

1 **Appendix H – Rappel Risk Management for Fire Missions**

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

4 **Preflight, In-Flight, Arrival, and Size-Up**

5 **Preflight**

- 6 A. Preflight helicopter checks completed by pilot.
- 7 B. Load calculation for destination elevation and temperature completed by pilot and
8 reviewed by spotter.
- 9 C. Flight hazard map checked by pilot and spotter for aerial hazards on flight route
10 and at destination.
- 11 D. Weather forecast and fire indices reviewed by pilot, spotter, and rappellers.
- 12 1. Thunderstorms and strong winds such as those associated with a cold front can
13 create hazardous conditions for landing/rappelling and increase fire behavior.
- 14 2. Winds blowing perpendicular to ridges or across geographical prominences can
15 increase lee side turbulence and should dictate extra caution in landing/rappel site
16 selection.
- 17 E. Spotter and rappellers should review pocket card for representative fuel type and
18 conditions.
- 19 1. High or extreme fire behavior indices should indicate extra caution in
20 landing/rappel site selection.

21 **Decision Point 1**

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

- 24 A. Cargo secured and checked by spotter.
- 25 1. Ropes and Sky Genies rigged and checked by spotter. (If not rappel ready, instead
26 check to insure that rappel gear is on board helicopter and secured.)
- 27 2. Rappeller checks completed by spotter. (If not rappel ready, skip this step.)

1 **En Route to Destination**

- 2 A. Establish & maintain positive flight following.
- 3 B. Pilot, spotter and rappellers practice in-flight crew resource management (CRM).
- 4 C. Any observed aircraft or potential problems should immediately be
5 communicated to the pilot by intercom.
- 6 D. Ensure maximum crew participation in searching for and calling out any aerial hazard.
- 7 E. Any of the above conditions may be an indicator of hazardous landing, rappelling, or
8 firefighting conditions. Pilot and spotter should look for weather and wind signs that
9 could indicate turbulence or downward movement of air at destination.
 - 10 1. A good indicator on fires is the smoke column; is it shifting direction, laying horizontal
11 or blowing downhill? Is it plume dominated?
 - 12 2. Are there thunderstorms in the area?
 - 13 3. Is there increased turbulence when flying on the lee side of ridges or geographical
14 prominences?

15 **Arrival on Scene**

- 16 A. Check airspace for other aircraft before approaching fire area.
- 17 B. Establish & maintain positive inter communications systems (ICS) with pilot & incident
18 command/rappeller in charge (IC/RIC). Inform dispatch of arrival.
- 19 C. Conduct high-level recon prior to transition to low-level recon. Look for wires, cables,
20 utility poles. Smoke and poor lighting conditions can make it harder to see wires. Small
21 gauge wires may be difficult to see at any distance. If first entry into area, assume there
22 are wires until proven otherwise.
- 23 D. Fire size-up
 - 24 1. Fire size?
 - 25 2. Position on slope?
 - 26 3. Fire actively spreading?
 - 27 4. Available fuels to allow fire growth?
 - 28 5. Potential for rapid fire growth due to weather, low fuel moisture, slope, or aspect?
- 29 E. Identify safety zone(s) and potential escape routes near fire or within burned area. Use
30 guidelines from page 7 of Incident Response Pocket Guide.

1 Before a burned area can be designated as a potential safety zone:

- 2 i. Most light fuels, including brush (if present), must have been consumed
- 3 ii. The burned area must have cooled sufficiently to permit human occupation
4 without excessive heat exposure
- 5 iii. Smoke conditions in burned area must not exceed normal tolerable
6 levels

7 F. Identify helicopter landing site(s) near fire (if any).

- 8 1. Pilot and spotter confirm elevation and temperature, to assure payload is within
9 load calculation parameters
- 10 2. If uncertain about whether site is in ground effect or out of ground effect,
11 assume site is out of ground until proven otherwise

12 G. If needed, identify potential rappel sites near fire.

- 13 1. Pilot and spotter confirm elevation and temperature, to assure payload is within
14 load calculation out of ground effect (OGE) parameters

15 **Deployment**

16 **Decision Point 2**

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

- 19 A. Land helicopter and deploy firefighters unless micrometeorological conditions
20 indicate marginal landing conditions at site. Consider that lee side winds/turbulence
21 can negatively affect helicopter performance.
 - 22 1. Off-site landings carry an elevated degree of risk; site should be carefully
23 evaluated prior to landing approach to confirm suitability as safe landing site.
24 Pilot and spotter should mutually agree on suitability of site
 - 25 2. Consider an hover out of ground effect (HOGE) high hover power check prior to
26 landing at an altitude comparable to the site or greater. A positive rate of climb
27 must be established without exceeding aircraft limitations
 - 28 3. Dispatch should be contacted prior to landing to inform them of upcoming
29 landing and location
 - 30 4. Flight crew should continue to look for wires and other hazards until helicopter
31 has landed
 - 32 5. Rotor wash can cause snags to fall; if snags next to proposed landing site could
33 potentially impact landing site, extreme caution should be used or an alternate
34 site selected
 - 35 6. Main & tail rotors must maintain adequate safety margin from rocks, brush, and
36 trees on approach route, in landing area, and on departure route
 - 37 7. Landing pad must be free of objects than could impact underside of fuselage
 - 38 8. Landing pad must be large enough for skids/wheels and not excessively sloped

- 1 9. Dusty landing sites can produce brownout conditions, carefully evaluate
2 and approach potentially dusty areas with caution

3 **Decision Point 3**

4 No landing site immediately adjacent to fire.

- 5 A. If fire has minimal chance of fire spread and is not an immediate threat to
6 firefighters, consider alternate landing sites an increased distance from fire.
- 7 1. Can aircraft remain on scene while firefighters approach incident? If not,
8 consider having the aircraft fly a bearing from the location of firefighters to the
9 fire to insure firefighters know where the fire is.
 - 10 2. If near end of day, will firefighters be able to reach the fire before dark? If not,
11 rappel may be preferred option.
 - 12 3. Can you shorten hiking time and minimize depletion of firefighter energy
13 reserves by using cargo letdown to deploy cargo near fire?

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

16 **If helicopter and rappellers are rappel equipped, go to Decision Point 4 If rappel**
17 **configured, skip Decision Point 4 and go directly to Decision Point 5.**

18 **Decision Point 4**

19 Off-site landing that requires reconfiguring for rappel mission.

- 20 A. If distance/terrain/fire behavior makes it unsafe or unfeasible for firefighters to hike
21 from potential landing site(s) to fire, find landing site a safe distance from fire to rig
22 for rappel. Off-site landings carry an elevated degree of risk; site should be carefully
23 evaluated prior to landing approach to confirm suitability as safe landing site.
- 24 1. Conduct high-level recon prior to transition to low-level recon. Look for wires,
25 cables, and telephone/power poles. Smoke and poor lighting conditions can make
26 it harder to see wires. Small gauge wires may be difficult to see at any distance. If
27 first entry into area, assume there are wires until proven otherwise.
 - 28 2. Do not land helicopter if micrometeorological conditions indicate marginal
29 landing conditions at site. Consider that lee side winds/turbulence can
30 negatively affect helicopter performance.
 - 31 3. Consider an OGE high hover power check prior to landing at an altitude
32 comparable to the site or greater. A positive rate of climb must be established
33 without exceeding aircraft limitations.
 - 34 4. Dispatch should be contacted prior to landing to inform them of upcoming
35 landing and location.
 - 36 5. Flight crew should continue to look for other aircraft, wires, and other hazards
37 until helicopter has landed.
38

- 1 6. Rotor wash can cause snags to fall; if snags next to proposed landing site could
2 potentially impact landing site, consider other sites.
- 3 7. Main & tail rotors must maintain adequate distance from rocks, brush, and trees
4 on approach route, in landing area, and on departure route.
- 5 8. Landing pad must be free of objects that could impact underside of fuselage.
- 6 9. Landing pad must be large enough for skids and not excessively sloped.
- 7 10. Dusty landing sites can produce brownout conditions; carefully evaluate
8 and approach potentially dusty areas with caution.

9
10 B. Once on the ground, rappellers and spotter reconfigure helicopter and cargo for rappel.

- 11 1. If the pilot and spotter decide not to shut down while configuring for rappel
12 mission, the pilot must remain at the controls.
- 13 2. The spotter and rappellers must be cognizant of the main and tail rotors while
14 reconfiguring and rigging for the rappel mission. Flight helmets and personal
15 protective equipment (PPE) must be worn at all times if rotors are turning.
- 16 3. Crewmembers should not rush or cut corners while reconfiguring and rigging
17 because rotors are turning or because they are concerned about the fire increasing
18 in size while they are absent.
- 19 4. Ropes and descent devices rigged and checked by spotter.
- 20 5. Cargo secured and checked by spotter.
- 21 6. Rappellers and spotters put on harnesses and rappel gear.
- 22 7. Rappellers complete buddy checks.
- 23 8. Spotter performs preflight walk-around check of helicopter and landing site
24 before completing rappeller checks.
- 25 9. Rappeller checks completed by spotter. Conduct last review with pilot and
26 rappellers to ensure nothing has been overlooked and everything is ready to go.
- 27 10. Establish and maintain positive ICS with pilot & rappellers. Dispatch should be
28 notified of departure from off-site landing area and arrival back at fire.

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

1 **Decision Point 5**

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

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

6 1. Conduct a HOGE high hover power check prior to rappelling at an altitude
7 comparable to the site or greater. A positive rate of climb must be established
8 without exceeding aircraft limitations.

9 2. Take into consideration that it is often easier to maintain a stable hover on a ridge
10 top than on a hillside or in drainage.

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

13 C. Rotor wash can cause snags to fall; if snags next to proposed rappel site could
14 potentially impact area where ropes or cargo letdown line would be deployed,
15 extreme caution should be used.

16 D. Dispatch should be contacted prior to rappelling to inform them of upcoming rappel
17 and GPS coordinates if needed. Radio volume should be turned down during the
18 rappel sequence.

19 E. If there are firefighters already on the ground, establish communications before
20 proceeding. Spotter should advise firefighters to remain away from rappel site and to
21 not interfere or attempt to help until rappellers and cargo are on the ground and
22 helicopter departs.

23 F. Main & tail rotor must maintain adequate safety clearance from terrain or trees.

24 G. Before ropes and rappellers are deployed, the spotter and pilot should reconfirm that
25 hover is stable and power is still good. Pilot can elect to re-establish forward flight if
26 aircraft performance indicators are marginal.

27 1. If pilot has difficulty establishing or maintaining a stable hover before ropes are
28 deployed, pilot should inform spotter of need to re-establish forward flight. Pilot
29 & spotter should jointly re-evaluate proposed rappel site and micrometeorological
30 conditions, re-entry into same site should occur only if conditions substantially
31 improve.

1 **Decision Point 6**

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

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

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

9 **Decision Point 7**

10 No safe landing or rappel site.

11 A. Do not deploy personnel.

12 **Post Deployment and Pre-Engagement**

13 **Actions**

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

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

20 C. The spotter should confirm that the IC/RIC has established positive radio
21 communications with dispatch before helicopter departs area.

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

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

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