

RAPPEL RISK MANAGEMENT FOR FIRE MISSIONS

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

Section 1: Preflight, in flight, arrival, and size-up

A 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 for aerial hazards on flight route and at destination.
4. Weather forecast and fire indices reviewed by pilot, spotter, and rappellers.
 - a. Thunderstorms and strong winds such as those associated with a cold front can create hazardous conditions for landing/rappelling and increase fire behavior.
 - b. Winds blowing perpendicular to ridges or across geographical prominences can increase lee-side turbulence and should dictate extra caution in landing/rappel site selection.
5. Spotter and rappellers should review pocket card for representative fuel type and conditions.
 - a. High or extreme fire behavior indices should indicate extra caution in landing/rappel site selection.
6. **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.
7. Cargo secured and checked by spotter.
 - a. Ropes and Sky Genies rigged and checked by spotter. (If not rappel ready, instead check to insure that rappel gear is on board helicopter and secured)
 - b. Rappeller checks completed by spotter. (If not rappel ready, skip this step)

B 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. Pilot and spotter should look for weather and wind signs that could indicate turbulence or downward movement of air at destination.
 - a. A good indicator on fires is the smoke column; is it shifting direction, laying horizontal or blowing downhill? Is it plume dominated?
 - b. Are there thunderstorms in the area?
 - c. Is there increased turbulence when flying on the lee side of ridges or geographical prominences?

Any of the above conditions may be an indicator of hazardous landing, rappelling, or firefighting conditions.

C Arrival on scene:

1. Check airspace for other aircraft before approaching fire area.
2. Establish & maintain positive ICS with pilot & IC. Inform dispatch of arrival.
3. Conduct high-level recon prior to transition to low-level recon. Look for wires, cables, 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.
4. 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?
5. 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 potential safety zone:
 - 1) Most light fuels, including brush (if present), must have been consumed.
 - 2) The burned area must have cooled sufficiently to permit human occupation without excessive heat exposure.
 - 3) Smoke conditions in burned area must not exceed normal tolerable levels.
6. 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.
7. 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.

Section 2: Deployment

D Risk decision-making priorities

Decision Point 2: Off-site landing area near fire, rapid engagement possible without helicopter or firefighters being exposed to unacceptable hazard from fire behavior:

1. 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.
 - a. 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.
 - b. 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.
 - c. Dispatch should be contacted prior to landing to inform them of upcoming landing and location.
 - d. Flight crew should continue to look for wires and other hazards until helicopter has landed.
 - e. 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.
 - f. Main & tail rotors must maintain adequate safety margin from rocks, brush, and trees on approach route, in landing area, and on departure route.
 - g. Landing pad must be free of objects than could impact underside of fuselage.
 - h. Landing pad must be large enough for skids/wheels and not excessively sloped.
 - i. Dusty landing sites can produce brownout conditions, carefully evaluate and approach potentially dusty areas with caution.

Decision Point 3: No landing site immediately adjacent to fire:

1. 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.
 - a. 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 insure firefighters know where the fire is.
 - b. If near end of day, will firefighters be able to reach the fire before dark? If not, rappel may be preferred option.
 - c. Can you shorten hiking time and minimize depletion of firefighter energy reserves by using cargo letdown to deploy cargo near fire?

NOTE: Option to land at site adjacent to fire 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.

Decision Point 4: Off-site landing and reconfiguring for rappel mission:

1. 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.
 - a. 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.
 - b. Do not land helicopter if micrometeorological conditions indicate marginal landing conditions at site. Consider that lee side winds/turbulence can negatively affect helicopter performance.
 - c. 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.
 - d. Dispatch should be contacted prior to landing to inform them of upcoming landing and location.

- e. Flight crew should continue to look for other aircraft, wires and other hazards until helicopter has landed.
 - f. Rotor wash can cause snags to fall; if snags next to proposed landing site could potentially impact landing site, consider other sites.
 - g. Main & tail rotors must have maintain adequate safety margin from rocks, brush, and trees on approach route, in landing area, and on departure route.
 - h. Landing pad must be free of objects that could impact underside of fuselage.
 - i. Landing pad must be large enough for skids/wheels and not excessively sloped.
 - j. Dusty landing sites can produce brownout conditions, carefully evaluate and approach potentially dusty areas with caution.
2. Once on the ground, rappellers and spotter reconfigure helicopter and cargo for rappel.
- a. If the pilot and spotter decide to not shut down while configuring for rappel mission, the pilot must remain at the controls.
 - b. The spotter and rappellers must be cognizant of the main/tail rotor while reconfiguring and rigging for the rappel mission. Flight helmets and PPE must be worn at all times if rotors are turning.
 - c. Crewmembers should not rush or cut corners while reconfiguring/rigging because rotors are turning or because they are concerned about the fire increasing in size while they are absent.
 - d. If doors need to be removed, they should be handled with great care.
 - 1) The light weight and large surface area of doors makes them behave like sails. Rotor wash or wind can catch the door and unbalance the person who carries it. Crewmembers who remove or carry a door should always maintain a firm two-handed grip on it and be prepared for the wind to catch it.
 - 2) After removal, the doors should be placed far away from the landing site and to the side of the approach/departure flight path so there is no chance that rotor wash will affect them while taking off or landing.
 - e. Ropes and Sky Genies rigged and checked by spotter.
 - f. Cargo secured and checked by spotter.
 - g. Rappellers and spotters put on harnesses and rappel gear.
 - h. Rappellers complete buddy checks.
 - i. Spotter performs pre-flight walk-around check of helicopter and landing site before completing rappeller checks.
 - j. Rappeller checks completed by spotter. Conduct last review with pilot and rappellers to insure nothing has been overlooked and everything is ready to go.
 - k. If external cargo system is used, spotter should watch external load during takeoff to insure skid clearance.
 - l. Establish & maintain positive ICS with pilot & rappellers. Dispatch should be notified of departure from off-site landing area and arrival back at fire.

3. 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/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.

Decision Point 5: Ridge top rappel site available above fire, rapid engagement possible without firefighters being exposed to undue hazard from fire behavior:

1. Rappelling carries an elevated degree of risk; site should be carefully evaluated prior to final approach to confirm suitability as safe rappel site.
2. Conduct an 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.
3. Rappel at ridge top unless micrometeorological conditions indicate potential marginal hover conditions at site. In general, it is often easier to maintain a stable hover on a ridgetop than on a hillside or in a drainage.
4. 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.
5. 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.
6. 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.
7. If there are firefighters already on the ground, establish communications before proceeding. Advise them 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.
8. Main & tail rotor must maintain adequate safety clearance from terrain or trees.
9. 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.
10. 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 & spotter should jointly re-evaluate proposed rappel site and micrometeorological

conditions, re-entry into same site should occur only if conditions substantially improve.

NOTE: See Chapter 6 for information regarding Rappel Emergency Procedures

Decision Point 6: Rappel site available nearby but located above fire, fuel & weather conditions will create unacceptable hazard to firefighters:

1. Rappel beside or below fire unless micrometeorological conditions indicate potential marginal hover conditions at site. Apply rappel risk evaluation/mitigation process from risk Decision Point 4 (except for direction to use ridgetop rappel site).
 - a. Downhill winds may invalidate normal assumptions about the bottom end of a fire being a safer place for firefighters to anchor and work.

Decision Point 7: No safe landing or rappel site:

1. Do not deploy personnel.

Section 3: Post deployment/pre engagement

1. After rappellers complete rappel, the Incident Commander (IC) or Rappeller-In-Charge (RIC) should immediately contact spotter by radio to confirm rappellers are OK.
2. IC/RIC should perform a rapid risk assessment of fire hazard, confirm safety zone(s) and escape routes are viable, and share that information with other rappellers.
3. The spotter should confirm that the IC/RIC has established positive radio communications 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 or 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.