ropes secure	<b>“EXPEDITE, EXPEDITE”</b>	State <b>“CLEAR”</b> . Close aircraft doors, take seat and fasten seatbelt.
Rappellers secure, ropes deployed	<b>“EXPEDITE, EXPEDITE”</b>	<b>CUT ROPES</b> , visually verify ropes are clear of skids, close aircraft doors, state <b>“CLEAR”</b> , take seat and fasten seatbelt.
Rappellers out of seat belts, ropes deployed	<b>“EXPEDITE, EXPEDITE”</b>	Give rappellers <b>RETURN TO SEAT BELT SIGNAL</b> . Once rappellers are in seat belts, <b>CUT ROPES</b> below descenders, visually verify ropes are clear of skids, close aircraft doors, state <b>“CLEAR”</b> , take seat and fasten seat belt.
Rappellers on skids	<b>“EXPEDITE, EXPEDITE”</b>	Give rappellers <b>RETURN TO SEAT BELT SIGNAL</b> . Once rappellers are in seat belts, <b>CUT ROPES</b> below descenders, visually verify ropes are clear of skids, close aircraft doors, state <b>“CLEAR”</b> , take seat and fasten seat belt.
Rappellers in descent (off skids)	<b>“EXPEDITE, EXPEDITE”</b>	<b>CONFIRM EMERGENCY/PROBLEM</b> , discuss the progress of the rappel with the pilot, once rappellers are on the ground, <b>CUT ROPES</b> , visually verify ropes are clear of skids, close aircraft doors, state <b>“CLEAR”</b> , take seat and fasten seat belt.

## 8.4 Cargo Deployment Immediate Response Actions

### PILOT DUTIES

It is imperative that pilots diagnose this emergency accurately without delay. Additionally, they must simultaneously alert the spotter by stating “**ABORT, ABORT.**”

### SPOTTER DUTIES

Spotter’s response must be immediate; however, actions will vary depending on the phase of cargo when the emergency occurs. It is critical spotters understand the sequence.

*Table 6--1 Cargo Deployment Immediate Response Actions*

<b>CARGO PHASE</b>	<b>PILOT STATES</b>	<b>SPOTTER ACTION/RESPONSE</b>
Cargo secure	“ <b>ABORT, ABORT</b> ”	State “ <b>CLEAR</b> ”, immediately take seat and fasten seat belt.  Doors and other cabin duties should not take priority over getting to a seat and into a seat belt.
Cargo unsecure doors closed	“ <b>ABORT, ABORT</b> ”	State “ <b>CLEAR</b> ”, immediately take seat and fasten seat belt.  Securing cargo and other cabin duties should not take priority over getting to a seat and into a seat belt.
Cargo unsecured inside aircraft  Doors open	“ <b>ABORT, ABORT</b> ”	<b>CUT LINE, JETTISON CARGO OUT OPEN DOOR.</b> state “ <b>CLEAR</b> ”  Immediately take seat and fasten seat belt.  Doors and other cabin duties should not take priority over getting to a seat and into a seat belt.
Cargo outside aircraft	“ <b>ABORT, ABORT</b> ”	<b>CUT LINE,</b> state “ <b>CLEAR</b> ”  Immediately take seat and fasten seat belt.

## 8.5 Cargo Deployment Delayed Response Actions

### PILOT DUTIES

When experiencing this type of emergency, **“EXPEDITE, EXPEDITE”** is intended as the initial alert for the crew communicating that the cargo deployment must be curtailed due to an aircraft malfunction or environmental condition. Communication shall not be limited, and pilot should advise the crew of the status of the aircraft and the intended duration of the flight.

### SPOTTER DUTIES

Unnecessary delays should be avoided due to the critical nature of the flight profile. The only time there should be any delay is during the cargo deployment sequence. If there is to be a delay, the spotter should advise the pilot as to the amount of time needed to get the cargo on the ground and cut line.

See below for pilot and spotter actions during an in-flight emergency or situation that may be addressed through a delayed response.

*Table 6--2 Cargo Deployment Delayed Response Actions*

<b>PHASE OF LETDOWN</b>	<b>PILOT STATES</b>	<b>SPOTTER ACTION/RESPONSE</b>
Cargo secure	<b>“EXPEDITE, EXPEDITE”</b>	Close aircraft door, state <b>“CLEAR”</b> , take seat and fasten seat belt.
Cargo unsecure inside aircraft	<b>“EXPEDITE, EXPEDITE”</b>	Secure cargo, close aircraft door, state <b>“CLEAR”</b> , take seat and fasten seatbelt.
Cargo unsecure outside aircraft	<b>“EXPEDITE, EXPEDITE”</b>	Complete cargo deployment, <b>CUT LINE</b> , close door, state <b>“CLEAR”</b> , take seat and fasten seatbelt.

## Chapter 9. Hand Signals

The following standard hand signals shall be used:

### Thumbs-Up

Used by rappellers and spotters to indicate "I agree" or "I am OK" (FIGURE 9-1).

*Figure 9--1 Thumbs-Up Signal*



### Remove Seat Belt

Imitate removing lap belt – spotter gives signal to each rappeller (FIGURE 9-2).

*Figure 9--2 Remove Seat Belt Signal*



### **Move to Skid**

Hands clasped at chest level with elbows out - signal given by spotter to rappellers to direct movement to pre-rappel position (FIGURE 9-3).

*Figure 9--3 Move to Skid Signal*



### **Begin Descent**

Arms extended with open palms down, sweeping downward motion – signal given by spotter to rappellers directing rappellers to begin descent (FIGURE 9-4).

*Figure 9--4 Begin Descent Signal*



## 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 handle and further descent is not possible (FIGURE 9-5).

*Figure 9--5 Spread Eagle Signal*



## Begin ETO

Horizontal arm wave with outstretched arm – signal given by spotter to rappeller after rappeller has given spread eagle signal – signal indicates that rappeller should tie-off and cut rope below him/her and prepare to be lifted out (FIGURE 9-6).

*Figure 9--6 Begin ETO Signal*

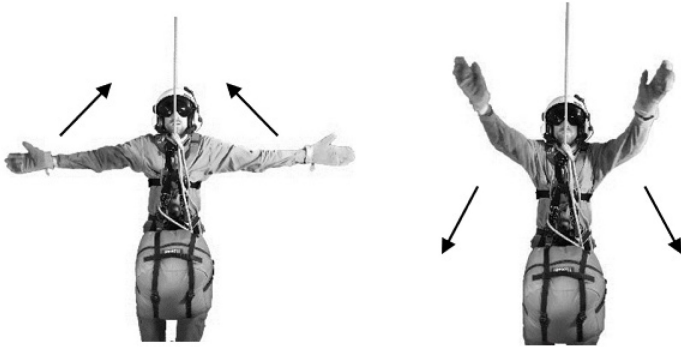




## Lift-Out

Upward motion with outstretched arms – signal given by rappeller to spotter to indicate that rope below rappeller has been cut and rappeller is ready to be lifted. Signal is given until rappeller and rope are raised above all surrounding obstacles (FIGURE 9-7).

*Figure 9--7 Lift-Out Signal*



## Clear to Fly Away

Both arms extended in 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. Rappeller then protects half hitches once in forward flight (FIGURE 9-8).

*Figure 9--8 Clear to Fly Away Signal*



## 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 (FIGURE 9-9).

*Figure 9--9 Bad Rope Signal*



## **Discontinue Rappel**

Slashing motion across throat with one arm – signal given by rappeller to spotter indicating bad rappel site, discontinue rappel (FIGURE 9-10).

*Figure 9--10 Discontinue Rappel Signal*



## **Knot**

Finger pointing down the rope – signal by spotter or rappeller indicating a knot in a deployed rope – this signal must be acknowledged by a head nod (FIGURE 9-11).

*Figure 9--11 Knot Signal*



## Return to Seat Belt

With arms extended and fists clenched, bring fists and elbows together— signal given by spotter to indicate rappeller(s) should return to seat and buckle seat belt (FIGURE 9-12).

*Figure 9--12 Return to Seat Belt Signal*



## Communication Lost

Single clenched fist – spotter will signal to the pilot the loss of communication with a shoulder tap and presentation of a single clenched fist. When ready to depart, spotter will signal to pilot with a shoulder tap and thumbs-up (FIGURE 9-13).

*Figure 9--13 Communication Lost Signal*





## Appendix B—Rappel Quality Assurance Review



The Standards for Rappel Operations—Appendix B is a checklist for programmatic evaluation and is part of a quality assurance program for Forest Service helicopter rappel operations.

# Chapter 1. National Rappel Operations Review Checklist

## 1.1 Introduction

The national aviation office in conjunction with regional representation will conduct an evaluation of helicopter rappel programs as part of the 2010 Rappel Quality Assurance(QA) Plan as outlined in the Rappel Program Strategic Risk Assessment Action Plan Response. All rappel programs should have adequate time, as acknowledged by the evaluators, to respond to the evaluation deficiency and to identify corrective action planned or already taken.

## 1.2 Purpose

The purpose of the rappel QA review is to ensure that all rappel programs are meeting the intent of the national standardization effort, abiding by the FS Standards for Rappel Operations (SFRO), and providing a quality assurance program. This information will also be utilized to provide a detailed report to the national aviation staff to ensure the quality assurance program is progressive, appropriate, and consistent with the mission of aerial delivery of personnel via helicopter.

## 1.3 Applicability

The format contained in the National Rappel Operations Checklist was developed by the national rappel specialist (NRS) with oversight provided by the national helicopter operations specialist (NHOS). This document may be revised or updated as needed or applicable.

The following items will be needed for the QA review.

*Table 1-1 Items Needed for QA Review*

1	Base Operations Plan	6	Rappel Equipment Records
2	Forest/Unit Aviation Plan	7	Base Organizational Chart
3	FS Standards for Rappel Operations	8	Fire Qualifications (IQCS overview)
4	Rappel Equipment Database (RapRec)	9	Rappel Aircraft
5	Rappeller/Spotter Training Records	10	Location for Rappel Ride-Along

## 1.4 Team composition

At a minimum, the team will consist of the national rappel specialist (NRS), rappel check spotter, and an additional rappel equipment subject matter expert. The Rappel QA Team will consist of individuals not associated with the program being reviewed. Additional team members may be added as needed.

## 1.5 Responsibility and Instruction for Completion

Aviation management at the national level is responsible for conducting the evaluation.

Completion of individual items is self-explanatory. The following is recommended as an overall approach:

- The rappel base manager should utilize the evaluation checklist to prepare for the visit by the team. It can also be used as a means of self-evaluation throughout the season.
- To cover the functional area in a reasonable amount of time, it is recommended that each member of the evaluation team cover a separate section of the functional area, with others on the team concurrently completing their assigned area.
- A closeout with local line officers, regional aviation members, and local fire management to review both deficiencies and positive aspects of the program is essential. A copy of the National Rappel Operations Review Checklist will be provided to the RAO, RHOS, and local line officer.
- A formal follow-up should be made to ensure corrective action has been taken to rectify deficiencies.
- Items marked with an asterisk are identified as not having a current standard. These items should not be rated, but information should be documented as to possibility of identified standards.

## 1.6 Routing and Filing:

Formal submission to the local line manager is essential, with follow-up reply from the local unit to ensure the corrective actions have been accomplished. Regional aviation management should keep past evaluations on file to ensure that items identified in previous visits have been addressed and are nonexistent in future evaluations.

## 1.7 Rappel Quality Assurance Review Checklist

Rappel Base: \_\_\_\_\_

Date of Review: \_\_\_\_\_

Location of Review: \_\_\_\_\_

Rappel Specialist and Team Lead: \_\_\_\_\_

Rappel Equipment Subject Matter Expert: \_\_\_\_\_

Rappel Check Spotter: \_\_\_\_\_

Additional Team Member: \_\_\_\_\_

Additional Team Member: \_\_\_\_\_

Additional Team Member: \_\_\_\_\_

Additional Team Member: \_\_\_\_\_

Review Code Key: E = Exceptional M = Meets Standard NI = Needs Improvement NR = Not Reviewed

### **PROGRAMMATIC EVALUATION CRITERIA**

*Evaluator: National Rappel Specialist (with QA team member as applicable)*

*Evaluate with: Base Manager, training manager, and one check spotter or spotter*

#### **N-1 Organizational Structure**

**Last Review Code:**

**Current Review Code:**

- Base manager name:
- Base managers' supervisor name:
- Review and obtain copy of base organizational chart
- Crew meets minimum crew size requirements per SFRO.
- Current crew size:
- Remarks:

#### **N-2 Qualifications**

**Last Review Code:**

**Current Review Code:**

- Obtain copy or review crew qualifications

- Program seeks opportunities for employee career development e.g., IMT involvement, details
- Obtain copy or review pilots interagency pilot card (ensure rappel sign-off)
- Remarks:

### N-3 Training

**Last Review Code:**

**Current Review Code:**

- Rappel and spotter currency standards are being met per SFRO
- Frequency of proficiencies:
- HERS maintaining HRAP currency:
- Program has access to typical-terrain proficiency rappel sites (local unit)
- Crew performs typical-terrain proficiencies (post rappel academy).
- Last typical terrain:
- Crew performs readiness drills, i.e., crash/rescue, medical, fire.
- Last readiness drill:
- Remarks:

### N-4 Mission Readiness

**Last Review Code:**

**Current Review Code:**

- Crew is committed to, and has a culture of physical fitness
- Fire-ready list is available (up-list/rotation board)
- Morning briefings are being conducted
- Program has a system in place that addresses boosters (check-in, briefing, rotation order)
- Remarks:

### N-5 Risk Management

**Last Review Code:**

**Current Review Code:**

- Risk assessments tools are being utilized, i.e., General Assessment of Risk (GAR)
- Spotters have documented Crew Resource Management Training (3.0 hour initial or 1.5-hour refresher).
- Remarks:



## N-6 Safety

**Last Review Code:**

**Current Review Code:**

- Program is adhering to work/rest guidelines
- SafeRap reporting system is accessible to all personnel
- SafeRap reports are available to all personnel (hard copy posted, and/or electronically available)
- Rappel-related Safety Alerts, Tech Tips, and Information Bulletins are hard- copy posted or e-filed
- Change blindness training is being conducted per SFRO standards
- Change blindness training controls in-place to ensure mis-rigged items are NOT used operationally
- Has the crew had any rappel or pack-out related injuries?
- Were CA-1s completed?
- Remarks:

## N-7 Reference Material

**Last Review Code:**

**Current Review Code:**

- SFRO available at base, and on support truck (hard-copy or downloaded electronic copy)
- Base Operations and Forest Aviation Plan(s) address rappel operations
- Remarks:

## **RAPPEL AIRCRAFT EVALUATION CRITERIA**

*Evaluator: Check Spotter*

*Evaluate with: Pilot, mechanic, and one spotter*

## N-8 Rappel Aircraft Safety and Performance

**Last Review Code:**

**Current Review Code:**

- Spotter is aware of aircraft weight and balance parameters
- Pilot has completed weight and balance calculations for various rappel configurations
- Remarks:

## **N-9 Rappel Bracket**

**Last Review Code:**

**Current Review Code:**

- ELAM installed, inspected, and documented by mechanic per applicable STC
- ELAM inspected daily by qualified rappel spotter
- Carabiners approved for human external load attached per SFRO standard
- Carabiners approved for cargo operations attached per SFRO standard
- Remarks:

## **N-10 Spotter Tether Anchor System**

**Last Review Code:**

**Current Review Code:**

- Ring/stud installed per ELAM STC
- ARS (18") installed per SFRO
- ARS has date stamp or tag. Life cycle 5 years from in-service, use from DOM if unknown
- Remarks:

## **N-11 Cargo**

**Last Review Code:**

**Current Review Code:**

- Cargo installed and secured with approved straps
- Life cycle 10-years from DOM
- Cargo netting, posts, and seats installed per SFRO/STC
- Figure 8s available, and meet inspection criteria
- Approved cargo lines available and securely stowed
- Remarks:

## **N-12 Rappeller Tether(s)**

**Last Review Code:**

**Current Review Code:**

- Inspected and logged annually
- Installed per SFRO
- Tagged with identifier, including date-of-manufacture

- Life cycle 5-years from in-service date, use from DOM if unknown
- Remarks:

### N-13 Surfaces

**Last Review Code:**

**Current Review Code:**

- Skid protectors installed per STC
- Flight step outer edges are smooth, preventing damage to ropes and cargo letdown lines
- Passenger cabin floor sill(s) are smooth, preventing damage to ropes and cargo letdown lines
- Remarks:

### N-14 Avionics

**Last Review Code:**

**Current Review Code:**

- Aircraft radios, ICS system, wireless drop cords (if applicable) are functioning properly
- Remarks:

## **RAPPEL EQUIPMENT EVALUATION CRITERIA**

*Evaluators: Equipment SME*

*Evaluate with: Equipment manager (or spotter) and two rappellers*

### N-15 Electronic Equipment Database (RapRec)

**Last Review Code:**

**Current Review Code:**

- System is accessible and updated
- (review with an individual with RapeRec access)
- Remarks:

### N-16 Individual Records

**Last Review Code:**

**Current Review Code:**

- Spotter Log is current and indicates proficiency status (review with one spotter)
- Rappeller Log is current and indicates proficiency status (review with two rappellers)
- Remarks:

### **N-17 Rappel Harness System**

**Last Review Code:**

**Current Review Code:**

- Within life cycle of 10-years from DOM for harness
- Tagged with identifier, including in-service date (manufacture tag may be used)
- User understands inspection criteria (review with two rappellers)
- Condition of rappel harness and carabiner (with lanyard pin) meet SFRO standard
- Raptor Knife attached to harness and inspected per standard (review w/ two rappellers)
- Confirm the Rappel Equipment Inspection Form is being kept and is up to date (w/ two rappellers)
- Remarks:

### **N-18 Rappeller Gear**

**Last Review Code:**

**Current Review Code:**

- Approved BD bag is in serviceable condition, contains minimum contents, and does not exceed 30 pounds
- Rappeller PPE is in serviceable condition (flight helmet, rappel gloves, eye protection, Nomex, boots)
- Rappeller can readily replace damaged or unserviceable equipment
- Remarks:

### **N-19 Spotter Harness System**

**Last Review Code:**

**Current Review Code:**

- Within life cycle of 10-years from DOM for harness and tether
- Tagged with identifier, including DOM (manufacture tag may be used)
- Spotter tether tagged with identifier, FS manufacture location, serial number, and DOM
- User understands inspection criteria (review with one spotter)
- Condition of spotter harness, and extendable tether meet SFRO standard

- Confirm that Rappel Equipment Inspection Form is being kept and up to date (with one spotter)
- Remarks:

## **N-20 Rappel Rope**

**Last Review Code:**

**Current Review Code:**

- Within life cycle of 5-years from in-service date or DOM if unknown
- Rope identified by length, serial #, DOM, (under termination protector), with ends marked A or B.
- User understands inspection criteria (review with two rappellers)
- Condition of rope meets SFRO/manufacture standards
- Rope bags are identified by: 250' orange, 300' yellow
- Ropes are stored in clean/dry area(s) with "OK" tags
- Confirm that Rappel Equipment Inspection Form is being kept and up to date
- Remarks:

## **N-21 Descender**

**Last Review Code:**

**Current Review Code:**

- Condition of descender meets SFRO/manufacture standards (life cycle is wear and functionality based)
- Factory serial number on cover is visible
- User understands inspection criteria (review with two rappellers)
- No-go gauges are available
- Descenders are stored in clean/dry/protective area (equipment case/locker)
- Confirm that Rappel Equipment Inspection Form is being kept and up to date
- Remarks:

## **N-22 Cargo Deployment Equipment (Hardware)**

**Last Review Code:**

**Current Review Code:**

- Approved cargo carabiners meet inspection criteria
- CMC Rescue 8 (aluminum or steel) meet SFRO/manufacture standards
- Remarks:

### **N-23 Cargo Deployment Equipment (Lines)**

**Last Review Code:**

**Current Review Code:**

- Within life cycle of 10-years from DOM
- Line tagged with identifier, labeled with unique base identifier, serial number, and DOM
- Lines clearly marked with black dye (25-foot section each end, 10-foot section in middle). Pre 2019, ok to have “contrasting” color
- Accordion Packs are identified by: 250' white w/ black seam tape, 300' white w/ yellow seam tape
- Packing and logging of line(s) meets SFRO standard
- Confirm that Rappel Equipment Inspection Form is being kept and up to date
- Remarks:

### **N-24 Cargo Deployment (Containers)**

**Last Review Code:**

**Current Review Code:**

- Cargo box harness within life cycle of 10-years from DOM
- Cargo loop within life cycle of 10-years from DOM
- Cubitainer Harness within life cycle of 10-yers of DOM
- All utilized cargo containers meet SFRO requirements
- Initial attack cargo container contains minimum contents
- Remarks:

## **RAPPEL OPERATIONS EVALUATION CRITERIA**

*Evaluators: Rappel check spotter (with QA team member assistance as needed)*

*Evaluate with: Pilot, rappel spotter and a load of rappellers w/cargo*

### **N-25 Mission Planning**

- Load calculations and manifests are complete, accurate, and posted
- Morning briefing conducted with crew/vendor staff (rollcall, fire weather, ready-list, SafeRap, SAFECOM)
- Pilot, mechanic, and driver available, on-site, and prepared to perform mission
- Weight and balance calculations are completed by pilot (if non-standard load is part of review)

- GAR completed (crew discusses and provides mitigation factors to items deemed high-risk)
- Remarks:

**N-26 Rappel Operation** *(Can be completed with proficiency or live operation rid-along)*

- Preflight Briefing
- Aircraft Configuration
- Rappel Rigging
- Boarding Sequence
- In-Flight Procedures
- Rappel Sequence
- Cargo Deployment
- Remarks:

## 1.8 Functional Area- Summary

- Review with manager, crew, and vendor as appropriate.
- Closeout with local firemanagement.
- Submit formal evaluation as soon as possible.

PROGRAMMATIC:

RAPPEL AIRCRAFT:

RAPPEL EQUIPEMENT:

RAPPEL OPERATIONS:

GENERAL REDINESS OF THE BASE:

ITEMS WHICH ARE DEFICIENT:







## Appendix C—New Base Startup and Timelines



The Standards for Rappel Operations—Appendix C provides the framework and timeline and necessary action for initiating new Forest Service helicopter rappel programs.

## Chapter 1. Rappel Capacity Request – New Base Start-Up

This appendix is intended to provide the framework of good communication and the expectations of a newly activated rappel program. A request is made with the *National Aviation Safety Management Plan, Aviation Proposal Template* to the Helicopter Operations Specialist Committee (HOSC). Additionally, the following elements must be provided in a briefing paper for clarity (electronic links to documents are acceptable).

- Proposed host base and location
- Proposed implementation date
- Facility infrastructure
- Regional fire and Aviation Management organizational chart
- Forest Fire and Aviation Management organizational chart
- Local Helitack/Aviation Program organizational chart
  - Provide list of current or expired rappellers/spotters to include years of operational experience and number of operational rappels/spots.
- Forest and regional aviation leadership staffing to support rappel and quality assurance.
- Ability to support the current/approved national rappel crew structure.
- Ability and willingness to support the national fire response effort. (crew/aircraft mobilization)
- Ability and willingness to support administrative functions (i.e., annual meetings, rappel subcommittee meetings, task groups, etc.)
- Ability and willingness to support national training events (i.e., facilities to host a training event, attend out of area training events)
- Most recent regional quality assurance review of proposed host base, i.e., Helibase Review

### 1.1 New Base Startup Timeline

There are two pathways to activation:

- 1) No experience within the crew organization which would follow the outlined two-year activation plan.
- 2) A crew with previous experience could be reviewed by the National Rappel Working Team (NRWT) and the Rappel Operations Subcommittee (ROS), and an individual activation plan may be allocated for the specific needs of that crew allowing for an accelerated activation period.

#### Two-Year Activation Plan

##### Year Prior to Activation

**Fall:** Requests are due to the HOSC by the November monthly meeting, to be then forwarded to the National Aviation Officer Council.

Example= November 2025 request is submitted; activation could occur in 2027.

Participate in the fall rappel meeting as determined by the NRS.

**Winter:** Requests are processed, and selections are completed. Regions requesting rappel activation will be formally notified of approval or disapproval by the AD Aviation or delegate.

Crew points of contact (POCs) are established for new startup programs. POCs should be a higher supervision leader in a program, preferably an identified spotter candidate. This person will be made known to the National Rappel Specialist (NRS) upon notification of the crew's activation approval. POCs are established one year prior to activation to provide a direct coordination link between the NRS and the new startup program(s).

Upon notification of activation approval, startup programs are responsible for managing the following:

- Notification by the National Helicopter Program Manager (NHPM) to the Contracting Officer (CO) of additional contract requirements of the rappel mission, if applicable.
- Participation on monthly rappel conference calls once established.
- Development of facility and other program support needs (if previously identified in activation request).
- Shadowing an active Forest Service Rappel program for at least one week for mission familiarization prior to program startup.

**April-October:**

- Commit crew members to participate in operational roles (i.e., HMGB, HEBM, DECK, ABRO, EMT, etc.) in support of the National Rappel Program during annual rappel trainings to network, garner information and situational awareness of the operation.
- Full season details should be considered as an option to obtain the desired exposure if possible.
- Commit at least two HMGB and ICT4 qualified employees to complete initial rappel training and boost rappel crews throughout the nation to garner rappel experience with the intent to complete four operational rappels and at least three assignments (~42 shifts) with multiple crews. These individuals should be identified as Helicopter Spotter Trainee Candidates for the following year's Spotter Immersion Training.
- Commit at least two crew members to complete initial rappel training and boost rappel crews throughout the nation to garner rappel experience and at least four assignments (~56 shifts) with multiple crews.
- Commit a crew supervisor to participate in a Rappel Quality Assurance Review as an observer.

**October-December:** Programs and their POCs are expected to:

- Participate in the fall rappel meeting.
- Recruit and fill crew positions while managing SFRO requirements for potential qualified spotters, spotter trainees, and recommended program size.
- Be notified of consolidated training venue location and dates as developed during the Fall Rappel meeting.

- Continue to work through staffing requirements, including additional funding requests (if previously identified in activation request) to meet the approved National Rappel Crew Structure.
- Ensure qualification and training requirements will be met as identified in SFRO.
- Continue to acquire rappel related equipment per Chapter 4, Rappel and Cargo Letdown Equipment in the current SFRO.

## 1.2 Activation Year

**January:** During the activation year, startup programs and their POCs are expected to:

- Continue to work toward activation activities as previously identified.
- Work with NHPM and CO to monitor helicopter vendor progress towards meeting all agency contract and SFRO requirements.

**Spring Prior to Activation Date:**

- Startup programs will participate in a New Activation pre-season Quality Assurance Review prior to rappel training. This will be conducted in accordance with the US Forest Service National Rappel Quality Assurance Plan consisting of the evaluation of:
  - Helicopter solicitation award and status.
  - Base ops plan reflecting SFRO QA requirements are complete.
  - Verification of Regional and Forest organizations per SFRO QA requirements; mitigation plan required for any current or anticipated organizational vacancies.
  - Review of the Regional and Forest response to Selected Risk Factors as provided by the NRS.
  - Verification that rappel-related equipment is received, configured, identified (labeled) and documented in accordance with SFRO.

**Activation:** Successful activation is contingent upon the following:

- Helicopter vendor pilots and aircraft shall attend a consolidated rappel training venue. Pilots will receive a rappel evaluation at that time.
- Completion of the mid-season quality assurance review Utilizing Appendix B Rappel Base Quality Assurance Review. This date will be determined by the National Rappel Specialist in coordination with crew.

**End of Year Reporting-** In addition to the National Helitack Data Questionnaire, base managers will be responsible for completion of an additional set of rappel specific questions. Contact the NRS prior to rappel training to obtain the current list of questions.



## Appendix D—Equipment, Procurement, Development, Evaluation Protocols, and Irregularities



The Standards for Rappel Operations, Appendix D — Equipment, Procurement, Development, Evaluation Protocols, and Irregularities describes the proposal process, development, evaluation procedures and responsibilities for introducing new equipment and procedures into the Standards for Rappel Operations, and it describes equipment irregularity reporting protocols.

# Chapter 1. Appendix D—Equipment, Procurement, Development, Evaluation Protocols, and Irregularities

## 1.1 New Equipment and Procedures Proposal Process

The Rappel Operations Subcommittee (ROS) evaluates new proposals for helicopter rappel equipment and procedures and makes the initial recommendation to the National Rappel Working Team (NRWT) as to whether a given proposal merits a formal evaluation.

New proposals for improved helicopter rappel equipment or procedures may come from field users and should be passed to their supervisor who will forward to the National Rappel Specialist (NRS). The NRS will then present the proposal to the ROS.

If a proposal is judged by the ROS to be worthy of a formal evaluation, the NRS will notify the NRWT chairperson and submit a formal proposal. The NRWT shall then consider the proposal based upon the ROS's recommendations.

If the NRWT concurs with the ROS recommendation, the NRWT chairperson will contact the appropriate technical specialist to develop a plan for technical evaluation of the proposed equipment or procedure. In the case of new equipment, the National Technology and Development Program (NTDP) rappel equipment specialist is the primary point-of-contact for development and evaluation.

New proposals for equipment or procedures shall be documented. Based on the significance of the changes, revision of the SFRO may be warranted.

## 1.2 Development and Evaluation Process Responsibilities

### 1.2.1 National Rappel Working Team

The NRWT is responsible for oversight, direction and approval of all Forest Service helicopter rappel and cargo letdown equipment, procedures, training, and operations.

To ensure that the NRWT decisions on helicopter rappel equipment, cargo letdown equipment, or procedures reflect applicable technical and safety standards, the rappel equipment specialist from NTDP may be invited as needed to participate in any NRWT meetings, conference calls, and communications as a non-voting member and technical advisor. To ensure that the NRWT considers operational issues related to proposed helicopter rappel equipment and procedures, it may be necessary to involve the ROS as an advisory group.

### 1.2.2 Rappel Operations Subcommittee (ROS)

The primary responsibility of the ROS is to provide the NRWT with sound and timely advice on all issues related to helicopter rappel equipment and procedures.

To ensure that the ROS recommendations for revisions to helicopter rappel equipment and or procedures reflects applicable technical and safety standards, the NTDP rappel equipment

specialist may participate as needed in ROS meetings, conference calls, and communications as a technical advisor.

The ROS is authorized by the NRWT to perform evaluations of any issue related to helicopter rappel equipment and procedures if the evaluation does not require personnel to be exposed to helicopter-related hazards or fall hazards.

The ROS will assign one member to lead each evaluation and report the results in writing back to the other ROS members. In some cases, the NTDP rappel equipment specialist may be assigned to lead such evaluations. The ROS chairperson is responsible for reporting the results of each evaluation to the chairperson of the NRWT.

After receiving such input from the ROS, the NRWT chairperson is responsible for disseminating the information to other NRWT members for review and for tracking the progress of the proposed change. The NRWT is responsible for making the final determination on any issue that might result in an alteration of current helicopter rappel equipment and procedures.

When an evaluation cannot be accomplished without exposing personnel to helicopter related or fall hazards, the ROS must be specifically and formally authorized to perform the evaluation by the NRWT. The authorization for conducting potentially hazardous evaluations will be in the form of a formal electronic letter under the NRWT letterhead sent from the NRWT chairperson to the ROS chairperson.

Once an authorization for conducting a potentially hazardous evaluation is received, the ROS chairperson will convene a meeting or conference call with all ROS members to determine who will be responsible for leading and conducting the evaluation, and to develop an action plan and schedule. In addition to the other responsibilities as outlined above, the person assigned to lead the evaluation will develop a Job Hazard Analysis.

### 1.2.3 Technical Specialists

Equipment and procedure development or evaluations generally rely upon collaboration with several specialists who have technical expertise related to the concern or initiative. Technical specialists include, but are not limited to, the NTDP rappel equipment specialist, national aeronautical engineer, national helicopter inspector pilot/program manager, and national aviation maintenance inspector.

Because NTDP has a designated role in the USDA Forest Service Washington Office Engineering Program to evaluate, design and test equipment used in Forest Service Fire and Aviation operations, the NTDP rappel equipment specialist will often be the primary technical specialist and lead on most Forest Service helicopter rappel equipment endeavors.

The chairperson of the NRWT is responsible for keeping the NTDP rappel project leader or appropriate technical specialist(s) informed on issues related to rappel equipment and procedures, and for negotiating the assignment of new tasks that may impact the technical specialist's program of work.



When the NRWT identifies a need for new or improved helicopter rappel equipment, the chairperson of the NRWT will notify the NTDP rappel equipment specialist or appropriate technical specialist. Upon receiving said notification, the rappel equipment specialist, or other technical specialist(s) and NRWT chairperson will jointly develop a formal tasking that includes a statement of work and projected timeline for completion. Once details of the tasking have been agreed upon, the NRWT chairperson will issue a formal tasking via a letter under NRWT letterhead.

#### 1.2.4 Workload Prioritization

The urgency and complexity of the requested task will dictate whether the task may be simply added to the technical specialist's existing work list or if the task will require a re-prioritization of the existing program of work. If an urgent need to accomplish a given task delays the accomplishment of other tasks in the program of work, the projected timelines on delayed tasks must be adjusted accordingly. The NRWT will collaborate with the technical specialist in re-prioritizing workloads.

If the funds required to accomplish specialty tasks are above what has been allotted to the rappel budget, the technical specialist will present the estimate to the NRWT chairperson. It then becomes the NRWT chairperson's responsibility to procure funding for the specialty project.

### 1.3 Rappel Equipment Irregularity and Reporting Protocols

1. If a piece of equipment used in rappel or cargo letdown operations presents a potential safety issue or is suspected to have contributed to a rappel accident or incident with potential, the equipment shall be immediately sequestered and removed from service.
2. The individual who identifies the issue will inform their base manager (ROS member) and complete a SAFERAP as soon as possible. If the incident or observation has the potential to cause harm to other individuals, the ROS member shall immediately notify the national rappel specialist (NRWT chairperson) and NTDP rappel equipment specialist.
3. The NRWT will make an assessment about the nature of the problem and determine whether it might pose an immediate or potential safety hazard. The NRWT is responsible for notifying all agency rappel users of known or suspected problems involving rappel or cargo letdown equipment.
4. The NRWT chairperson shall notify other agencies also conducting rappel operations of the issue or incident if the same equipment is being utilized.
5. NRWT members shall notify their respective regional aviation safety manager.
6. Any rappel equipment item that has been identified as anomalous, of questionable condition, or has contributed to an accident or incident will be sent to the NTDP rappel

equipment specialist for examination and testing as soon as possible. In such cases, the rappel equipment specialist will perform a technical evaluation and report back to the NRWT chairperson as soon as practical.

7. Based upon the findings of the equipment testing, the NRWT, with collaboration from the ROS and NTDP rappel equipment specialist, shall communicate those findings to the field units along with recommendations or direction.



## Appendix E—Specified Equipment Attachment Standards



The Standards for Rappel Operations—Appendix E describes the technical equipment attachment procedures required for Forest Service Helicopter Rappel Operations

## 1.1 Equipment Attachment Methods

### 1.1.1 Attaching BD Bag Click Lock Buckle Adapter to Rappel Harness

1. Position buckle adaptor (MTDC-1023) over harness between webbing bridge and leg buckle (FIGURE E-1). Ensure adapter buckle is correctly oriented.
2. Route adapter buckle through webbing loop (FIGURE E-2).
3. Complete installation by dressing webbing as shown (FIGURE E-3).
4. Tacking or other fasteners are not needed to keep the buckle in the correct location.

*Figure E- 1, E-2*



*Figure E- 3*



### 1.1.2 Attaching Click Lock Buckles to BD Bag

1. Place a mark on both BD bag compression straps, 6 ½” below the top of the main back panel (Figure E-4).

*Figure E-4*



2. Fold 4 ½” webbing strap (provided) to create a ½” overlap. Then fold overlapped webbing under to cover cut edge (FIGURE E-5). Grasp with forceps. Note orientation of click lock buckle.

*Figure E-5*



3. Align the folded webbing with the reference mark made in step 1, then orient the buckle facing the top of the BD bag with the ½” fold (from step 2) against the compression strap.

Place three  $\frac{3}{4}$ " bar tacks  $\frac{1}{4}$ " apart beginning  $\frac{1}{8}$ " from the folded edge as shown in FIGURE E-6.

*Figure E- 6*



4. Repeat the process for the other side. Check connection with rappel harness to ensure proper buckle orientation.

### 1.1.3 Attaching Rappel Spotter Extendable Tether (NTDP-1132) to Miller Revolution Harness

1. Insert the free end of tether through the adjuster as shown. Pass end of tether through underside of harness ring (FIGURE E-7).

*Figure E- 7*



- 2.
3. Pass tether end through harness D ring and back through adjuster (FIGURE E-8)

*Figure E- 8*



4. Adjust for the proper tether length (27"), then fold the free end back over the bottombar of adjuster and under top bar of adjuster. Secure the loose end utilizing the techniques on the following pages:

- a. Using nylon super tack cord and a large gauge needle, pass needle down through locking tab and the outer webbing of the adjustment loop, then back up through both webbing layers (FIGURE E-9 and E-10).

*Figure E-9*



*Figure E-10*





- b. Bring the double ends of super tack cord together and tie a surgeon's knot in the center. Trim the ends leaving about 1/2" tails (FIGURE E-11).

Figure E- 11



- c. OR secure the loose end tab to the webbing with a 1/4" bar tack located 1" from the adjuster (FIGURE E-12)

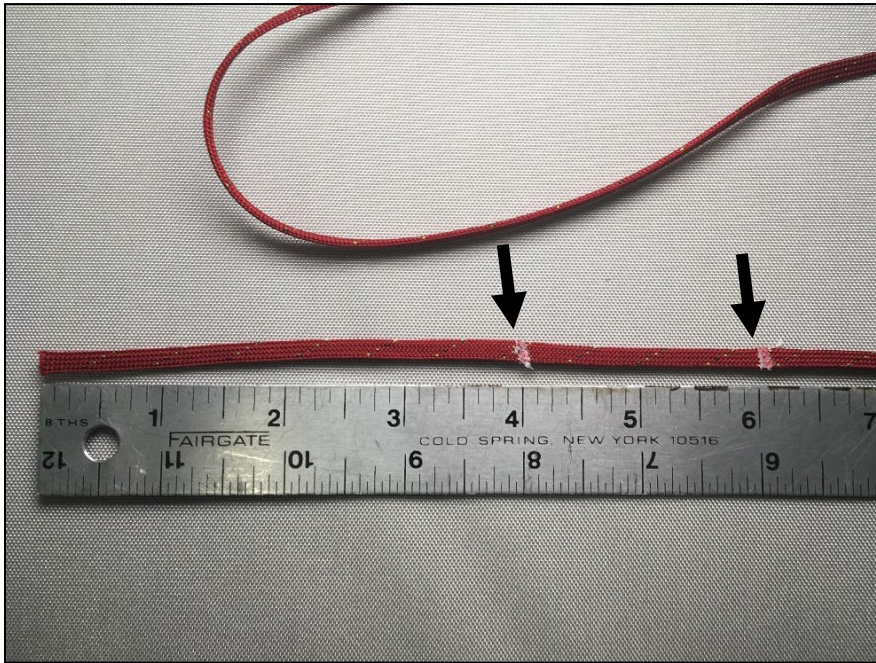
Figure E- 12



### 1.1.4 Rappeller Knife and Sheath Installation

1. Route rappeller knife tether through knife handle and mark tether at 4" and 6" from the free end (FIGURE E-13).

Figure E- 13



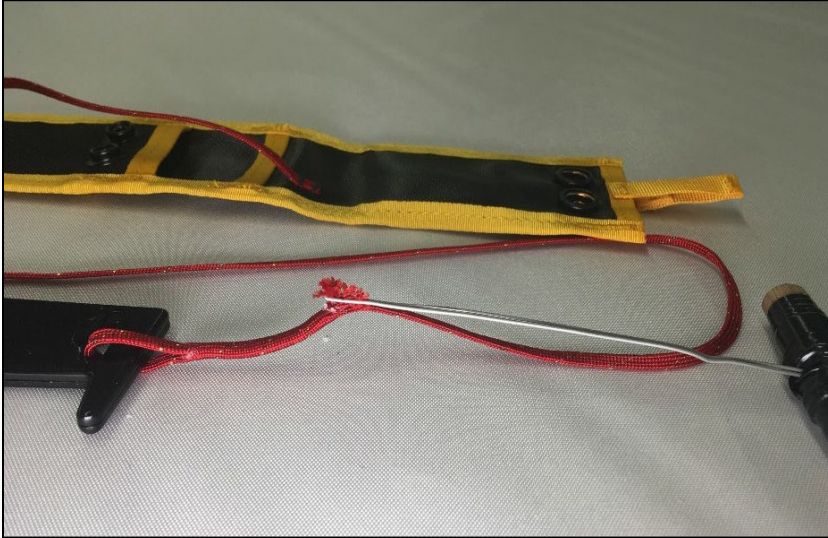
2. Route fid as shown, entering and exiting the cord at the marks created in step 1 (FIGURE E-14).

Figure E- 14



3. Pull cord with fid to create fingertrap (FIGURE E-15). Place a  $\frac{3}{4}$ " bar tack (or straight stitch) in cord to create a 1" loop around knife handle (Figure E-16)

*Figure E- 15*

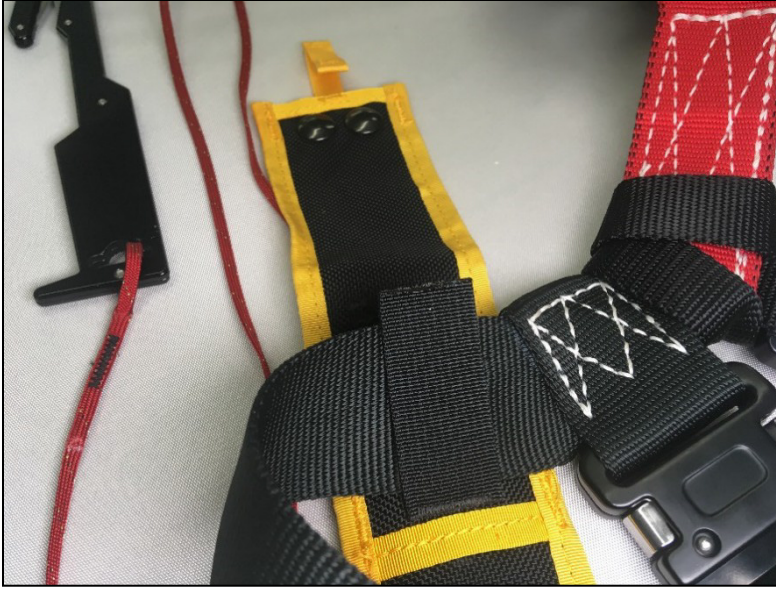


*Figure E- 16*



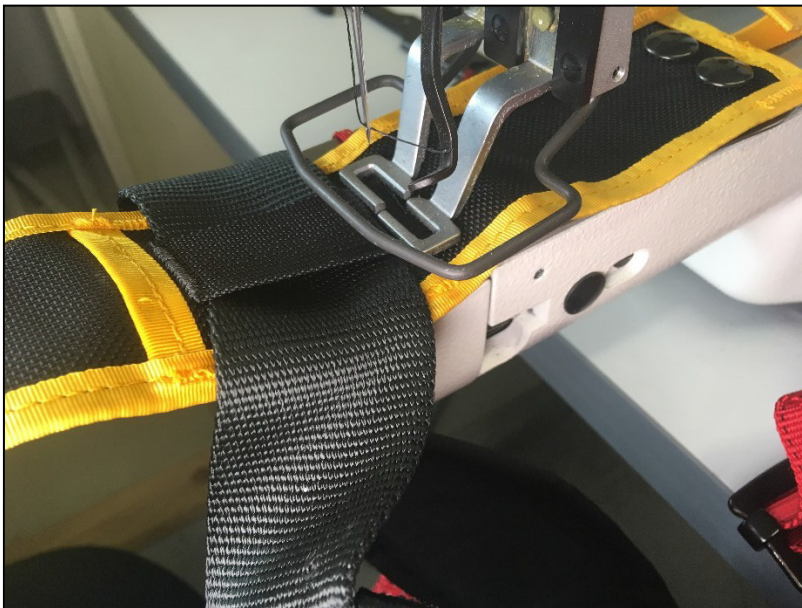
1. The rappeller version of the knife sheath comes with one end of the “belt loop” already attached. It is acceptable to use either a standard industrial type sewing machine (four passes with FF) or a bar tack machine to complete this attachment. Locate the installation location on rappel harness on the left side between the legstrap pad and leg strap connecting buckle (Figure E-17).

*Figure E- 17*



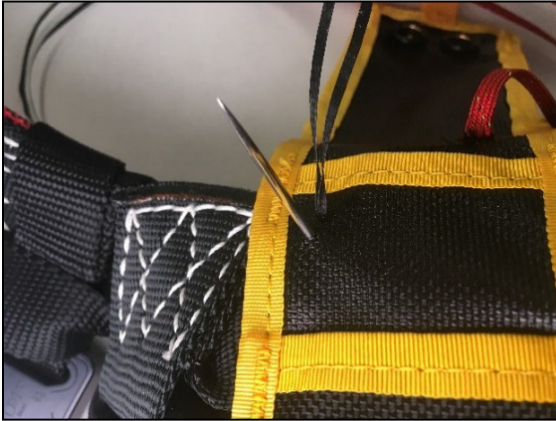
2. Place the 1” webbing “belt loop” over the 1 ¾” harness webbing and sew 1” webbing belt loop to the back side of the sheath above the top of lanyard pouch **DO NOT SEW TO HARNESS WEBBING.** (FIGURE E-18)

*Figure E- 18*



3. Locate the knife as close to the leg buckle as possible and secure in place using super tack cord. Pass the needle through the knife sheath and harness leg webbing then back through about ¼” apart (FIGURE E-19). Complete the tacking by tying a surgeon’s knot and trimming the tails to about ½” (FIGURE E-20).

*Figure E- 19*



*Figure E- 20*



4. Complete the installation by stowing the lanyard in the lanyard pocket with the knife properly oriented and securing the snaps.

### 1.1.5 Spotter Knife and Sheath Attachment

1. Attach the knife to the sheath by routing the lanyard as shown in FIGURE F-21 and placing 2 bar tacks or lock stitches (1/2" long, FF thread), attaching the lanyard cord to the knife and sheath closure tab. Note the knife orientation (FIGURE E-21).

*Figure E- 21*



1. Locate spotter knife installation location on left shoulder strap of spotter harness.
2. Handle should face downward. (FIGURE E-22)

*Figure E- 22*



3. Place  $\frac{3}{4}$ " bar tacks (or lock stitch, FF thread) at each webbing loop to complete "belt loop" attachments (FIGURE E-23). Do not sew through harness webbing.

*Figure E- 23*



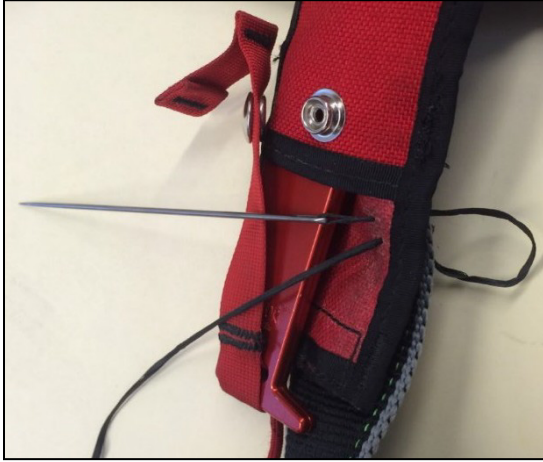
4. It may be necessary to tack the knife sheath to the harness shoulder strap. After adjusting the harness for proper fit, use nylon super tack and a large needle to tack the sheath to the harness. Pass the needle through both the sheath and harness webbing, then back through about  $\frac{1}{4}$ " apart. Finish the installation by tying a surgeon's knot.

*Figure E- 24*



5. Remove the lanyard cord prior to tacking, to ensure it is not tacked in place (FIGURE E-24 and E-25).

*Figure E- 25*

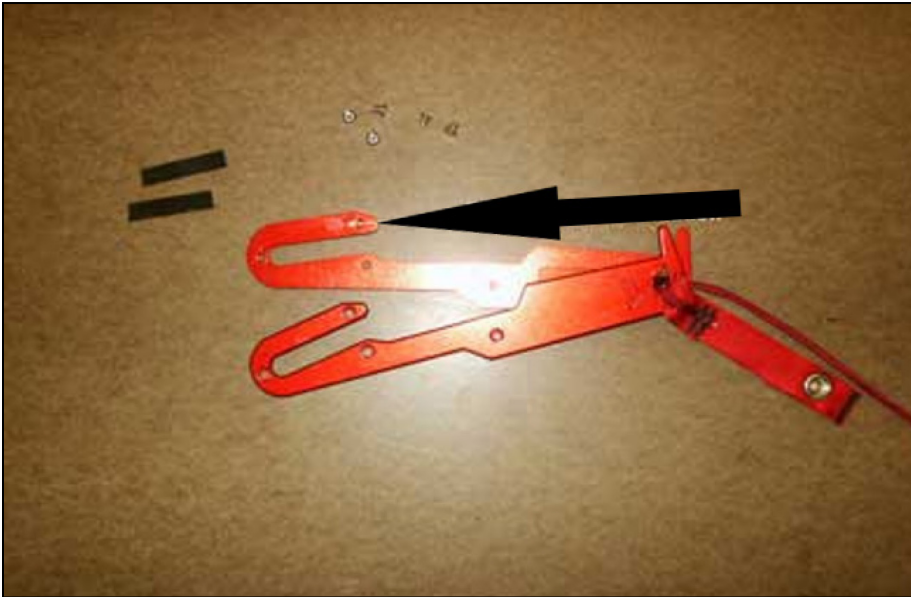




### 1.1.6 Emergency knife blade replacement

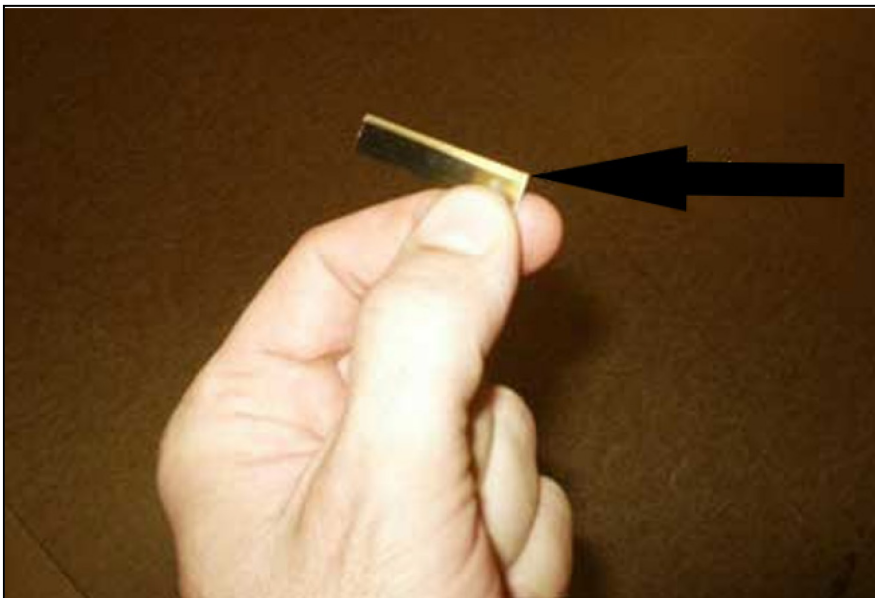
1. Use a Philips screwdriver to remove the 5 screws. It is not necessary to remove the lanyard/webbing when changing blades.
2. Separate the two halves and remove old blades. Note the rectangular blade locator indentations on the inside of each half of the knife frame (Figure E-26).

*Figure E- 26*



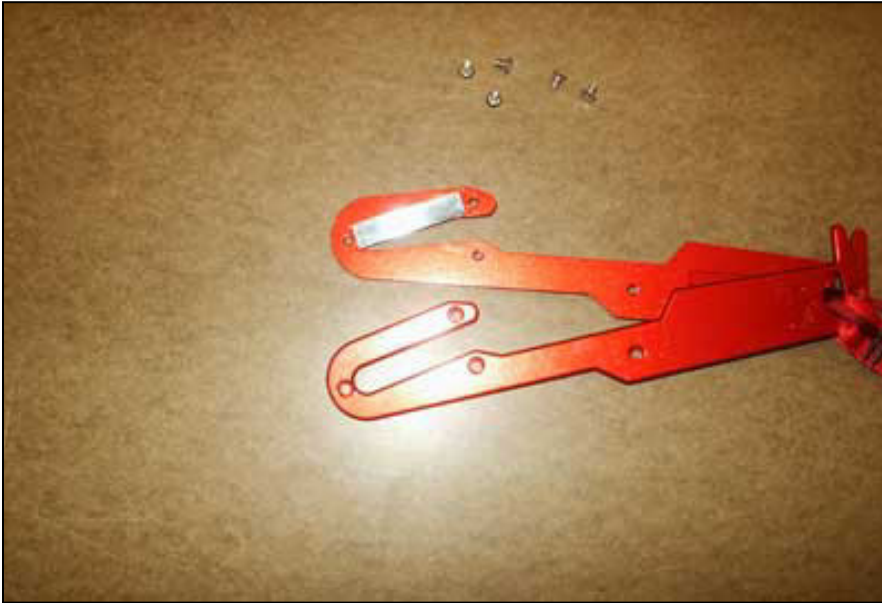
3. The Raptor blades have a bevel on one side. The blades must be placed correctly in the locator indentations, with the beveled side overlapping in the center (FIGURE E-27).

*Figure E- 27*



5. Replace the blade in the bottom section first. Place the new blade beveled side down, cutting edge facing the center of hook, in the locator indentation (FIGURE E-28).

*Figure E- 28*



6. Carefully lift upper half, place new blade in locator indentation on upper half, beveled side up, cutting edge toward center of hook. Temporarily hold blade in place with thumb (FIGURE E-29).

*Figure E- 29*



7. Continue holding upper blade in place with thumb, move both knife ends to tableedge. Carefully clamp the two halves together as shown. The upper blade will be temporarily held in place between the two frame halves (FIGURE E-30).

*Figure E-30*



8. Align the two knife halves, ensuring that the upper blade remains in correct position by maintaining slight downward pressure on the upper frame half (FIGURE E-31).

*Figure E-31*



9. Hold frame halves together until screws have been inserted and tightened. Recheck blades to ensure correct placement (FIGURE E-32).

*Figure E- 32*





## Appendix F—Rappel Risk Management for Fire Missions



The Standards for Rappel Operations—Appendix F is a supplemental risk management process for rappel helicopter crews.

IMPORTANT NOTE: The use of this appendix is not mandatory. It is intended to be used as a supplement to other risk management training tools.

## 1.1 Preflight, In-Flight, Arrival and Size-Up

### 1.1.1 Preflight

1. Pre-flight helicopter checks completed by pilot.
2. Load calculation for destination elevation and temperature completed by pilot and reviewed by spotter.
3. Flight hazard map checked by pilot and spotter for aerial hazards on flight route and at destination.
4. Weather forecast and fire indices reviewed by pilot, spotter and rappellers.
5. Thunderstorms and strong winds such as those associated with a cold front can create hazardous conditions for landing/rappelling and increase fire behavior.
6. Winds blowing perpendicular to ridges or across geographical prominences can increase lee-side turbulence and should dictate extra caution in landing/rappel site selection.
7. Spotter and rappellers should review pocket card for representative fuel type and conditions.
8. High or extreme fire behavior indices should indicate extra caution in landing/rappel site selection.

### 1.1.2 Decision Point 1

**Before departure the spotter must consider the environmental and operational factors and local unit recommendations that influence departing the base of operations configured or equipped.**

1. Cargo secured and checked by spotter.
  - a. Ropes rigged and checked by spotter. (If not rappel ready, instead check to ensure that rappel gear is on board helicopter and secured.)
  - b. Rappeller checks completed by spotter. (If not rappel ready, skip this step.)

### 1.1.3 En Route to Destination

1. Establish & maintain positive flight following.
2. Pilot, spotter and rappellers practice in-flight CRM.
3. Any observed aircraft or potential problems should immediately be communicated to the pilot by intercom.
4. Ensure maximum crew participation in searching for and calling out any aerial hazard.

5. Any of the below conditions may be an indicator of hazardous landing, rappelling, or firefighting conditions. Pilot and spotter should look for weather and wind signs that could indicate turbulence or downward movement of air at the destination.
6. A good indicator on fires is the smoke column; is it shifting direction, laying horizontal or blowing downhill? Is it plume dominated?
7. Are there thunderstorms in the area?
8. Is there increased turbulence when flying on the lee side of ridges or geographical prominences?

#### 1.1.4 Arrival on scene

1. Check airspace for other aircraft before approaching fire area.
2. Establish & maintain positive ICS with pilot & IC/RIC.
3. Inform dispatch of arrival.
4. Conduct high-level recon prior to transition to low-level recon.
5. Look for wires, cables, utility poles. Smoke and poor lighting conditions can make it harder to see wires. Small gauge wires may be difficult to see at any distance. If first entry into area, assume there are wires until proven otherwise.
6. Fire size-up
  - a. Fire size?
  - b. Position on slope?
  - c. Fire actively spreading?
  - d. Available fuels to allow fire growth?
  - e. Potential for rapid fire growth due to weather, low fuel moisture, slope, or aspect?
7. Identify safety zone(s) and potential escape routes near fire or within burned area. Use guidelines from page 7 of Incident Response Pocket Guide.
  - a. Before a burned area can be designated as a potential safety zone:
    - i. Most light fuels, including brush (if present), must have been consumed.
    - ii. The burned area must have cooled sufficiently to permit human occupation without excessive heat exposure.
    - iii. Smoke conditions in burned area must not exceed normal tolerable levels.
8. Identify helicopter landing site(s) near fire (if any).
  - a. Pilot and spotter confirm elevation and temperature, to assure payload is within load calculation parameters.

- b. If uncertain about whether site is in ground effect or out of ground effect, assume site is out of ground until proven otherwise.
9. If needed, identify potential rappel sites near fire.
    - a. Pilot and spotter confirm elevation and temperature, to assure payload is within load calculation OGE parameters.

## 1.2 Deployment

### 1.2.1 Decision Point 2

#### **Off-site landing area near fire, rapid engagement possible without helicopter or firefighters being exposed to unacceptable hazard from fire behavior:**

Land helicopter and deploy firefighters unless micrometeorological conditions indicate marginal landing conditions at site. Consider that lee side winds/turbulence can negatively affect helicopter performance.

- Off-site landings carry an elevated degree of risk; site should be carefully evaluated prior to landing approach to confirm suitability as safe landing site. Pilot and spotter should mutually agree on suitability of site.
- Consider an HOGE high hover power check prior to landing at an altitude comparable to the site or greater. A positive rate of climb must be established without exceeding aircraft limitations.
- Dispatch should be contacted prior to landing to inform them of upcoming landing and location.
- Flight crew should continue to look for wires and other hazards until helicopter has landed.
- Rotor wash can cause snags to fall; if snags next to proposed landing site could potentially impact landing site, extreme caution should be used, or an alternate site selected.
- Main and tail rotors must maintain adequate safety margin from rocks, brush, and trees on approach route, in landing area, and on departure route
- Landing pad must be free of objects than could impact underside of fuselage
- Landing pad must be large enough for skids/wheels and not excessively sloped
- Dusty landing sites can produce brownout conditions, carefully evaluate and approach potentially dusty areas with caution



### 1.2.2 Decision Point 3

#### **No landing site immediately adjacent to fire.**

If fire has minimal chance of fire spread and is not an immediate threat to firefighters, consider alternate landing sites an increased distance from fire.

- Can aircraft remain on scene while firefighters approach incident? If not, consider having the aircraft fly a bearing from the location of firefighters to the fire to ensure firefighters know where the fire is.
- If near end of day, will firefighters be able to reach the fire before dark? If not, rappel may be preferred option.
- Can you shorten hiking time and minimize depletion of firefighter energy reserves by using cargo letdown to deploy cargo near fire?

**IMPORTANT NOTE:** If option to land at site adjacent to fire is not available, fire potential indicates need for rappel.

If helicopter and rappellers are rappel equipped, go to Decision Point 4 if rappel configured, skip Decision Point 4, and go directly to Decision Point 5

### 1.2.3 Decision Point 4

#### **Off-site landing that requires reconfiguring for rappel mission.**

If distance/terrain/fire behavior makes it unsafe or unfeasible for firefighters to hike from potential landing site(s) to fire, find landing site a safe distance from fire to rig for rappel.

Off-site landings carry an elevated degree of risk; site should be carefully evaluated prior to landing approach to confirm suitability as safe landing site.

- Conduct high-level recon prior to transition to low-level recon. Look for wires, cables, and telephone/power poles. Smoke and poor lighting conditions can make it harder to see wires. Small gauge wires may be difficult to see at any distance. If first entry into area, assume there are wires until proven otherwise.
- Do not land helicopter if micrometeorological conditions indicate marginal landing conditions at site. Consider that lee side winds/turbulence can negatively affect helicopter performance.
- Consider an OGE high hover power check prior to landing at an altitude comparable to the site or greater. A positive rate of climb must be established without exceeding aircraft limitations.
- Dispatch should be contacted prior to landing to inform them of upcoming landing and location.

- Flight crew should continue to look for other aircraft, wires, and other hazards until helicopter has landed.
- Rotor wash can cause snags to fall; if snags next to proposed landing site could potentially impact landing site, consider other sites.
- Main & tail rotors must maintain adequate distance from rocks, brush, and trees on approach route, in landing area, and on departure route.
- Landing pad must be free of objects that could impact underside of fuselage. Landing pad must be large enough for skids and not excessively sloped.
- Dusty landing sites can produce brownout conditions; carefully evaluate and approach potentially dusty areas with caution.

Once on the ground, rappellers and spotter reconfigure helicopter and cargo for rappel.

- If the pilot and spotter decide not to shut down while configuring for rappel mission, the pilot must remain at the controls.
- The spotter and rappellers must be cognizant of the main and tail rotors while reconfiguring and rigging for the rappel mission. Flight helmets and PPE must be always worn if rotors are turning.
- Crewmembers should not rush or cut corners while reconfiguring and rigging because rotors are turning or because they are concerned about the fire increasing in size while they are absent.
- Ropes are rigged and checked by spotter.
- Cargo secured and checked by spotter.
- Rappellers and spotters put on harnesses and rappel gear. Rappellers complete buddy checks.
- Spotter performs pre-flight walk-around check of helicopter and landing site before completing rappeller checks.
- Rappeller checks completed by spotter. Conduct last review with pilot and rappellers to ensure nothing has been overlooked and everything is ready to go.
- Establish and maintain positive ICS with pilot & rappellers. Dispatch should be notified of departure from off-site landing area and arrival back at fire.

Upon arrival back at the fire, check for other aircraft in fire area. Spotter, pilot, and IC should re-evaluate fire and planned rappel site to determine if fire and micrometeorological conditions have changed significantly during time away from fire. If previous assessment is no longer valid, conduct new fire behavior/rappel risk assessment. If previous assessment is still valid and rappel can be conducted safely, go to Decision Point 5.

## 1.2.4 Decision Point 5

### **Ridge top rappel site available above fire allows for possible rapid engagement without firefighters being exposed to undue hazard from fire behavior.**

Rappelling carries an elevated degree of risk; site should be carefully evaluated prior to final approach to confirm suitability as safe rappel site.

- Conduct a HOGE high hover power check prior to rappelling at an altitude comparable to the site or greater. A positive rate of climb must be established without exceeding aircraft limitations.
- Take into consideration that it is often easier to maintain a stable hover on a ridge top than on a hillside or in drainage.

Pilot and spotter select rappel site. An alternate emergency site should also be selected in the event a rappeller has to perform an emergency tie-off.

- Rotor wash can cause snags to fall; if snags next to proposed rappel site could potentially impact area where ropes or cargo letdown line would be deployed, extreme caution should be used.
- Dispatch should be contacted prior to rappelling to inform them of upcoming rappel and GPS coordinates if needed. Radio volume should be turned down during the rappel sequence.
- If there are firefighters already on the ground, establish communications before proceeding. Spotter should advise firefighters to remain away from rappel site and to not interfere or attempt to help until rappellers and cargo are on the ground and helicopter departs.
- Main & tail rotor must maintain adequate safety clearance from terrain or trees.
- Before ropes and rappellers are deployed, the spotter and pilot should reconfirm that hover is stable and power is still good. Pilot can elect to re-establish forward flight if aircraft performance indicators are marginal.
  - If pilot has difficulty establishing or maintaining a stable hover before ropes are deployed, pilot should inform spotter of need to re-establish forward flight. Pilot and spotter should jointly re-evaluate proposed rappel site and micrometeorological conditions, re-entry into same site should occur only if conditions substantially improve.

**IMPORTANT NOTE:** See Appendix A, Chapter 8 of the SFRO for Rappel and Cargo Operations Emergency Procedures.

### 1.2.5 Decision Point 6

**Rappel site available nearby but located above fire; fuel and weather conditions may create unacceptable hazard to firefighters.**

Rappel beside or below fire unless micrometeorological conditions indicate potential marginal hover conditions at site. Apply rappel risk evaluation and mitigation process from risk Decision Point 4 (except for direction to use ridge toprappel site).

- Downhill winds may invalidate normal assumptions about the bottom end of a fire being a safer place for firefighters to anchor and work.

### 1.2.6 Decision Point 7

**No safe landing or rappel site.**

- Do not deploy personnel.

## 1.3 Post Deployment and Pre-Engagement

### 1.3.1 Actions

After rappellers complete rappel, the Incident Commander (IC) or Rappeller-In- Charge (RIC) should immediately contact spotter by radio to confirm rappellers are OK.

IC/RIC should perform a rapid risk assessment of fire hazards, confirm safety zone(s) and escape routes are viable, and share that information with other rappellers.

The spotter should confirm that the IC/RIC has established positive radiocommunications with dispatch before helicopter departs area.

- If positive radio communications cannot be established between firefighters on ground and dispatch, firefighters should not engage the fire.

Before engaging the fire, IC/RIC should perform a risk assessment using the risk management process from the Incident Pocket Response Guide.

- Other firefighters should participate in this process; the results should be shared with all present.



## Appendix G—General Assessment of Risk (GAR) - Rappel



The Standards for Rappel Operations—Appendix G provides for operational / mission risk assessment via the GAR Model and includes associated documentation.

## 1.1 General Assessment of Risk

The GAR model allows for time-critical risk assessment and generates communication concerning mission risks. This communication helps identify the risk and leads to the appropriate mitigation. The GAR can be applied in a variety of situations. It can be used to help identify programmatic risk and is efficient enough to be utilized as a pre-mission risk assessment tool. The GAR is not intended to replace pre-mission planning, briefings and debriefings, or post-action follow-up, but to provide an efficient risk management tool for dynamic environments.

Making risk decisions at the appropriate level establishes clear accountability. Those accountable for the success or failure of a mission must be included in the risk decision process. The higher the risk, the more mitigation may be necessary. If significant differences in the same rating categories are identified, all team members will re-evaluate the mission and address any mitigation prior to continuing with the mission.

It provides a more general analysis of the operational system and provides a qualitative rating scale for each of the categories that correspond to the identified areas of risk. It is important to remember that risk management is a process that continues throughout the mission, and each assessment model allows management to set the acceptable risk standards as they apply to each mission.

The GAR should be applied to helicopter missions as appropriate. All helicopter program managers should receive training on the GAR and its use. Helicopter program managers will be responsible for implementing the GAR with all members of the team at their base.

Additional information on risk management can be found in Appendix F of this guide.

A GAR, which creates a GO/NO-GO decision tool, should be conducted individually by each member of the team on the Operational/Mission Risk Assessment Worksheet prior to initial dispatch. Individual scores will be compiled on the spotter or manager's Operational/Mission Risk Assessment Worksheet and be reviewed and discussed by all members of the team. If there are any mitigations, they will be discussed and documented on the worksheet. The assessment may be completed at the beginning of an operational period, and it should be reviewed and updated if the team or mission changes or if other mission-specific information becomes available. While assigned to a large incident, the helibase manager or equivalent will be considered an essential team member.

Operations that have a total post-mitigation score in the amber range can be conducted with pilot and spotter concurrence. Rappel operations with a post-mitigation score in the red will need line officer or IC approval to proceed with the mission.

## 1.2 Risk Control Categories

### 1.2.1 Supervision

Supervisory control considers how qualified the supervisor is and whether effective supervision is taking place. Supervision acts as a control to minimize risk. The higher the risk, the more the

supervisor needs to be focused on observing and checking. A supervisor who is actively involved in a task is easily distracted and should not be considered an effective safety observer in moderate to high-risk conditions.

### 1.2.2 Planning

Planning and communication should consider how much information you, your team, and other resources with whom you may be interacting have: Does everyone have the same information? How accurate is the information? Is there adequate time to plan for and evaluate the existing and emerging conditions? What is the availability of contingency resources and how reliable is the communication infrastructure? Can effective CRM be established with this information?

### 1.2.3 Team Selection

Team selection for the stated mission should consider the knowledge, skills, proficiency, and competence of the individuals. Team fitness should consider the physical and mental state of the crew to include the rappellers, spotter, pilot, and helicopter. The amount and quality of duty/rest a team member has had as well as an evaluation of all internal and external stress are important factors to consider.

### 1.2.4 Environment

Consider the area of operation that could influence the performance of the aircraft, including but not limited to, density altitude, temperature, wind, topography, etc. Known factors such as terrain, forest canopy, and site selection should be eyed with caution as the operational environment is very dynamic.

### 1.2.5 Incident Complexity

Evaluate the experience level of the team. Generally, the longer one is exposed to a hazard, the greater the risks. The situation includes considering how long the environmental conditions will remain stable and the complexity of the work. Potential for large fire growth or medical response and multiple resources responding to incident both ground and air.

## 1.3 Risk Assessment Rating System Explanation

Table 0-1 Risk Assessment Rating System

<b>Supervision</b>		
Supervisor has perfect knowledge about the mission, personnel, capabilities, and limitations, and can apply the appropriate control to minimize risk.	<b>1-2-3-4-5</b>	Supervisor has little knowledge about the mission, personnel, capabilities, and limitations, and lacks skill, knowledge, or ability to apply the appropriate control to minimize risk.
<b>Planning</b>		
There is a well-designed plan that is reviewed and revised as needed to meet the demands for safety and efficiency and to account for adaptation. Time is well managed. CRM is in place and well versed on with all parties. Adequate personnel and technology are available to relay information accurately to those who make the decisions. Contingency personnel, resources and equipment are available.	<b>1-2-3-4-5</b>	There is no plan, or the plan doesn't address many current adaptations made in response of demands for efficiency. Time constraints have a strong effect on ability to plan. CRM is poor or not utilized. Communications are poor between personnel. Communication equipment is lacking efficiency and coverage of response area. No contingency personnel, resources, or equipment.
<b>Team Selection</b>		
Multiple personnel are trained, proficient, healthy, and rested prior to starting the mission. Personal issues are addressed, and little external stress is being exerted. Selection and preparation are done well in advance so there is plenty of time for personnel to get personal and job-related demands addressed.	<b>1-2-3-4-5</b>	Only one person is available, and the success of the mission depends on that person juggling many responsibilities to squeeze this mission into the work schedule. Personnel lack training. Personnel have been squeezing in many additional duties as assigned distracting them from their proficiency or personal life.
<b>Environment</b>		
Weather and visibility are conducive to the best possible chance for success in the mission. Operational tempo is appropriate for the mission.	<b>1-2-3-4-5</b>	Winds are unpredictable, temperature is extreme, low ceilings and visibilities, precipitation, sun angle creates strong shadows, etc. Mission tempo is too low or high.
<b>Mission Complexity</b>		
A single agency is involved with personnel from the same unit who regularly work together. Mission is straight forward and covered by standard operating procedures. Fire activity is at a minimum. Non- emergency medical operation.	<b>1-2-3-4-5</b>	Multiple agencies are involved in a mission that defies definition or has ever been attempted. Personnel are new to each other and come from different cultures. Many leaders are emerging and working toward different objectives. Fire activity and numerous resources responding. Immediate response medical emergency.



## 1.4 Daily Operational/Mission Risk Assessment Worksheet

Table 0-2 GAR Operational Risk Assessment

Daily Operational/Mission Risk Assessment Worksheet							
GREEN 0 - 11	AMBER 12 - 19	RED 20 - 25	SPOTTER	IC	PILOT	BASE MANAGER	TEAM MITIGATION
Risk rated 1-5 for each category. Mitigations should be considered for any category rated higher than 3. If one or more categories rate higher than 3, a team mitigation needs to be completed for that category. A team-mitigation will also have to be completed if the total of the individual score is greater than 12.							
<b>Supervision:</b> Presence, accessibility, and effectiveness of leadership for all teams and personnel. Clear chain of command.							
<b>Planning:</b> Adequate briefings and mission planning time available. Shared communications plan. Radio communications available throughout area of operations.							
<b>Team Selection:</b> Level of individual training and experience. Level of team member's rest/fatigue, physical fitness, morale, and absence of outside distractions. All team member's current in required qualifications and standardized procedures.							
<b>Environment:</b> Extreme temperatures, elevation, difficulty of terrain (aspect, canopy, slope, etc.), long approach, remoteness.							
<b>Incident Complexity:</b> Potential for incident that would tax the current staffing levels. Potential for large fire growth or medical response. Severity and probability of mishap.							
<b>Total:</b>							

<sup>1</sup>The team-mitigation column would be used if any one team member's overall score goes into the amber or red, or if an individual rates any category higher than a 3. Mitigation measures will be documented on the following page. If the team's consensus mitigation score stays in the red, they will need Line Officer or IC approval to proceed with the mission.

Table 0-3 GAR Scoring Table

GREEN	AMBER	RED
0 - 11	12 - 19	20 - 25
LOW RISK	MODERATE RISK	HIGH RISK
Proceed With Mission	Proceed With Caution	Implement Measures Prior to Proceeding

The ability to assign numerical values or "color codes" to hazards isn't the most important part of risk assessment. Team discussion is critical to understanding and managing risks.

### Crew/Team Mitigations:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

IC/Line Officer Signature: \_\_\_\_\_



## Appendix H—Standard Operating Guidelines



The Standards for Rappel Operations, Appendix H —Standard Operating Guidelines describes the organization of the NRWT and the NROS

# Chapter 1. Forest Service National Rappel Working Team Standard Operating Guidelines

## 1.1 Background

To provide operational oversight for the Forest Service National Rappel Program (FSNRP), the Helicopter Operations Specialist Committee (HOSC) established the National Rappel Working Team (NRWT).

## 1.2 Purpose

The NRWT will develop and oversee FSNRP rappel operations in support of Forest Service (FS) fire management - rappel mission requirements, contract development, operational compatibility, policies, and procedures for the FSNRP. The purpose will include developing rappel policy, procedures and standards, mission requirements, aircraft, equipment, and support services specifications for acquisition, and working with other federal agencies, aviation specialists and maintenance experts to ensure compliance with Federal Aviation Regulations and agency policy. The NRWT recommends and submits any policy change to the HOSC.

## 1.3 Authority

The NRWT is chartered by the HOSC. The deliberations within NRWT are exempt from the Federal Advisory Committee Act under section 04 of the Unfunded Mandates Reform Act of 1995.

The NRWT reports to and receives direction from the Chair of the HOSC. The HOSC authorizes the Chair of the NRWT to convene meetings, schedule agenda items, make contacts, negotiate work assignments, operational changes in policy, equipment, and procedures, and make commitments. The NRWT may charge members or technical specialists with tasks or create working groups.

## 1.4 Organization and Membership

The NRWT is comprised of the National Rappel Specialist (NRS) and the Regional Helicopter Operations Specialists (RHOS) from regions with designated rappel program(s). The NRWT is chaired by the NRS. The co-chair is one of the RHOS from the regions listed above. The term for the co-chair is two years.

The terms of tenure are indefinite for the NRWT. The Co-chair will assume duties in the absence of the Chair.

Voting membership consists of one member from each active Region and the NRS. A quorum of four members or designee must be present to be considered a voting body.

The NRWT may use technical specialists for support of focus on specific issues. These positions may include but are not limited to:

- Chair of the Rappel Operations Subcommittee
- Rappel Equipment Specialist, NTDP
- Aviation Maintenance Inspectors
- National Helicopter Operations Specialists
- Regional Helicopter Operations Specialists
- Helicopter Pilot Inspectors
- Aviation Safety Officers
- The Technical Specialists participation will be on a request basis by the Chair

## **1.5 Cooperation and Coordination**

The NRWT communicates any significant updates or changes with the HOSC.

## **1.6 Standard Operating Guideline Approval**

These guidelines are effective as of the date of approval and shall remain in effect until revised or revoked.

Approved:

Helicopter Operations Specialist Committee Chair

## Chapter 2. National Rappel Operations Subcommittee Standard Operating Guideline

### 2.1 Background:

To provide support to the National Rappel Working Team (NRWT), the Chair of the NRWT has established the National Rappel Operations Subcommittee (NROS).

### 2.2 Objective

The primary mission for the NROS is to establish a formal process for standardization, review, and evaluation of rappel program standards, current or proposed helicopter rappel equipment, rappel procedures, training, certification, and assurance for the Forest Service. Based on those evaluations, the NROS will submit recommendations to the NRWT.

### 2.3 Programmatic Focus Areas

- Programmatic
  - Monitor operational efficiency and effectiveness
  - Staffing (crew size, structure, type of employment, qualifications)
  - Recruitment and retention (experience, diversity, hiring standards, career development)
  - Rappel aircraft (configuration, next-generation aircraft, aircraft accessories)

### 2.4 Training/Technical Focus Areas

- Training
  - Standardization
  - Certification
- Technical
  - Equipment
  - Quality Assurance
- Operational
  - Procedures
  - Standardization
  - Quality Assurance

## 2.5 Authority

The NROS reports to and receives direction from the NRWT. The NRWT authorizes the Chair of the NROS to convene meetings, schedule agenda items, make contacts, negotiate work assignments, and create working groups or task teams. The Chair may also charge technical specialists listed in the NRWT charter with tasks.

## 2.6 Purpose

The NROS will solicit, review, and evaluate inputs from the field on rappel operations (efficiency, effectiveness, safety, etc.), program management, rappel training, equipment, and procedures standardization from the FS Helicopter Rappel Program.

The NROS will respond to issues and concerns regarding currently approved rappel equipment and procedures.

The National Rappel Specialist (NRS) will collect and submit proposals to the NROS for voting. Approved proposals and recommendations will be submitted to the NRWT via the NRS

## 2.7 Group Composition

The NROS is composed of the NRS, all rappel base managers (or designee), and check spotters. NROS shall include a minimum of one member from each active rappel region. One voting member per region is designated by the corresponding NRWT member.

Other technical specialists may be requested as needed.

To ensure that subcommittee(s) recommendations for revisions to rappel equipment, cargo letdown equipment, or rappel and cargo letdown procedures reflect applicable technical and safety standards, the National Technology and Development Center (NTDP) rappel equipment project leader will participate as needed in evaluations, meetings, conference calls, and communications as a non-voting member and technical advisor.

All voting members must be present to be considered a voting body. A proxy may be designated by the representing NRWT member. In the event of a split decision, the NRS will be the deciding vote.

## 2.8 Replacement of Voting Members

Replacement of voting members will be solicited from the respective NRWT Member.

## 2.9 Selection of the Chairpersons

The Subcommittee will appoint a chair and co-chair. The Chairperson will be in numerical rotation starting with Region 1. The rotation will progress in order every two years. The Co-chair will be the next Region in order. If either the chair or Co-chair positions are vacated or unavailable to fill the role, the next region in the rotation will select an individual to fill the role. The Chair and Co-chair will serve a term of two years; at the end of the two-year term, the Co-chair will become the Chair.

## 2.10 Standard Operating Guideline Approval

This guideline is effective as of the date of approval and shall remain in effect until revised or revoked.

Approved:

National Rappel Specialist, NRWT Chair