



Aviation Services / Helicopter Operations

Helicopter Operations Field Manual

AVI-3001M

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Helicopter Operations Field Manual

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Helicopter Operations Field Manual

Summary

The Pacific Gas and Electric Company (PG&E) Helicopter Operations Department provides a full range of services needed for PG&E organizations to safely and efficiently utilize helicopters and helicopter services.

Helicopter Operations maintains oversight over all helicopter use on PG&E property. This manual provides guidance and standards for both PG&E employees working with and around aircraft and vendors providing helicopter support to PG&E projects.

To request helicopter services support, access the on-line link at **PG&E@Work > Organizations > Gas Operations > Helicopter Operations >** then click the link **Helicopter Services On-Line Request Form**; this path is subject to change, then search for “**Helicopter Services On-Line Request Form**” or call Helicopter Operations at 707-449-5832.

Level of Use: Informational Use

Target Audience

Helicopter operations employees, Lines of Business (LOBs) utilizing helicopter support and services, and all contracting helicopter vendors.

Safety

Before performing any procedures covered in this manual, pilots, employees, and contractors must complete the required training to PG&E standards; see Chapter 12, Training.

Before You Start

NA



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Chapter 1, Using a Helicopter

Chapter 1, USING A HELICOPTER

1.1 Introduction

1.1.1 Chapter 1 lists PG&E's most common uses for helicopters in the field. This manual does not address helicopter insulator cleaning activities. All requirements, procedures, and safety mandates for helicopter insulator cleaning are contained in the *Insulator Cleaning Manual* in the Technical Library (<http://www.techlib/default.asp?body=manuals/insulatorcleaning/>).

1.1.2 Helicopters are used to perform (but not limited to) the following tasks:

- Transporting employees to remote work sites
- Patrolling Power Generation, Gas, and Electric facilities from the air
- Washing insulators
- Stringing conductors
- Installing marker balls
- Transporting sling loads of material and equipment
- Performing human external cargo (HEC) work procedures
- Performing Federal Energy Regulatory Commission and Division of Safety of Dams Inspections

1.1.3 Employees requiring additional information about using helicopters should contact PG&E Helicopter Operations on the Intranet:

- **PG&E@ Work > Organizations > Gas Operations > Helicopter Operations:**
<http://pgeweb.utility.pge.com/gas/aviation/Pages/HelicopterOperations.aspx>
- Click on the **Helicopter Services On-Line Request Form** link.

1.1.4 It is important that all work site personnel (PG&E employees and vendors) understand the requirements and instructions contained in this manual. A copy of this manual (AVI-3001M) must be available on site for reference during all helicopter operations and tailboards.

1.2 Approvals Required

1.2.1 Helicopter Operations maintains oversight over all helicopter use.

1.2.2 Each LOB is responsible for their own procedures. All requests must have the specific level of leadership required, to review and approve each mission. Example of approvals for some mission types require:

- Routine Patrol – Supervisor
- Non-Routine Patrol – Supervisor
- Pole Set (Lifting Under A/C) – Supervisor

(List
Continues)

Chapter 1, Using a Helicopter

(1.2.2, continued)

- HEC – Superintendent
- Mid-Span/Barehand (Energized or De-energized) –Superintendent
- All Hydro requests require a Hydro manager approval

1.3 Dispatching

- 1.3.1 For preflight briefing, all pilots must call Helicopter Operations Dispatcher (707-449-5833) prior to the first flight of the day. (See section 3.2, on page 31)
- 1.3.2 Pilots must complete a Flight Risk Assessment (FRA) before departing from their hangar or airport (see AVI-3001M-JA05, HO Vendor FRA Required Elements in Appendix 2, Job Aids and Checklist).
- 1.3.3 Additionally, pilots must call Helicopter Operations Dispatcher to confirm the manifest prior to boarding passengers. At no time can a pilot take off without an accurate manifest confirmed by the dispatcher.

1.4 Flying with Doors Off or Open

- 1.4.1 The requirement for flying with doors off or open applies to both air patrols and external load operations.

Air Patrols/Reconnaissance

- 1.4.2 Except as noted below, aircraft doors must be installed and closed for any air patrol or detailed inspection utilizing a helicopter.
- IF a specific condition requires any or all doors to be removed or open for the flight, THEN **prior approval is required** by the Helicopter Operations (call 707-449-5832).
 - IF any or all doors are removed or opened for flight, THEN secure all non-essential items related to the mission per Appendix 10, Loose Items Storage System. No loose papers or pads allowed in cabin or cockpit.
 - No person onboard the aircraft may wear any article of clothing that can be dislodged during flight and unintentionally exit the cabin (e.g., hats, caps, visors).

External Load Operations

- 1.4.3 Pilots performing Federal Aviation Administration (FAA) Part 133 external load operations, with any or all aircraft doors off or open, should wear a protective flight helmet. Any pilot working on PG&E facilities, performing these operations, must not wear a hat, cap, visor, or any other article of clothing that can be dislodged during flight and unintentionally exit the cabin.



Chapter 1, Using a Helicopter

1.5 Forest Service Requirements

- 1.5.1 The United States Forest Service (USFS) recognizes four classes of activities that utilize helicopters. PG&E LOBs are responsible to comply with USFS requirements that fall under any of these four class activities. Refer to ***Operations and Maintenance Plan for Electric Facilities on National Forest System Lands within the Pacific Southwest (Forest)***, ([Link to O&M Plan](#), [Link to Reduced O&M Plan](#); or contact USFSMPE@pge.com):
- Class I Activities – Routine Patrols, Inspections, and de Minimis Activities.
 - Class II Activities – Routine Operations and Maintenance
 - Class III Activities – Project Proposals
 - Class IV Activities – Emergency Response (to include emergency repairs)
- 1.5.2 For Vegetation Management **heli-saw operations**, authorization must be coordinated with the Forest Service Line Officer, for work performed on USFS property. The Helicopter Operation Scheduler will verify with the requester that authorization from USFS Line Officer was received or coordinated for a specific mission, if needed.
- 1.5.3 LOBs must notify or coordinate with Forest Service Line Officer for all flights that are below 200' AGL (or less than 200' above treetops) on USFS property, or if landing on Forest Service property.
- 1.5.4 The Helicopter Contractor or primary contracting company requesting helicopter support must have a response plan for hazardous material releases or an Emergency Response Plan, where applicable, for larger hazardous material releases.
- 1.5.5 A specific plan for refueling a helicopter on Forest Service property must be on hand. Refueling must be outside of a water course, riparian habitat, or habitat occupied by federally listed species. The refueling vehicle must have as a minimum a fire extinguisher and shovel.

1.6 HAZMAT

- 1.6.1 Code of Federal Regulations, Title 49, Part 175 prescribes requirements that apply to the transportation of hazardous materials (HAZMAT) in commerce aboard (including attached to or suspended from) aircraft. The requirements in part 175 are in addition to other requirements contained in parts 171, 172, 173, 178, and 180 of CFR Title 49.
- 1.6.2 Please contact the Helicopter Operations with any questions or needed guidance regarding HAZMAT loads aboard or suspended from aircraft.
- 1.6.3 No explosives, flammable material, or other hazardous materials, as identified in DOT HAZMAT Regulations, will be placed on board any aircraft **without proper DOT shipping papers (49 CFR §175.33)**.



Chapter 1, Using a Helicopter

1.7 PG&E Rules Governing Helicopters and Pilots

- 1.7.1 All pilots working on PG&E missions must comply with the following (in conjunction with Title 14 Code of Federal Regulations (CFR) Part 135 requirements):
- Pilots must not exceed 8 hours of flight time and 14 hours of duty in any 24-hour period. For extended duty hour(s) approval:
 1. Pilot gets approval from their Operations Manager/Supervisor.
 2. The pilot's Operations Supervisor/Manager notifies Helicopter Operations (HO) Dispatcher of approval or denial (via e-mail or telephone). The dispatcher enquires about the last 72 hours of duty.
 3. Helicopter Operations Dispatcher contacts Manager of Helicopter Operations. IF unable to contact the Manager, THEN contact the Director (for approval or denial). Go to step 5.
 4. Manager of HO contacts the Director of Aviation for approval (or denial), then notifies HO Dispatcher (of approval or denial).
 5. Helicopter Operations Dispatcher then notifies the pilot and Vendor Operations Manager (or designee) of approval (or denial).
 - Pilots may take a ten-minute rest period after one hour of flight time during 14 CFR Parts 91, 133, or 137 operations. Pilot will take all necessary rest periods to ensure the safe operation of the aircraft.
- 1.7.2 **Civil Twilight** – Twilight is measured in degrees of the sun below the horizon. Civil twilight is the period after sunset or before sunrise when the sun is about 6 degrees below the horizon and during which, on clear days, there is enough light for ordinary outdoor activities. The twilight period varies in time throughout the year; in the PG&E service area civil twilight is about 25 – 30 minutes.
- 1.7.3 **PG&E Night Operations** – If a pilot needs to perform any night operations to include the civil twilight period, Helicopter Operations Manager approval is required, and no PG&E personnel can be onboard without prior approval.
- An operation can be approved for airport to airport ferry/transport.
 - Airport to LZ can only be approved if arriving at the work LZ after morning civil twilight (sunrise).
 - Additionally, no landing at the work LZ during night or evening civil twilight hours (after sunset).
- 1.7.4 **Pilot Performance** – Company employees, including contractors, must notify their supervisor and Helicopter Operations Department if they observe any work practices by the pilot (including near hits or any action with the potential of becoming a near hit) that they consider unsafe or in violation of safety rules and regulations.
- 1.7.5 **Power Check / Trending** – Performed Power checks every 10 hours (+/- 2.5 hours) hours of operation. Perform power assurance checks in accordance with the Rotorcraft Flight Manual (pilot's operating handbook) or approved company performance monitoring program. Refer to job aid AVI-3001M-JA02 for additional information.



Chapter 1, Using a Helicopter

1.8 Pilot Authority

1.8.1 **Pilots** – For safety, it is important to understand a pilot's legal responsibilities. Pilots are licensed professionals and, as such, have command of the helicopter. Federal Aviation Regulations (FARs) document the following rules:

- **FAR Part 91.3a:** The pilot in command of an aircraft is directly responsible for, and is the final authority, as to the operation of that aircraft.
- **FAR Part 91.8:** No person may assault, threaten, intimidate, or interfere with a helicopter crew member in performance of the crewman's duties aboard an aircraft being operated.

1.9 Pilot Responsibility

1.9.1 The pilots will evaluate all missions. On occasion, pilots may be asked to perform a mission that, in their judgment, is not safe. It is the pilot's responsibility to recognize and refuse all such missions. The pilot's word is final as to whether the flight is feasible and can be conducted in a safe and efficient manner.

1.9.2 If at any time anyone feels that a flight or operation is unsafe and requests that it be terminated for safety reasons, it is the pilot's responsibility to comply with such requests.

1.9.3 Before departure, the pilot must check in with the Helicopter Operations Dispatcher (707-449-5833) for the dispatcher's morning briefing. The pilot must understand the mission request and have on board all applicable maps and charts. Additionally, the pilot is required to be aware of weather forecasts, winds, hazards, temporary flight restrictions, and all pertinent information necessary to perform the mission.

1.10 Requesting a Helicopter (Providing Information to Helicopter Operations)

1.10.1 The PG&E LOB employees responsible for requesting a helicopter must complete the Helicopter Operations' online request form. Be prepared with the following information.

- Date, location (street address or nearest intersection), and starting time for the work.
- Landing zones: global positioning system (GPS) coordinates, or other landmarks that provide the pilot with a reference point for locating the work site.
- Purpose of the flight, scope of work, and any special circumstances.
- Estimated duration of the job.
- Length of time the helicopter will be needed.
- Size and type of helicopter suitable for known conditions (see Appendix 4, Selecting an Aircraft)
- Name and approximate weight of each person on board.
- Weight of the sling load, tool, or equipment (if applicable).
- Estimate of the highest ambient temperature.
- Elevation of the work site.
- Confirmation by requestor and/or supervisor that all employees involved with helicopter activities are properly training and qualified.

Chapter 1, Using a Helicopter

(1.10, Requesting a Helicopter, continued)

- 1.10.2 When performing aerial patrols (e.g., surveying power line, pipeline, flume, etc.), employees must comply with their department's policies—control center or powerhouse operator. For flight safety and security purposes, contact the appropriate control center or switching center.
- 1.10.3 An example of department requirements:
- For Electric Department requirements refer to TD-1466P-02, *Electric Operating Instructions*, Section 13, Working on or Near Towers or Energized Lines.
 - For Hydro requirements, refer to PG-2021S.

1.11 Reporting an Incident or Accident

- 1.11.1 Report all incidents/accidents before end-of-day, to each of the following:
- The responsible work supervisor at the job site
 - The Helicopter Operations Department (707-449-5832)
 - (When appropriate), the contract administrator, if the project/work is for a specific contract or contractor
- 1.11.2 An incident/accident includes any contact, or probable contact, between an aircraft and any object, regardless of perceived damage or cost, and/or federal reporting requirements. All incidents/accidents will be investigated by PG&E.
- **Aircraft Incident** – An occurrence, other than an accident, associated with the operation of an aircraft that takes place between the time the aircraft first lands at a PG&E job site until the aircraft departs at the end of the day, associated with the operation of an aircraft that affects, or could affect, the safety of operations; an injury only requiring basic first aid—not requiring a doctor's attention.
 - **Aircraft Accident** – An occurrence associated with the operation of an aircraft that takes place between the time any PG&E person (employee or contractor) boards the aircraft, and all such persons disembark and in which any such person suffers an injury requiring more than basic first aid, other serious injury, or death, or in which the aircraft receives any damage. This includes any work associated with, but not limited to, the following: HEC, pole setting, wire stringing, general construction, and groundmen handling sling loads.
- 1.11.3 Before a pilot can return to work on PG&E property after any type of incident that interrupts the pilot's flying status (accident, surgery, etc.), the pilot must submit to Helicopter Operations Manager the following (to be filed in the pilot's records kept with Helicopter Operations):
- A copy of the pilot's new medical certificate.
 - A current (post incident) check ride validating pilot's skills—the document must identify what was checked and the results.



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1.12 Safe Working Distance

1.12.1 Except for Heli-Wash during insulator cleaning, any rotorcraft working on PG&E property may at no time operate next to any fixed object closer than 1.5 times the rotor diameter; that is, no closer than 50% of the rotor diameter. See paragraph 1.12.3 for rotor diameters of typical helicopters. Always round up to a whole foot.

- Example 1: MD-520 main rotor 28 feet, can be no closer to a fixed object than 14 feet.
- Example 2: UH-1H main rotor 49 feet, can be no closer to a fixed object than 25 feet.

1.12.2 Examples of fixed objects included, but not limited to:

- Trees (vegetation of any kind)
- Vehicles (exception of vehicles would be the fuel truck supporting the aircraft)
- Equipment
- Signs
- Structures
- Dwellings
- Towers
- Poles
- Conductors

1.12.3 Table 1 shows the main rotor diameter of helicopters commonly used by PG&E (diameter rounded up to a whole foot).

Table 1: Rotor Diameter of Common Helicopters

Aircraft	Rotor	Aircraft	Rotor
MD 520	– 28'	Bell 407	– 35'
MD 530F	– 28'	UH-1H	– 49'
206B3	– 34'	214B	– 50'
206L3	– 37'	UH-60A	– 54'
AS350B3	– 35'	Sky Crane	– 72'

1.13 Scheduling

1.13.1 All scheduling is handled through Helicopter Operations Department. For planned missions, book helicopters at least 10 days in advance of need, through Flight Vector.

1.13.2 For normal online helicopter requests, go to the Helicopter Operations website:

- **PG&E@Work > Organizations > Gas Operations > Helicopter Operations**, then select **Helicopter Services On-Line Request Form**.
<http://pgeweb.utility.pge.com/gas/aviation/Pages/HelicopterOperations.aspx>
- The direct link to **Helicopter Services On-Line Request Form** is:
<http://www.t2flightvector/>

Chapter 1, Using a Helicopter

(1.13, Scheduling, continued)

1.13.3 **Emergency/Storm Request** – Call Helicopter Operations, at **707-449-5832**.

1.13.4 Contractors must contact Helicopter Operations (phone 707-449-5832 or e-mail helicopteroperations@pge.com) and request the “**Third Party Helicopter Request**” form. Contractors submit the completed form to the Helicopter Operations main mailbox (helicopteroperations@pge.com). The schedulers review the form and enter the request into Flight Vector.



Chapter 2, Patrolling and Ferry/Passenger Transport

Chapter 2, PATROLLING AND FERRY/PASSENGER TRANSPORT

Training Required: TECH-0002WBT, SAFE-0256.

2.1 Introduction

- 2.1.1 Chapter 2 describes patrolling (with a patrolman) and ferry/passenger transportation. It identifies responsibilities for pilots, PG&E employees, and contractors. When personnel are serving as aerial patrol observers, they must also comply with TD-4412P-07.

NOTE

Construction Projects – Anytime a flight requires a construction employee to fly ahead for reconnaissance of upcoming work, (e.g., veg management, towers, distribution, etc.) the flight must be at 1000' or above. If the employee is current with SAFE-0256, they may perform the reconnaissance at a lower patrol altitude.

- 2.1.2 **Patrol:** Flights performed at low altitude (<1000' AGL) where observations from the aircraft are conducted (e.g., transmission, distribution, vegetation, job walk, etc.) and requires SAFE-0256 training; a qualified patroller must be in the front seat. An exception is authorized only upon request; contact Helicopter Operations' Supervisor or Manager at 707-449-5832.
- 2.1.3 **Without a SAFE-0256 qualified employee on board, a flight must not go below 1000 feet.**
- 2.1.4 **Passenger Transport (Ferry):** To transport from one location to another, without the purpose of observing structures or terrain (see patrol) and requires TECH-0002WBT.
- 2.1.5 Passengers are limited to the configuration of seat belts as designed—extensions are not acceptable. If the seatbelt does not fasten, you cannot occupy the seat.
- 2.1.6 Pilots will evaluate all missions and may assign seating for proper CG (center of gravity) weight and balance. On occasion, pilots may be asked to perform a mission that, in their judgment, is not safe. It is their responsibility to recognize and refuse all such missions. The pilot's word is final as to whether the flight is feasible and can be conducted in a safe and efficient manner. If at any time the onboard personnel and/or helicopter pilot feel that the flight or operation should be terminated for safety reasons, it is the pilot's responsibility to honor such requests in a professional manner.
- 2.1.7 Any last-minute additions in personnel must be cleared through the Helicopter Operations Dispatcher to confirm required training, contact 707-449-5833. (See section 2.8, "Passenger Manifest".)

Chapter 2, Patrolling and Ferry/Passenger Transport

(2.1, Introduction, continued)

- 2.1.8 Before departure, the pilot must understand the mission and have on board the applicable maps and charts. Additionally, the pilot is required to be aware of weather forecasts, winds, hazards, temporary flight restrictions and all pertinent information necessary to perform the mission.

2.2 Boarding/Exiting a Helicopter

- 2.2.1 The helicopter pilot is in charge of all operations involving the helicopter. Always follow the pilot's instructions.
- 2.2.2 Before boarding a helicopter, all personnel must receive the pilot's preflight briefing outlined in section 2.10, "Pilot's Preflight Briefing".
- 2.2.3 Following the pilot's briefing, all personnel must also receive the PG&E "Helicopter Patrol/Ferry Tailboard Checklist" (AVI-3001M-F02).
- 2.2.4 Wait at the end of the designated landing zone and face the front of the helicopter. When the pilot lands in the center of the LZ, everyone in the immediate area should be easily visible.
- 2.2.5 Do not approach the helicopter when the engine is running or the main rotor blades are still in motion, unless signaled to do so by the pilot. Wait for the "safe-to-board" signal from the pilot before approaching.
- 2.2.6 Approach the helicopter within the pilot's normal field of view unless otherwise directed by the pilot. Figure 1 identifies acceptable, preferred, and prohibited approach zones.

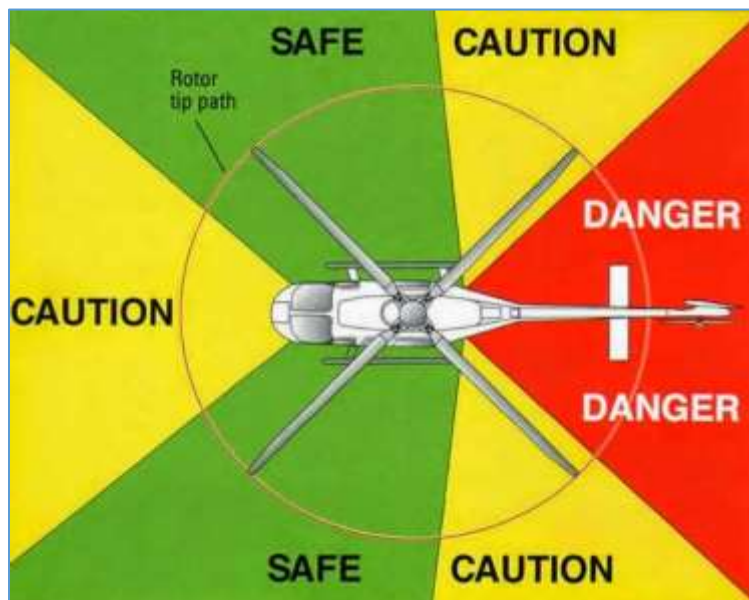


Figure 1: Helicopter Approach Zones

Chapter 2, Patrolling and Ferry/Passenger Transport

(2.2, Boarding/Exiting a Helicopter, continued)

- 2.2.7 Secure any loose items (e.g., glasses, hats, caps, coats, etc.) that may blow away when approaching or exiting a helicopter.
- 2.2.8 Be alert when approaching the helicopter. Walk under the main rotor blades in a crouched position with your head held low. Use extreme caution.
- 2.2.9 Do not approach (or exit) an operating helicopter from ground that is higher than the ground on which the helicopter is sitting. This is especially true when the helicopter lands on uneven terrain, in a “saddle,” or on sloping ground.
- 2.2.10 Never approach, enter, or exit an operating helicopter from the rear.

2.3 Crew Resource Management

- 2.3.1 Fundamental to safe flight operations is Crew Resource Management (CRM) or the Total Crew Concept, also called the Multi-Crew Concept. Each crew member is trained to do their job and to demand that other crew members do theirs. Crew members actively monitor one another and give or solicit on-demand assistance as necessary. For patrols, the patrolman is considered a crew member.
- 2.3.2 All crew members operate as a coordinated and well-disciplined team with the pilot responsible for team management. Regardless of their role, a crew member is not required to conform with any procedure, technique, or other action that they believe is unauthorized or unsafe.
- 2.3.3 All crew members, dispatch, and management personnel, will always, exercise good CRM skills to enhance overall safety. These skills include but are not limited to:
 - Communicating effectively
 - Speaking up about hazards or concerns
 - Maintaining situational awareness
 - Actively working with the team (crew)
 - Using sound judgement to make decisions
 - Coordinating the crew in emergency and abnormal situations

2.4 Debriefing

- 2.4.1 Research has shown that a debriefing is a key ingredient to successful teams and improvement in both quality and safety.
- 2.4.2 After any mission, a “hot debrief” should be conducted. The hot debrief should address the following:
 - Provide feedback to involved personnel.
 - Identify areas of concern for follow-up.
 - Reinforce lessons learned.



Chapter 2, Patrolling and Ferry/Passenger Transport

2.5 Emergency Procedures

- 2.5.1 All onboard personnel must be aware of, and pilots should instruct everyone (see “Pilot’s Preflight Briefing”, section 2.10) covering at least:
- **Emergency Exits:** location and normal operation
 - **Emergency Seating Position WITH SHOULDER HARNESS** (four point OR single diagonal strap): sit in full upright position with head and back pressed against seat and use arms to brace in position. If time permits and so equipped, lock the inertial reel to shoulder harness.
 - **Emergency Seating Position WITH LAP Belt ONLY:** bend over as far as possible and hold onto your legs
 - Follow instructions of pilot
 - Snug seat belt and shoulder harness; secure gear
 - Assist any injured person who cannot leave the aircraft
 - Move clear of the aircraft only after rotor blades stop or when instructed to do so by the pilot
- 2.5.2 In the event of an emergency, the person in the front seat must know how to activate the PG&E tracking device.
- 2.5.3 After landing, follow pilot’s instructions. Assess situation after landing; render basic first aid and contact emergency services.

2.6 Flying in a Wire Environment

- 2.6.1 Required training: SAFE-0256, “Flying in a Wire-Obstruction Environment”. Training is required annually but divided into instructor led training (ILT) every three years and web-based training (WBT) each year in between. Refer to section 12.5 for currency requirements.

2.7 In-Flight Requirements

- 2.7.1 During a patrol, if more than one passenger is onboard, the person qualified with SAFE-0256 must be in the front seat. If the mission is just transporting individuals between two LZs, it is not required to have the SAFE-0256 qualified individual in the front seat.
- 2.7.2 When seated in the front seat of the helicopter do not touch any helicopter controls.
- Keep clear of the flight controls at all times
- 2.7.3 Secure items per the pilot’s instruction (see Appendix 10, Loose Items Storage System):
- Loose items inside of aircraft secured and manageable
 - All baggage secured in aircraft or cargo compartment
- 2.7.4 Wear seat belts and/or shoulder harnesses at all times when inside an operating helicopter.
- No movement inside aircraft without the pilot’s approval



Chapter 2, Patrolling and Ferry/Passenger Transport

(2.7, In-flight Requirements, continued)

- 2.7.5 Ensure the doors are securely latched before takeoff. Never slam the helicopter doors.
- 2.7.6 Follow the pilot's instructions at all times:
 - Unbuckle only when directed to do so by the pilot
- 2.7.7 Never throw any object from the helicopter.
- 2.7.8 Leave the doors closed until instructed otherwise; wait for the pilot's, or designee, authorization to unload any equipment.

2.8 Passenger Manifest

- 2.8.1 All passenger carrying flights (patrols, ferry, etc.) must have a manifest listing each passenger and their weight.
- 2.8.2 Helicopter Operations and the pilot must have a copy of the manifest. During the Dispatch Briefing (section 3.2), the pilot and PG&E Helicopter Operations Dispatcher review the manifest for accuracy and to verify and record any passenger changes. No passengers are allowed on the aircraft unless they are listed on the manifest. Any additions to the passenger manifest need to be approved by the respective Line of Business Leadership and the Helicopter Operations Dispatcher.
- 2.8.3 When the pilot arrives at the pick-up location and the passenger pick-up is different than what is on the approved manifest, the pilot must call the dispatcher (707-449-5833) to verify and record any changes. The pilot must call the dispatcher if:
 - Someone is a no-show.
 - A name is different than what is on the manifest. For example: Two people are listed, and two people show up, but one (or both), is different than what is listed on the manifest.
 - An additional person shows up, not listed on the manifest.

2.9 Patrolling a New or Unfamiliar Circuit

- 2.9.1 To enhance the quality and safety of the patrol, the pilot or patrolman must be familiar with the circuit being patrolled. When requesting a helicopter in Flight Vector:
 - If this is the patrolman's first-time to patrol a specific area, the person making the request should note in comments box: "First time patrolling this area for patrolman."
 - 2.9.2 When patrolling an unfamiliar or new circuit for the first time, follow these rules:
 - Begin with the highest voltage in the circuit. This provides the ability to observe wire crossings from the top down.
 - Prior to commencing work, the pilot and patrolman must brief using maps, photos, and other information necessary to perform the patrol safely.
- (List Continues)*



Chapter 2, Patrolling and Ferry/Passenger Transport

(2.9.2, continued)

- The pilot must concentrate on flying the aircraft that includes obstacle avoidance such as identification of wire crossings, antennae, and sensitive areas while providing the patrolman the best view possible to safely inspect the line.
- Conduct a high reconnaissance of a patrol segment. This provides the ability to observe wire crossings and other hazards from the top down. (See Appendix 16, Segmented Patrol.)
- The likelihood of seeing a wire in time to take evasive action is much greater at slower airspeeds—keep it slow.
- The lower the line voltage the more skills required. The greater complexity of the lower-voltage circuits increases the patrol workload.

2.9.3 During the flight:

- Do not become complacent. Look for visual cues (e.g., shiny new hardware, new poles, or road development) that may indicate changes occurring in the system.
- Do not expect line crossings to be marked. Be alert for other indications of "over" and "under" line crossings.
- Flight over wires should occur over the top of the structure of the highest-voltage line. This will normally assure passage over the highest wires.
- Line crossing and obstruction callouts are MANDATORY.
- During patrol, fly the helicopter with the skids (or wheels) above the highest wire on the structures. If descent below the highest wire is required for any reason, reduce speed to allow enough time to avoid hidden obstacles.
- The pilot's primary purpose is to fly the helicopter. The pilot should avoid performing the patrol observation function.
- When encountering new obstacles during a patrol, note the location on a chart or map for post-flight debriefing and future reference.
- Flight into a low (rising or setting) sun or haze may reduce the visibility of wires due to reflection and glare. Be very aware of this condition, especially when patrolling an unfamiliar circuit.
- When terrain conditions warrant, consider conducting the patrol on the downhill side of the wires. Evaluate wind speed and direction, attempting to patrol into the wind, if possible.
- Avoid judging distance from a wire, particularly stranded wire, based on visual reference to the wire only. The potential for illusions and misjudgment is high, especially in low-light conditions.
- Hovering and slow flight performance factors (Loss of Tail Rotor Effectiveness and Settling with Power) must be considered when patrol requirements dictate close observation of the circuit. Always "FLY NEIGHBORLY"



Chapter 2, Patrolling and Ferry/Passenger Transport

2.10 Pilot's Preflight Briefing

- 2.10.1 In accordance with 14 CFR §91.519 and §135.117, the pilot must review the preflight instructions with any person who will be aboard the helicopter. Preflight instructions must address the following items on the pilot's safety checklist.
- Operating the seat belts.
 - Operating the doors.
 - The best seating arrangement for the flight (who should sit where).
 - Locating and using the fire extinguisher.
 - Locating and using life jackets, if any part of the flight is over water (beyond gliding distance to shoreline).
 - Emergency escape procedures for hard landing on land or water.
 - Locating and using the communication system. The pilot should ensure that all necessary jacks, switches, volume controls, and headsets are in full operation at this time.
 - Emergency activation of the PG&E tracking device.
 - How to shut off the fuel and battery.
 - How to stop the rotor's rotation using the rotor brake.
 - Locating and reading the fuel gauge.
 - The best areas for storing maps, note paper, and other personal materials during flight.
 - Location of the first aid kit.
 - Location of the emergency locating transmitter (ELT) and activation procedures.
 - Review the use of the satellite phone (if needed).
- 2.10.2 In addition to the pilot's emergency safety checklist, the pilot must also address loose items safety (see Appendix 10, Loose Items Storage System):
- Loose items must be secured in the aircraft equipment bag or the baggage compartment. Loose items include, but not limited to, the following:
 - Hats
 - Work Vests
 - Hard Hats
 - Purses
 - Maps
 - Carry-on baggage:
 - Stowage of carry-ons must be attached to the Daisy Chain, secured in the storage compartment, or a canvas aircraft equipment bag.
 - How to stow items in aircraft equipment bag and retrieve them during flight if needed.
 - How items will remain secured during flight that will be used during flight to complete mission.
 - Doors on/off configuration and potential hazards.
 - Items that will not fit in the baggage compartment or the aircraft stowage bag will not be allowed on flight.



Chapter 2, Patrolling and Ferry/Passenger Transport

2.11 PG&E Preflight Tailboard

- 2.11.1 Following the pilot's pre-flight briefing and prior to any patrol or ferry, the responsible PG&E employee (or contractor) will provide the entire flight crew with a tailboard briefing (AVI-3001M-F02) to include, but not limited to:
- Scope of flight
 - Known hazards (e.g., line crossings, obstructions, livestock)
 - Each onboard person's role (purpose of flight) and responsibility
 - Anticipated need to hover (e.g., picture taking or detailed inspections)
 - Planned landings and shutdowns (e.g., snow surveys, water flow adjustments, switching)
 - Familiarity with specific circuit or area

2.12 Power Line Patrol Profile

Altitude

- 2.12.1 The power-line patrol altitude must be commensurate with the line being inspected with respect to the line voltage, structure height and width, construction type, hazards, terrain, weather conditions and obstacles.
- 2.12.2 The pilot must position the aircraft in such a manner to provide the optimum view of the line and structures by the patrolmen without sacrificing safety. If flying through National Forest, altitude must be above 200' AGL or 200' above treetops; see section 1.5.
- 2.12.3 The safe operation of the aircraft takes precedence over the observance of the line.
- 2.12.4 While patrolling, the skids of the aircraft must remain at or above the height of the structures.
- 2.12.5 The aircraft may descend below the height of the structures only for the purpose of a detailed inspection of a suspected structural issue, following a detailed reconnaissance of the area, and with little or no horizontal movement by the aircraft.

Airspeed

- 2.12.6 The power line patrol airspeed will be commensurate with the line being inspected with respect to the line voltage, structure height and width, structure construction type, hazards, terrain, weather conditions and obstacles.
- 2.12.7 The crew must remain constantly aware that, as the distance from ground decreases, hazards, obstacles, and distractions increase. Additionally, patrol airspeeds should decrease as the altitude above ground decreases.



Chapter 2, Patrolling and Ferry/Passenger Transport

(2.12, Power Line Patrol Profile - Airspeed, continued)

- 2.12.8 Table 2 identifies the maximum airspeeds for the respective line voltages. These airspeeds take into consideration the average patrol altitude, line and structure size, the effects of visibility science, and the presumption of hazard potential. These speeds are applicable for all LOBs (e.g., Hydro, Veg Management, Environmental, Compliance, etc.) utilizing helicopters in the close proximity of power lines.

Table 2: Maximum Patrol Airspeed Over Power Lines

Line Voltage	Maximum Airspeed *
4kV – 21 kV	30 Knots Ground Speed
60kV – 115kV	60 Knots Ground Speed
230kV	80 Knots Ground Speed
500kV	90 Knots Ground Speed
* The crew must use judgement as to the speed appropriate for each specific segment of the patrol. Situations may require significantly slower patrol speeds than those listed.	

2.13 Safety Around Helicopters

- 2.13.1 An operating helicopter is approached only as described in section 2.2, “Boarding/Exiting a Helicopter” (see Appendix 5, Helicopter Safety Chart).
- 2.13.2 No explosives, flammable material, or other hazardous materials (HAZMAT), as identified in DOT HAZMAT Regulations, are placed on board any aircraft without proper DOT shipping papers.
- 2.13.3 All employees must remain well outside of the landing zone when the helicopter is taking off or landing.
- 2.13.4 Motorized vehicles approaching the helicopter and/or equipment must never drive under the rotor blades, unless instructed by the pilot.
- 2.13.5 Employees must not lift their arms or carry objects extending above head level when approaching or working near a helicopter.
- 2.13.6 Wear PG&E-approved eye and hearing protection when near an operating helicopter.

2.14 Unplanned Landings

- 2.14.1 During a patrol or ferry flight, there may be an unplanned event onboard the helicopter. This could happen away from an airport or designated PG&E helicopter landing zone in a remote location.



Chapter 2, Patrolling and Ferry/Passenger Transport

(2.14, Unplanned Landings, continued)

- 2.14.2 Unplanned landings may be caused by a warning light, medical emergency, weather, or to inspect PG&E damaged facilities. A chip light or engine failure could cause an immediate landing.
- 2.14.3 An event may require both the patrolman and the pilot to quickly work together. The patrolman should assist the pilot in identifying a suitable landing area. The pilot may not see a safe area to land from their side of the helicopter; the safe location might be on the patrolman's side—call this out. In such a situation:
- Speak clearly and loudly.
 - Say what you see (“I see a small meadow on the hillside.”).
 - Use the clock method when possible.
 - Point to the area you see. This will help the pilot to identify the site to determine if the site is suitable.
- 2.14.4 IF there is a hazard, as you get closer to the LZ site,
THEN identify the hazard to the pilot (e.g., “I see a fence on the bottom part of the meadow.”). The pilot can then avoid the hazard.

Need to Land

- 2.14.5 IF the pilot and patrolman need to land at a remote site they have not previously used,
THEN follow this procedure:
1. Use a sterile cockpit posture and limit conversation to previously agreed callouts on the approach.
 2. Perform a high reconnaissance of the area you have selected for landing.
 3. Continue the high reconnaissance down to the tree top level.
 4. Look for:
 - Conductors near the LZ
 - Trees that could potentially fall
 - Wires attached to trees; sometimes seen as wire shadows on the ground
 - Loose dirt and debris; brown-out conditions
 - Level surface
 - Ground hazards
 - Safe clearance from the end of the rotor to a stationary object.



Chapter 2, Patrolling and Ferry/Passenger Transport

2.15 Useful Equipment

- 2.15.1 During a patrol, the patrolman may consider some useful equipment to have available, in addition to other items (e.g., charts, maps, etc.) specific to the patrol type:
- Kneeboard; something to take notes on
 - Binoculars; for close-up observations
 - Camera; any necessary pictures

2.16 Water Safety

- 2.16.1 Approved personal flotation device (PFD) standards are specified for over water operations per federal regulations 14 CFR Part 91 §205.
- **14 CFR Part 91 §205 (12)** – If the aircraft is operated for hire over water and beyond power-off gliding distance from shore, approved flotation gear readily available to each occupant and, unless the aircraft is operating under part 121 of this subchapter, at least one pyrotechnic signaling device. As used in this section, “shore” means that area of the land adjacent to the water which is above the high-water mark and excludes land areas which are intermittently under water.

NOTE

HEC employees are required to wear auto inflatable PFD when operating over water beyond the gliding distance of the aircraft.

- 2.16.2 When conducting operations over water beyond the gliding distance to shore, approved PFD must be readily available by each individual on board the aircraft and during all helicopter hovering flights over water sources such as lakes and coastal waters.
- 2.16.3 Automatic inflation (e.g., water activated) personal flotation devices are not allowed inside the cabin of the aircraft.



Chapter 2, Patrolling and Ferry/Passenger Transport

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Chapter 3, Communications

Chapter 3, COMMUNICATIONS

3.1 Introduction

- 3.1.1 Unless engaged in required flight communication, helicopter pilots flying on PG&E business must continuously monitor the radio frequency 123.025. This frequency is the single frequency for monitoring helicopter-to-helicopter air traffic in any given area. Having all pilots monitor 123.025 enables ongoing communication between pilots working with different departments when they are flying in the same geographic locations. Upon visual contact with another helicopter in the same proximity, use this frequency to communicate with the other pilot.
- 3.1.2 When operating in or travelling through the Bay Area airspace, pilots must monitor frequency 124.300.
- 3.1.3 Hydro pilots communicate through switching centers operated by Power Generation (Hydro). Patrol and ferry flight pilots supporting Hydro operations (but not directly assigned to a Hydro base), refer to PG-2021S for communications with Hydro switching centers.

3.2 Dispatcher Briefing

- 3.2.1 Prior to the first flight of the duty day, pilots flying on PG&E property must check in with Helicopter Operations Dispatcher 707-449-5833 for a flight briefing. Pilots must complete a Flight Risk Assessment before departing from their hangar or airport (see AVI-3001M-JA05, HO Vendor FRA Required Elements).
- 3.2.2 Please have the request number handy to expedite flight briefing; briefing covers the following:
- Request number
 - Helicopter tail number
 - Fuel Hours/Mins and LBS
 - Work location
 - Overnight location (if multi day project)
 - Verify
 - Number of passengers
 - Passenger Names (LanID if PG&E employee)
 - Additional passengers not on request (if needed)
 - Passenger's weight
 - Weather reports (Current and Forecast)
 - NOTAMS
 - Temporary flight restrictions
 - Low altitude PGE traffic advisories to be performing work in close proximity
 - Special airspace notifications (e.g., restricted areas, MOAs, laboratories, nuclear plants, power plants, prisons, refineries)
 - Any additional pertinent info to discuss

Chapter 3, Communications

(3.2, Dispatcher Briefing, continued)

- 3.2.3 IF on a patrol and the troublemen would like to patrol lines not listed on the request form, THEN notify the dispatcher of the additional lines.
- 3.2.4 Additionally, IF lines are listed on the request form to be patrolled and will not be patrolled, THEN please notify the dispatcher. This eliminates the need for the dispatcher to brief other pilots working in the proximity of the electric line or the line being patrolled.
- 3.2.5 When starting engines, verify that the tracker is turned on and reporting normally. The unit should always be on if it is a PG&E revenue flight.
- 3.2.6 IF a pilot notices an irregularity, THEN please notify your maintenance department and PG&E Helicopter Operations Dispatcher.
- 3.2.7 IF a pilot has any fuel stops planned for the day THEN please advise dispatcher. There could be some fuel pumps out of service, where NOTAMS have not yet been filed, but maybe reported by other pilots to the dispatcher.
- 3.2.8 IF landing at an airport and the fuel pumps are inoperative, THEN notify the dispatcher. Dispatcher can provide support by notifying the airport management and any other pilots planning to stop at that airport.

3.3 Relaying Information – Ground to Ground

- 3.3.1 In isolated locations during long-line operations, pilots may be required to relay communications between two ground positions not able to communicate directly.

3.4 Special Airspace

- 3.4.1 In addition to contacts listed in this chapter, numerous small installations require special communications or notifications. The Helicopter Operations Dispatcher maintains a current list (the Helicopter Operations Dispatcher maintains an active list of Special Airspace Contacts) and will advise the pilot, as necessary, when checking in before the day's operation.
 - Mt. Lassen (Rodgers Flat)
 - Sierra NF Wilderness (Angel's Camp)
 - Sequoia / Kings Canyon NP (Auberry)
 - Three Lakes Wilderness / Rodgers Flat
- 3.4.2 Diablo Canyon Power Plant is a very critical special airspace installation, with unique communication requirements, follow communications in Appendix 12, DCPD.

Chapter 3, Communications

3.5 China Lake

- 3.5.1 PG&E has gas lines requiring patrol within the China Lake restricted area (R-2505).
- 3.5.2 China Lake does not provide a Letter of Agreement with PG&E for access to their restricted area, R-2505.
- 3.5.3 China Lake requires **14-business day's** notification prior to any work within the restricted area R-2505. Contact Helicopter Operations (707-449-5832) early enough to allow them to secure approval before the 14-day requirement.
- 3.5.4 Helicopter Operations will provide further instructions when they secure access.

3.6 Edwards Air Force Base

- 3.6.1 PG&E has gas lines requiring regular patrols within the Edwards Airforce Base restricted area (R-2515). In addition to R-2515, Edwards AFB also manages restricted area R-2508.
- 3.6.2 Per PG&E approved Letter of Agreement (dated 02 Oct 2015), access to these restricted areas (R-2515 and R-2508) requires 5-business day's prior notification. (Refer to Helicopter Operations Dispatcher for copy.)
- 3.6.3 The Helicopter Operations dispatcher contacts either of the following for access and prior approval:
 - Airspace Manager – 412OSS.OSO.R-2515AirspaceMgr@us.af.mil
 - Airspace Management – 661-277-2515
- 3.6.4 Upon authorization, the Helicopter Operations Dispatcher is provided an Operations Number for the specific mission. The dispatcher provides the Operations Number to the pilot at the morning pilot's briefing.
- 3.6.5 Pilots must contact Sport MRU on 132.75 prior to entering the R-2515 area; the pilot must have the approved operations number to facilitate access.
- 3.6.6 First time pilots check with Helicopter Operations Dispatcher about requirements for new briefing at Edwards AFB. (See Appendix 13, Edwards AFB Pilot Briefing.)

3.7 Vandenberg Air Force Base

- 3.7.1 Mission requests must provide adequate time to secure prior approval. Prior approval is required before entering Vandenberg (VBG) air space (R-2516, R-2517, R-2534a, and R-2534b) to attend and/or repair PG&E equipment. Approval is limited to specific aircraft (by tail number); the Helicopter Operations Dispatcher maintains an active list of authorized helicopters.
- 3.7.2 Helicopter Operations Dispatcher contacts Vandenberg for prior approval and informs the pilot during the morning briefing of the current operation's number.



Chapter 3, Communications

(3.7, Vandenberg Air Force Base, continued)

- 3.7.3 Prior to entering the VBG controlled airspace, the pilot Contacts the Western Range Control Center, call sign "Frontier Control," on VHF 121.4 MHz or UHF 256.0 MHz. Frontier Control coordinates the flight with Vandenberg Tower and Los Angeles Center/Santa Barbara TRACON (Terminal Radar Approach Control Facility). Be sure to pass them the current operations number (provided by Helicopter Operations Dispatcher), which has been scheduled and approved through 2ROPS/DON.
- 3.7.4 IF unable to contact Frontier Control on frequencies VHF 121.4 MHz or UHF 256.0 MHz, THEN contact Vandenberg tower directly at VHF 124.95.
- 3.7.5 The Helicopter Operations Department updates the VBG Overflight agreement annually.

3.8 Yosemite National Park

- 3.8.1 Yosemite National Park (NP) Aviation Manager provides guidelines to PG&E for operating helicopters within Yosemite National Park. The Helicopter Operations Dispatcher maintains a current agreement with Yosemite NP.
- 3.8.2 A PG&E patrolman or trouble-man contacts Yosemite Park Aviation Manager providing adequate notice prior to a flight.
IF the Yosemite Park Aviation Manager (209-756-8142) cannot be reached,
THEN contact Yosemite Emergency Communications Center (209-379-1999).
- 3.8.3 Helicopters remain under the operational control of PG&E Helicopter Operations Department while performing maintenance on power lines within Yosemite NP.
- 3.8.4 The Helicopter Operations Department updates the Yosemite NP Aviation Management SOP annually.

Chapter 4, Selecting a Landing Zone

Chapter 4, SELECTING A LANDING ZONE

4.1 Introduction

- 4.1.1 All LOBs must be familiar with AVI-1003S, “Helicopter Landing Zone Standard”, published in the Guidance Document Library.
- 4.1.2 A PG&E/contractor employee must initially select a landing zone (LZ); however, the pilot retains the right to change or modify that selection if potentially unsafe conditions exist. This may require the pilot to establish radio communications with ground personnel (PG&E and/or helicopter support) to resolve any unsafe conditions before landing.
- 4.1.3 Use the job aid “LZ Preparation Checklist” (AVI-3001M-JA03, in Appendix 2, Job Aids) during the pre-job planning (site walk-down) when selecting a temporary LZ at any construction site. This job aid helps ensure safe conditions for both the pilot, the employees, and the public in and around the LZ.

4.2 Approach/Departure Path

- 4.2.1 Site selection should provide for approaches and departures in several directions. If the site is not located on a ridge top, an approach/departure path aligned with the prevailing wind should be identified. If possible, avoid one-way landing sites; or find an alternative LZ site.
- 4.2.2 When possible, locate landing areas to make takeoffs and landings into the prevailing winds.
- 4.2.3 Before landing do a hover/performance check.
- 4.2.4 The pilot should do a reconnaissance flight to assess if the LZ is suitable and large enough with proper 50% safety clearance on both sides before landing. Also consider the overall length of the helicopter, including the tail rotor.

4.3 Full Performance Takeoff and Landing

- 4.3.1 Vertical approaches and departures are not inherently unsafe, but should be avoided if possible, especially on an extended-use basis.

4.4 Hydro Specific

- 4.4.1 Hydro classifies LZs as yellow or green, based on performance and/or access. Pilots must meet certain training standards for these LZs; see job aid AVI-3001M-JA04, Yellow/Green Requirements.
- 4.4.2 Pilots flying in Hydro areas must also be familiar with the Hydro requirement PG-2021S, “Helicopter Flight Approval, Request, and Change.”
- 4.4.3 Helicopter Operations maintains a list of all Hydro LZs.

Chapter 4, Selecting a Landing Zone

4.5 Landing in Snow Areas

- 4.5.1 Depth perception on snow is often poor (known as “flat light” condition). It is important to mark clearly the landing site with objects of contrasting colors. If possible, and a ground crew is available, tamp the area thoroughly inside the safety circle.
- If surfaces are icy, avoid locations that are over a 6-degree slope (9:1). Choose a site large enough and flat enough to keep main- and tail-rotors clear of obstacles. Test the surface and load-bearing capability of the touchdown pad area to avoid snow bridges, thinly covered crevasses, crusts, and cornices.
 - Helicopters that operate in snow areas are usually equipped with snow pads, which function similarly to snowshoes by spreading the weight of the helicopter over a larger load-bearing area. It is the pilot’s responsibility to determine if a landing can be safely made in snow conditions, with or without snow pads.

4.6 Landing Near Schools

- 4.6.1 The State of California has a law governing landings and departures of helicopters at children’s schools. Public Utilities Code (PUC) Section 21662.5 states, in part, that, with limited exemptions, “no helicopter may land or depart in any area within 1,000 feet, measured by air line, of the boundary of any public or private school maintaining kindergarten classes or any classes in grades 1 through 12, without approval of the department [*i.e.*, Caltrans].” In response, the Division of Aeronautics developed and oversees the Helicopter Landing Authorization (HLA) program, as described in California Code of Regulations (CCR), Title 21, Section 3532(c).
- 4.6.2 Verify that the LZ is not within 1,000 feet of a school, grades K – 12.
- IF the LZ is within 1,000 feet of a school (grades K – 12),
 THEN notify Helicopter Operations Department, to inform vendor they need proper approval. Landing within 1,000 feet of a school (grades K–12) is prohibited without advance approval from California Department of Transportation (see 21 CCR §3532, (c) (1) or online at **Caltrans** (<http://www.dot.ca.gov/>) / **A to Z** tab / **Aeronautics** (link) / **Airports** (link) / **Heliport Permitting**).

4.7 LZ Review and Maintenance

- 4.7.1 For LOBs, such as Hydro, Electric Operations, and TeleCom, that regularly use identified or assigned LZs, the primary LZ LOB is responsible for maintaining the landing zone in proper condition. This includes a physical review at least every two years, using the “LZ Maintenance Review Checklist”, AVI-3001M-F03 (see Appendix 2, Job Aids, and the LZ specific data plate; data plates are available from Helicopter Operations.

4.8 National Forest

- 4.8.1 The United States Forest Service has specific requirements when landing helicopters in National Forest. (See section 1.5.)

Chapter 4, Selecting a Landing Zone

4.9 Property Access

- 4.9.1 Do not assume that any suitable piece of property can be used for an LZ over an extended period without first determining ownership. This should be addressed in the advanced planning and is often overlooked in the rush to establish an LZ on short notice. It should not happen with the advance planning time available for projects. Address site approval issues during the site selection and planning process.
- 4.9.2 When an LZ is not on PG&E property, contact the PG&E LOB representative and/or the PG&E Land Department to secure permission or waivers from the landowner.

4.10 Site Selection

NOTE

See **AVI-3001M-JA03**, LZ Preparation Checklist, Appendix 2, Job Aids

- 4.10.1 The PG&E employee must consider the following when selecting a proper helicopter landing zone.
- See section 4.11, **Touchdown Pad and Safety Circle Dimensions**, on page 38.
 - Try to find an area that allows the pilot to land and take off with as shallow an approach as practical and into the wind. Pilots prefer **not** to land and take off vertically.
 - Is site accessible for fuel truck, if needed; if not, identify alternate fueling site.
 - Is there enough room to ensure vehicles are an appropriate distance from the LZ pad (or touchdown area) to prevent damage from flying debris?
 - Helicopter landing zones should be as safe and secure as possible, ensuring public and employee safety. The landing zone should be relatively smooth with a slope of not more than 6 degrees. The landing zone should be free of hazards, including but not limited to:
 - Non-authorized people
 - Trees or tall brush
 - Fences
 - Large rocks
 - Towers or poles
 - Overhead wires
 - Dust and small pieces of debris
 - Vehicles
 - Fresh snow (snow can be tamped down)

Pilot Responsibility

- 4.10.2 The pilot is responsible for making the decision to use an unimproved landing site. The PG&E employee on board may make a recommendation, but must defer to the pilot's judgment, even if the pilot's preferred site is at a distance from the desired location.
- 4.10.3 Conversely, both the PG&E employee or pilot has the option to advise that they do not feel comfortable landing at a site selected and may decline to land at the site.



Chapter 4, Selecting a Landing Zone

(4.10, Site Selection, Pilot Responsibility, continued)

- 4.10.4 Prior to landing at an unimproved site, the pilot must make a high-level and low-level reconnaissance of the area to determine the location of any aerial hazards in the approach or departure path and to determine wind conditions, slope, ground stability, rotor clearances, ground hazards, and size of touchdown area.

PG&E Responsibility

- 4.10.5 Ground crew must remove any objects, in a minimum 200-foot diameter, that may be drawn into the main or tail rotor or fly up during landing and takeoff. Objects that could cause problems include, but are not limited to:

- Tarps
- Ropes
- Lumber or nails
- Traffic Cones
- Paper, cartons, or boxes
- Pieces of glass
- Cans
- Pieces of wire
- Any trash or other debris
- Check for livestock in the area
- Excessive Dust (mitigation: water truck)

4.11 Touchdown Pad and Safety Circle Dimensions

- 4.11.1 The touchdown pad is a designated area, which may have a prepared or improved surface, at the LZ used for takeoff, landing, or the parking of helicopters.
- 4.11.2 The safety circle is a zone that provides an obstruction-free area on all sides of the touchdown pad. For LZs, the only items that should be within the safety circle are a fire extinguisher, a pad marker, and if applicable, external loads awaiting transport. A fuel truck may also be within the safety circle.
- 4.11.3 When there are multiple helicopters at a LZ, safety circle dimensions may or may not provide adequate clearance and separation between helicopters when rotors are turning.
- 4.11.4 Use adequate separation distances when laying out the LZ (refer to Table 3 on the next page). These recommended distances are not mandatory but used to provide safe separation between helicopters.
- When helicopter makes/models are known, the rotor-to-rotor separation dimensions may be used as a guide to provide safe separation between helicopters.
 - When helicopter makes/models are unknown, it is recommended that the pad-to-pad separation dimensions be used as a guide to provide safe separation between helicopters.

Chapter 4, Selecting a Landing Zone

(4.11.4, continued)

Table 3: Recommended Safe Helicopter Separation on LZ

Type ¹	Landing Pads		LZs with Multiple Aircraft	
	Touchdown Pad	Safety Circle	Rotor-to-rotor Separation	Pad-to-Pad Separation
1	30' x 30'	110'	100'	200'
2	20' x 20'	90'	75'	125'
3	15' x 15'	75'	60'	90'

¹ Refer to Appendix 4, Selecting an Aircraft, for additional information about helicopter types.



Chapter 4, Selecting a Landing Zone

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Chapter 5, Tailboard Briefing for Crews

Chapter 5, TAILBOARD BRIEFING FOR CREWS

5.1 Introduction

- 5.1.1 Conduct tailboards in accordance with CSP 1115 (always refer to current copy of CSP):

Tailboard briefings associated with helicopter operations shall be held at the immediate jobsite. (a) All crew personnel and helicopter company employees and associated contractors shall attend the tailboard briefing. If the work commences prior to the helicopter arriving, an additional tailboard shall be conducted prior to the commencement of helicopter work procedures. (b) All crew members and the helicopter company employees shall attend the tailboard to facilitate a common understanding of the work to be accomplished, the procedures which will be utilized to accomplish the work and role/responsibilities of all involved. During the tailboard all equipment including the helicopter shall be shutdown to allow all employees the ability to clearly hear, understand, and question the details of the planned work assignments during the tailboard discussion.

- 5.1.2 A tailboard briefing is a pre-work meeting or discussion held in a safe location, (usually at the job site or LZ), to discuss job activities before starting the work and again at any time conditions at the job site change (e.g., work scope or activities change, crewmembers change, new equipment introduced, contractor activities change, environmental changes (weather), etc.). Tailboard briefings encourage employee involvement and participation.

WARNING

Any deviation from the requirements stated in this chapter must be approved (verbal or written) prior to the start of the job by the superintendent or manager.

- 5.1.3 To ensure safe operations, the LZ-Lead must remain at the landing zone during all helicopter operations.

5.2 Before the Tailboard

- 5.2.1 Each work site must have an LZ-Lead or EIC (employee in charge) as the person responsible for all helicopter operations in and around the LZ. The EIC must have the latest copy of both (see section 7.8 for a complete list of LZ requirements):
- The AVI-3001M, *Helicopter Operations Field Manual* (HOFM) **at the work site/LZ.**
 - Their department specific ERP/EAP.



Chapter 5, Tailboard Briefing for Crews

(5.2, Before the Tailboard, continued)

NOTE

Construction Projects – Anytime a flight requires a construction employee to fly ahead for a reconnaissance of upcoming work, (e.g., veg management, towers, distribution, etc.) the flight must be at 1000' or above. If the employee is current with SAFE-0256, they may perform the reconnaissance at a lower patrol altitude.

- 5.2.2 Before starting work, the pilot must perform a thorough survey (aerial or on the ground), as appropriate, preferably with the employee in charge. However, non-crew personnel are not allowed in restricted category aircraft. (see Appendix 1, Glossary for **Restricted Category Aircraft**, on page 123.)

5.3 Changing Conditions / New Crews

- 5.3.1 IF the job tasks or conditions change—including the arrival of additional workers or aircraft —THEN the employee-in-charge **conducts additional tailboards and documents as necessary.**

5.4 During the Tailboard – Responsibilities

- 5.4.1 Tailboard briefings associated with helicopter operations must be held daily at the primary work site or LZ. All PG&E crew personnel, affected helicopter company employees (including fuel truck drivers, mechanics, any outside contractors, etc.), and any additional personnel involved with the helicopter operation must attend the tailboard briefing to facilitate a common understanding of the work to be accomplished, the procedures to be used to accomplish the work, and the roles/responsibilities of everyone involved.
- 5.4.2 All personnel not involved with the helicopter operation **must remain outside of a 200-foot radius of the operations** at the LZ or receiving sites.
- 5.4.3 **During the tailboard, all HEC qualification ¹ cards must be checked by the employee in charge for specific qualification of work being performed. HEC employees must include their total body weight (with equipment) on tailboard signature sheet** (see paragraph 11.1.4).
- 5.4.4 Communicate the specific PG&E radio channel to all employees who are involved in the helicopter safety tailboard. Ensure that affected work site employees check their radio units to make sure the units are on the correct frequency and operating properly. Pilot's may be required to relay information between ground crews (see section 3.3).

¹ Learning Services processes, issues, and monitors work crew qualification cards.



Chapter 5, Tailboard Briefing for Crews

(5.4, During the Tailboard, continued)

- 5.4.5 The emergency plan must be discussed with the pilot, contractors, fuel truck driver, etc., during the tailboard briefing (e.g., ERP and evacuation plan).
- 5.4.6 Ensure that all members of the crew are clothed properly and are wearing the required personal protective equipment (PPE) listed below (applies to HEC or working in LZ and/or materials site—including any/all receiving sites):
 - Approved eye protection (goggles or safety glasses)
 - Hearing protection
 - Appropriate clothing
 - Hard hat with chin strap
 - Gloves
 - Dust protection (if necessary)
- 5.4.7 Shut down all equipment, including the helicopter, so employees can clearly hear, understand, and question the details of the planned work assignments.
- 5.4.8 The employee in charge is responsible for informing the helicopter pilot whether the line being worked on is energized or de-energized. This includes any supplemental lines on structures (e.g., distribution under-built facilities on transmission structures).
- 5.4.9 The employee in charge must tailboard the helicopter pilot on the proper work procedures to be used, ensuring the safety of the workers and of the pilots at all times. The employee in charge must ensure that there is a minimum clearance of 30 feet between any energized power line and any part of the helicopter and load combination, unless under the direct supervision of a qualified electrical worker.
- 5.4.10 **For Linework** – Before any helicopter operations begin, the pilot must be informed of the locations of the grounding devices, on the line section they are working on.
- 5.4.11 Determine who will signal the pilot from the ground. Only one designated person at each landing zone (including receiving sites) is authorized to give the pilot hand/head signals during the operation. Review Appendix 6, Helicopter Hand and Head Signals, with the designated employee. Ensure that the pilot can easily recognize the designated signaler.
- 5.4.12 Ensure the TB briefing covers standard helicopter hand/head signals with the designated employee(s) during the to help reduce the risk of confusing or misunderstood hand signals. (Refer to Appendix 6, Helicopter Hand and Head Signals.)
- 5.4.13 When using head signals, mark the top of the hard hat with black tape in a “V” or “X” so the pilot can easily see and understand signals.
- 5.4.14 Public safety must be addressed at every tailboard to mitigate all risks from PG&E flight operations. Identify all public safety hazards, whenever possible, prior to the day of the flight. All hazards must be identified and mitigated before the flight. If conditions change, the pilot and crew must re-tailboard to discuss the changing conditions.



Chapter 5, Tailboard Briefing for Crews

(5.4, During the Tailboard, continued)

- 5.4.15 Public safety hazards include, but are not limited to, the following:
- Livestock
 - Railroad tracks
 - Recreation areas
 - Walking or hiking trails
 - Schools
 - Flight over and near roads (vehicles may need traffic control)
 - Restricted flight times due to winds, traffic, *etc.*
 - Dust
 - Noise
 - Bystanders
 - Other aircraft
- 5.4.16 IF traffic control is used in conjunction with any helicopter operations, THEN:
- Traffic control must verify two-way communication via radio with helicopter pilot
 - Traffic control representative must attend the helicopter operations tailboard

5.5 Helicopter Late Arrivals

- 5.5.1 If a helicopter arrives after the morning briefing, then the pilot(s) **MUST**, before performing any work:
- Receive a supervisor's or lead person-in-charge briefing on work to perform
 - Sign documentation that briefing took place
 - Do an aerial reconnaissance of the pick-up and drop-off sites

5.6 Tailboard Verification

- 5.6.1 All personnel attending a tailboard must sign the signature page. This includes:
- All PG&E employees
 - Pilot (and any support crew)
 - Contractor personnel
 - Other visiting personnel
- 5.6.2 For a joint tailboard at multiple locations via phone or radio, all sites must have a signature sheet (see examples in Appendix 9, Tailboard Checklists).

Chapter 6, Emergency Response and Action Plan

Chapter 6, EMERGENCY RESPONSE AND ACTION PLAN

NOTE

PG&E aircraft, or contracted aircraft, should not be considered the first option for emergency evacuation – call 911.

6.1 Introduction

- 6.1.1 Chapter 6 describes the procedures for addressing a medical emergency and requesting an air ambulance (see LOB, *Emergency Response Plan/Emergency Action Plan*). It also contains instructions for ensuring that the EMS pilot finds the location and is able to land safely.
- 6.1.2 In all cases, guidelines in this chapter conform to PG&Es *Code of Safe Practices*, section 204 (always refer to latest revision of CSP):
- (a) A person with serious injuries shall only be moved if they are in danger of being further injured, such as from fire, collapse of a building, or automobile traffic. Improper handling of an injured person may cause additional injury or the complication of an existing injury.
 - (b) If emergency medical services as described in the First Aid Plan are delayed or unavailable, transport the victim by the best method available, taking care not to cause additional injury or complicate an existing one.
 - (c) Seriously injured persons shall be moved on a stretcher or in a lying-down position whenever possible.
 - (d) Transport persons with open wounds or where there is potential for exposure to body fluids in accordance with the Company's Bloodborne Pathogen Exposure Control Plan, as described in Safety and Health Environment, Procedure 233.
- 6.1.3 In case of an emergency that may result in a serious personal injury or property damage, rules may temporarily be modified or suspended as necessary to permit expediting the emergency. In any such cases, the person so acting, will be fully accountable for the reasonableness of such actions and for any incident or service interruption that results from such actions. (See section 1.11, for reporting an incident or accident.)
- 6.1.4 Employees must follow their organization's emergency response procedures.

6.2 Air to Ground Communication

- 6.2.1 Helicopters have basic air-to-air communication with any aircraft for flight safety purposes. When practical, to support rescue, the contract helicopter can guide and inform EMS helicopter of weather/ground conditions or location of the injured person.
- 6.2.2 As soon as a visual sighting of the helicopter is confirmed, provide the pilot with a pinpoint location of the accident site. This information is best communicated by one of the following methods:
- (List Follows)

Chapter 6, Emergency Response and Action Plan

(6.2.2, continued)

- Radio
- Strobe light
- Displaying red signal flags or waving bright clothing
- Power flare/battery light

6.2.3 On approach, the pilot will fly over the scene to evaluate the potential landing zone(s) nearest the injured. The pilot will also look for hazards associated with the rescue before performing a rescue or landing.

6.2.4 The PG&E work site LZs may be the locations for air ambulances to land. If the LZ can only support one helicopter the contract helicopter must move.

6.3 Emergency Requests

6.3.1 All requests for emergency helicopter transportation or ground ambulance must be made through 911 or the appropriate Power Generation switching center using the latest copies of the LOB *Emergency Response Plan* (ERP) or the *Emergency Action Plan* (EAP). A PG&E employee requesting a helicopter (or ground ambulance) for emergency reasons must provide the information in sections 6.4 and 6.6, of this chapter.

6.3.2 For air medivac or rescue call the California Highway Patrol (CHP) Air Operations 911 Dispatcher directly; the dispatcher will coordinate. Table 4 shows PG&E areas with corresponding CHP division numbers.

Table 4: CHP Air Operations 911 Direct Contact Numbers

PG&E Regions	CHP Air Operations	CHP Phone Number
Humboldt Reading/Red Bluff	Northern Division	530-242-3210
Sacramento Sierra Foothills /Sonoma Stockton	Valley Division	916-861-1300
Sonoma SF Bay Area (North/East Bay) Peninsula San Jose	Golden Gate Division	707-641-8300
Yosemite Fresno Kern County /Bakersfield	Central Division	559-262-0400
Central Coast /Salinas Paso Robles	Coastal Division	805-593-3333
Kern (Mojave-Barstow)	Inland Division	909-428-5400
Note: PG&E Regions and CHP Division do not precisely overlay; in some adjacent areas the CHP Dispatcher may redirect your call.		

Chapter 6, Emergency Response and Action Plan

6.4 Hospitals

- 6.4.1 Do not use PG&E helicopters or contracted helicopters to fly anyone to a hospital. Caltrans maintains a list of hospitals equipped with Heliports, found online at: <http://www.dot.ca.gov/hq/planning/aeronaut/helipads/dataplates/index.htm>
- 6.4.2 To access with a smart phone or tablet: access California Department of Transportation (www.dot.ca.gov), click the A to Z tab, then **Aeronautics**, then **Airports** link, then **Hospital Heliport Dataplates**.

6.5 Providing Medical Information

- 6.5.1 Gather as much emergency medical information as possible, providing the following information to the Emergency Medical Service (EMS) 911 Dispatcher.
- State the medical emergency in as much detail as possible.
 - Describe the condition of the person(s) needing attention in as much detail as possible.
 - Request a rescue helicopter, if an injured victim is on the ground in an inaccessible area without an accessible LZ.
 - Give the name and department of the person requesting the helicopter.
 - State the number of people in need of emergency transportation.
 - Give the time of the incident.
 - Supply any other information that the 911 Dispatcher requests.

6.6 Providing Physical Information

- 6.6.1 Give the location of the injured employee(s) on the ground for aerial rescue.
- 6.6.2 Provide information on possible landing areas, including:
- Type of terrain:
 - Hazards or obstacles in the area, wires, trees, *etc.*
 - How the area will be marked.
 - Approximate elevation.
 - Describe the visibility in the rescue area.
 - Give the temperature and weather conditions.
 - Describe the wind speed and direction.
 - Describe any special conditions or provide other instructions.
 - Provide global positioning system (GPS) coordinates, when available.
- 6.6.3 IF using radios,
THEN provide emergency dispatcher with your radio information.



Chapter 6, Emergency Response and Action Plan

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Chapter 7, General Requirements for External Loads (Cargo)

Chapter 7, GENERAL REQUIREMENTS FOR EXTERNAL LOADS (CARGO)

Training Required: TECH-0002WBT.

7.1 Approved Rigging

WARNING

Do NOT use MULETAPE® during any helicopter operations. This product is intended for underground cable installation. See Appendix 14, MULETAPE® Restriction and Warning.

NOTE

Slings must ALWAYS be protected from cutting and damage by edges, corners, protrusions, and abrasive surfaces that come in contact with the sling.

When cribbing slings, use material of sufficient strength, thickness, and construction to prevent damage and catastrophic sling failure.

- 7.1.1 The pilot and crew must inspect and use only approved and rated rigging components (*i.e.*, clevises, shackles, grapples, and fiber or wire rope slings) that are properly tagged or stamped. Refer to PG&E documents:
- SAFE-1016S “Rigging Safety Standard”
 - TD-2327P-01 “Selecting and Caring for Ropes, Knots, Splices, and Slings”
 - TD-2888B-095 “Cribbing for Rigging Component Protection”
- 7.1.2 Labels (tags or stamps) on clevises, shackles, grapples, or fiber and wire rope slings must be visible and legible; refer to TD-2327P-01, “Selecting and Caring for Ropes, Knots, Splices, and Slings”, for additional information.



Chapter 7, General Requirements for External Loads (Cargo)

(7.1, Approved Rigging, continued)

- 7.1.3 When hauling wire spools to a job site, ensure they are properly rigged (Figure 2) to prevent spinning.

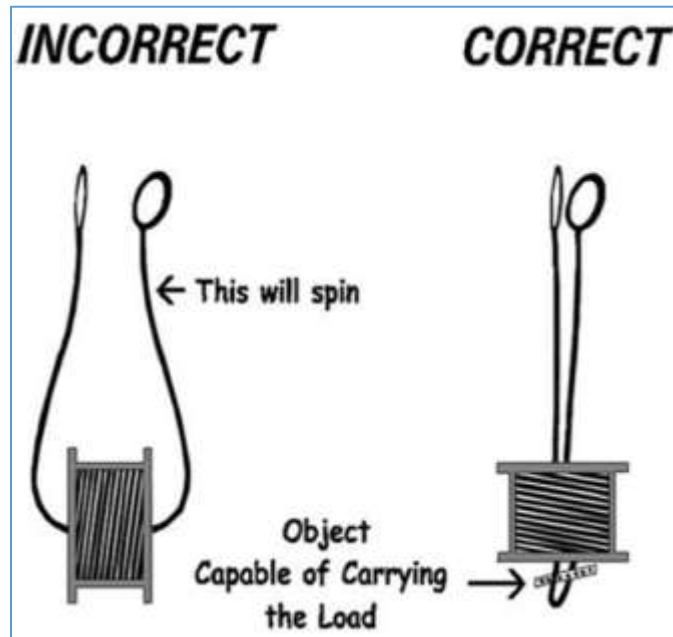


Figure 2: Rigging Wire Spools

7.2 Cargo Nets

- 7.2.1 Exercise caution when using cargo nets to ensure that small tools or equipment will not fall through the net. Use one of the methods listed below:
- Line the cargo net with plastic or similar material.
 - Secure smaller items to larger items (e.g., tape items together).
 - Use a bag or similar container to secure small items.

7.3 External Cargo – Longline Operations

NOTE

Height-Velocity Curve

What it means to the Pilot, ground crew and management:
 If a helicopter has a catastrophic engine failure while hovering at 100 feet AGL, it will contact the ground in approximately 2.5 seconds at a speed of 50 miles per hour, or 67 feet per second. Keep alert while working under a helicopter doing longline work!



Chapter 7, General Requirements for External Loads (Cargo)

(7.3, External Cargo – Longline Operations, continued)

- 7.3.1 When cargo is transported incorrectly, there is the potential for dropped external loads, hazardous materials spillage, over-grossed aircraft, or other serious safety hazards. Incorrect methods of rigging and transporting cargo have resulted in catastrophic accidents.
- 7.3.2 In areas of sloping terrain or with obstacles rising to one or more sides of the cargo pick-up/delivery area, the pilot must maintain rotor clearance from all obstacles equivalent to ½-rotor diameter (or 50% of the main rotor, see section 1.12). When obstacles present a risk of contact with aircraft or rotor blades, the pilot should decline the mission until hazards are removed, additional line can be added, or a better location can be identified. Pilots have the final say in accepting or declining any mission.
- 7.3.3 If the helicopter is within a horizontal distance of less than ½-rotor diameter of the highest obstacle, the pilot must add another length of line.
- 7.3.4 Rigging of operating equipment, specialty material, pipe, wood, or steel poles must follow PG&E guidelines, or the manufactures guidelines, if they are more stringent.
- 7.3.5 Refer to the latest Utility Standard SAFE-1016S, “Rigging Safety Standard” and TD-2327P-01, “Selecting and Caring for Ropes, Knots, Splices, and Slings”, work procedures when rigging equipment and Appendix 11, Helicopter Pole Rigging Guidelines.
- 7.3.6 Important guidelines to follow when using longlines; these cannot be over-emphasized.
- Ground personnel and pilots should be thoroughly trained and briefed on rigging.
 - All personnel understand head and hand signals (see Appendix 6, Helicopter Hand and Head Signals).
 - Pinch points -- Personnel should never stand under a load or between the load and an immovable object.
 - A swivel allows the load to rotate while in flight and prevents the long-line from twisting, preventing cable damage or inadvertent release. The use of a swivel should be considered on every load.
 - There is no way to predict how each load will fly. This is especially true of non-standard loads such as reels, plywood, or Zena™ shield panels. Consult with the helicopter vendor or the pilot, who may be able to supply the necessary expertise and/or equipment.
 - IF a load does not fly well,
- (List Continues) THEN evaluate the rigging and rig the next load differently and try again, provided there are no safety issues. **Do not compromise safety**; find other means of transportation, such as a ground vehicle.

Chapter 7, General Requirements for External Loads (Cargo)

(7.3.6, continued)

CAUTION

The pilot always has the final say regarding whether or not to conduct the mission. Do not pressure the pilot, either implicitly or explicitly, into flying a load with which he or she does not feel comfortable.

- When working with unstable loads, personnel should avoid placing hands in an area where they can be caught in rigging.
- It is acceptable to use a long-line with a grapple or gated hook, provided that qualified personnel are available at both ends of the operation to disconnect the load—if needed.
- A single-point sling (choker strap) is not normally the best method to carry a load, except for items such as logs.
- A two-point sling with less than a 45-degree angle to the hook or long-line is the common method for most loads that will not fit into a cargo net.
- Use a four-point sling for box-like loads.
- A spreader bar is useful for stabilizing a load, or where the sling may catch or damage the load if attached conventionally.
- Certain loads such as all-terrain vehicles, tracked equipment, and utility trailers and other irregular loads, require special rigging. Never attempt to build such loads without prior training and/or experience. Consult manufacture or engineering guidelines.
- The aerodynamic configuration of a load may cause it to spin and/or oscillate, which in turn may cause the pilot to experience control problems with the helicopter. Such difficulties may cause the pilot to return with the load for re-rigging, or, in extreme cases, to release the load, either intentionally or inadvertently.

7.4 Grapple Hooks

- 7.4.1 The grapple hook is authorized for use with external load operations, not including HEC—the grapple hook is only used for the transportation of cargo. The grapple hook is an alternative to the Remote Cargo Hook. All grapple hooks must be rated and tagged.

Chapter 7, General Requirements for External Loads (Cargo)

(7.4, Grapple Hooks, continued)

- 7.4.2 When utilizing a grapple hook, take extra care to ensure that the load does not get inadvertently released when the load line is allowed to slacken. Figure 3 shows an acceptable grapple.



Figure 3: Grapple Hook

- 7.4.3 Ground personnel are required at the setting locations to detach the pole from the grapple hook, allowing the helicopter to depart.

7.5 Helicopter Belly Hooks

CAUTION

Prior to using a belly hook, it is extremely important to first test the manual release, then the electrical release to ensure that both function properly. This sequence is necessary because the manual release is usually a cable release susceptible to snagging. Move the cargo hook to its extreme travel limits to ensure that the manual release will not operate inadvertently.

- 7.5.1 The belly hook is attached to the helicopter. It must be FAA approved, self-cocking, and automatic locking. It may be loaded and locked in a single motion with one hand. The release must be both manually and electrically operated by the pilot from the cockpit.
- 7.5.2 The belly hook also has a manual release on the hook itself that can be operated by the individual performing the hook-up. This release allows the pilot or hook-up person to check that the hook is functioning properly.

Chapter 7, General Requirements for External Loads (Cargo)

7.6 Helicopter Flights Over Congested and Densely Populated Areas

7.6.1 With respect to external load helicopter operations over congested or densely populated areas, the FAA has determined that such operations are in the public interest and do not pose an undue risk to the public, as long as risk management principles are implemented (see definition of **Restricted Category Aircraft** in Appendix 1, Glossary). The employee in charge will notify Helicopter Operations Department at least 14 business days prior to work in congested areas, so that the vendor(s) can be informed. The vendor is required to file proper **Congested Area Flight Plans**:

- **14 CFR, Part 133.33 (d) (1)** – The operator must develop a plan for each complete operation, coordinate this plan with the FAA Flight Standards District Office having jurisdiction over the area in which the operation will be conducted, and obtain approval for the operation from that district office. The plan must include an agreement with the appropriate political subdivision that local officials will exclude unauthorized persons from the area in which the operation will be conducted, coordination with air traffic control, if necessary, and a detailed chart depicting the flight routes and altitudes.

7.6.2 Specifically, the Federal Aviation Regulations permit an operator to conduct external load operations over congested and densely populated areas provided the following conditions are met:

- Each flight must be conducted at an altitude, and on a route, that will allow a jettisonable external load to be released.
- Route must permit a rotorcraft landing in an emergency without hazard to persons or property on the surface. However, in the event of an emergency involving the safety of persons or property, a certificate holder may deviate from the rules of this part to the extent required to meet that emergency.

7.6.3 The **congested** nature of an area is defined by what exists on the surface, not the size of the area. While the presence of the nonparticipating public is the most important determination of “congested,” the area may also be congested with structures or objects. An area considered congested for airplane operations could be equally congested for helicopters. If an airplane flying over a congested area at less than 1,000 feet above ground level (AGL) is in violation of 14 CFR part 91, §91.119(b), the area may also be a congested area for a helicopter conducting external-load operations. However, the most important word in this concept is “over.” Helicopters can operate over relatively small uncongested areas because of their maneuvering abilities.

7.6.4 **Densely populated** areas are those areas of a city, town, or settlement that contain a large number of structures. Additionally, a densely populated area may not contain any buildings but could consist of a large gathering of persons on a beach, at an airshow, at a ball game, or at a fairground. Helicopters may conduct external load operations over roadways as long as the pilot is able to remain clear of non-participating personnel. Mitigations include (but not limited to):

- “See and avoid”
- Traffic control using road guards (coordinate with appropriate authorities)
- Closure of road or any pathway
- Navigable body of water (post signs at boat ramps and “no boating” buoy in vicinity of over flights)

Chapter 7, General Requirements for External Loads (Cargo)

(7.6, Helicopter Flights Over Congested and Densely Populated Areas, continued)

- 7.6.5 Ensure that areas for load jettisoning, emergency landings, ingress and egress routes, and a means to reduce the threat to the non-participating public are communicated. The last item is most important since the presence of a helicopter conducting an external load operation is likely to draw spectators and other unnecessary personnel to the scene.

7.7 Longlining with Remote Electric Hook

- 7.7.1 The longline/remote hook system mounted to the belly of the helicopter, consists of suspension rope sections, a remote cargo hook, a remote hook guard and handgrip, appropriate matching attaching hardware, and electrical pigtail. The pilot is able to electrically release loads attached to the remote hook.
- 7.7.2 At the end of the rope is a remote electric hook, similar to the cargo hook on the helicopter. An electrical line runs the length of the cable and is plugged into the electrical system of the helicopter. The other end is plugged to the remote hook. The hook is self-cocking (that is, it should return to “latched” position after the electrical “release” signal is removed).
- 7.7.3 Refer to Appendix 11, Helicopter Pole Rigging Guidelines, for more details on the remote electric hooks. Basically, the differences between self cocking and non-self cocking are identified with the coil spring shown in Figure 4 compared to Figure 5 with the coil spring removed and with the a bolt installed in the keeper.

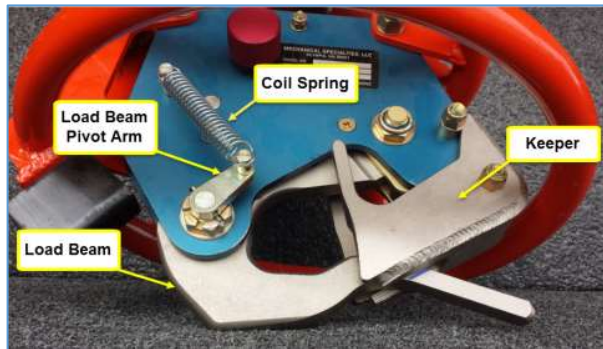


Figure 4: Self Cocking Remote Hook

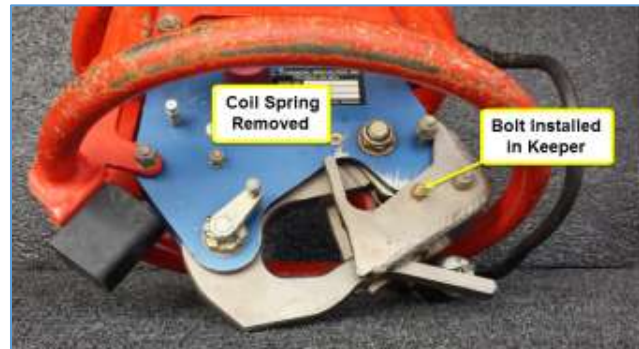


Figure 5: Non-Self Cocking Remote Hook

- 7.7.4 Considerations and requirements for remote electric hook operations include:
- Never place a swivel above the remote hook—consider a swivel only between remote hook and load.
 - A swivel allows the load to rotate while in flight and prevents the long line from twisting, preventing cable damage or inadvertent release. The use of a swivel should be considered on every load.
 - The sling load should be placed on the ground in the center of the loading area.

(List Continues)

Chapter 7, General Requirements for External Loads (Cargo)

(7.7.4, continued)

- On approach, the signal person should advise the pilot (with head and hand signals or radio if available) on load clearance from trees, load height above the ground, and any problems that might arise in the pick-up or drop zones.
- When attaching a load to the remote electric hook, the hookup person should allow the hook to contact the ground before touching it. This grounds the hook and eliminates the possibility of shock from static electricity.
- When attaching a load to a remote hook, ensure a positive control of the hook.
- The hookup person hooks the load to the remote electric hook and leaves the area.

7.7.5 On approach or departure to the remote hook, the hook-up person must not step over the longline when attaching the load.

- The helicopter is then positioned above the load and the load is lifted from the ground and flown out.
- When receiving a load, stay clear of the receiving area. Let the pilot set the load on the ground and release it before entering the area. On approach or departure, the hookup person must not step over the longline when detaching the load.

7.8 LZ Requirements

7.8.1 Each work site must have someone in charge (the LZ Lead or EIC) as the person responsible for all helicopter operations in and around the LZ. Responsibilities include:

- Maintain **at the work site**, the current *Helicopter Operations Field Manual*
- Maintain **at the work site**, the current *Code of Safe Practice (CSP)*
- Maintain **at the work site**, a current department specific Emergency Response Plan or Emergency Action Plan
- Must have radio communications with the pilot and workers at all times
- Must remain at the landing zone during all helicopter operations
- Ensure that all crew have proper PPE
- Ensure that during any change in condition a new tailboard is given

7.8.2 For site safety, the LZ Lead, along with the EIC, must also ensure that the available ground crew is staffed to handle the intended scope of work.



Chapter 7, General Requirements for External Loads (Cargo)

7.9 Safety Around Helicopters

- 7.9.1 While performing helicopter external load procedures (e.g., HEC and/or cargo load procedures), do not perform any other work that may create an unsafe environment for the pilot or helicopter. This includes moving wires or conductors, setting structures or structure members, pulling lines (e.g., sock line or conductors), delivering tools or equipment, *etc.*
- 7.9.2 Authorized workers should minimize the amount of time spent under a hovering helicopter when hooking up or unhooking a load. ***No unsecured clothing or articles that may flap in the downwash or have the potential to get snagged on hoist lines or cargo, is permitted under the helicopter when attaching loads of any kind.***
- 7.9.3 Employees must always watch an approaching and departing helicopter, paying attention to the suspended load or hook to avoid injury.
- 7.9.4 Observe the helicopter until it is clear of the work location or landing zone.
- 7.9.5 Where employees are working at heights, or on steep inclines, the employee in charge must do the following:
- Ensure that a crew or an employee, who is receiving material in an elevated location, or on a steep incline, has an established escape route.
 - PG&E employees and contractors who are working at the edge of, or on a steep slope, must be protected from falling by using barriers of adequate design or a fall restraint system. **Refer to the latest copy of the *Fall Protection Reference Manual*** for information on barriers and fall restraint systems. (See SAFE-1012S and SAFE-1016S; copies available in the Guidance Document Library.)
- 7.9.6 The pilot may use the helicopter's rotor wash to blow down a receiving area to remove any loose debris (e.g., pine cones, tree branches, *etc.*) before flying into an area with employees present; after the site has been blown down, employees may enter (or return to) the site.
- 7.9.7 IF a synthetic helicopter load line is not available and employees must use a stranded steel line,
THEN the ground crew must either wear Class 2 rubber gloves or use a grounding device when a stranded steel line is use. This prevents static-electrical buildup and discharge.
- 7.9.8 **Dust Abatement:** The potential for dusty conditions usually exists when not operating from turf or pavement. Dust abatement must be accomplished at all Landing Zones. This may be as simple as the application of water by ground equipment or from helicopter buckets.
- 7.9.9 **Static electricity:** Static electricity may present a problem to the hookup person when attaching loads to hovering helicopters. Ways to reduce static shock:
- Allow the remote hook to touch the ground.
 - Use of rubber gloves.

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7.10 Swivels

- 7.10.1 A cargo swivel consists of a ring or link on the upper end, a hook on the lower end, and a swivel section in between (Figure 6). The ring or link and hook may be integral with, or detachable from, the swivel body. If detachable, components should be replaceable and attached by bolts secured with self-locking nuts, or some other system that provides equivalent safety.
- A swivel allows the load to rotate while in flight and prevents the long line from twisting, preventing cable damage or inadvertent release. Consider using a swivel on every load.
 - The aerodynamic configuration of a load may cause it to spin and/or oscillate, which in turn may cause the pilot to experience control problems with the helicopter. Such difficulties may cause the pilot to return with the load for re-rigging, or, in extreme cases, to release the load, either intentionally or inadvertently.



Figure 6: Swivel Hook

CAUTION

Do not use swivels without a capacity stamp.

- 7.10.2 **Capacity of Swivels.** Swivels must be rated for vertical lifting and must have a working capacity equal to or greater than the load to be carried.
- 7.10.3 **Inspection and Maintenance of Swivels.** When inspecting swivels, check:
- The spinning action of the swivel.
 - The condition of the integrated latch system.
 - The bolts on the detachable type of swivel.
 - Check all serviceable parts.



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7.11 Wire Pulling (a.k.a., Sock line, Softline, Hardline, Rope)

- 7.11.1 Wire pulls are only to be executed by trained pilots who have reviewed the pull process with both their Flight Operations managerial staff and the Safety Training Officer. At no point during the pull is the aircraft to be closer than $\frac{1}{2}$ the rotor diameter from any fixed object (see section 1.12). If this is not possible, do not conduct the pull and discuss alternatives.
- 7.11.2 The aircraft fuel tank must be TOPPED OFF prior to hooking onto ANY sock-line, rope, wire, or other, for a pull. Engine oil must also be checked and FULL prior to initiating a pull/series of pulls.
- 7.11.3 The pilot is to review all details of the pull—any unique information and any potential delays that could happen *during* the wire pull—with the foreman during the tailboard, prior to flight. The pilot must inform the PG&E Foreman during the tailboard of the fueling requirements and maximum flight durations for the wire-stringing operation. Additional items the pilot and employee in charge should consider:
- Does the pull need to be done using a longline and weight to achieve safe working distance?
 - Length plus estimated duration of the pull?
 - Line type/weight (3/8" hardline, rope, fiber, etc.)?
 - Topography, break-overs, angles?
 - Communication with puller/tensioner, crew on structures, if assistance is needed?
 - If the pull is to be held, will a reverse grapple work or does crew need to place the pull in a bight and disconnect A/C?
 - If flying weighted longline versus side pull, is a contingency plan needed if weight isn't sufficient?
- 7.11.4 Install side-pull equipment in accordance with any applicable Supplemental Type Certificate (STC). Only helicopter employees that have received training and have been approved will be allowed to install the equipment. At no time will PG&E employees install the side-pull rigging. When using the side pull, the pilot must use a minimum of 16' of rigging from the helicopter to the rigging attach point. The pilot must also install the appropriate amount of weight on the side-pull line to prevent the line from becoming a hazard during flight.
- 7.11.5 Needles may be used during sock line pulling operations to allow the sock line to be threaded through structures. The helicopter vendor must supply a needle that is of sufficient design and strength for each project.
- 7.11.6 The MAXIMUM amount of flight time to be flown before refueling is 45 MINUTES. **DO NOT EXCEED 20 KNOTS** when executing a wire/rope pull.



Chapter 7, General Requirements for External Loads (Cargo)

(7.11, Wire Pulling, continued)

- 7.11.7 In addition to the STC, operators should have the latest instructions for the side-puller device, which should clearly state minimum fuel load while engaged in pulling wire. Because the fuel pick-up line on the MD500 is on the left side of the fuel-cell, and the helicopter side-pull operation places the aircraft in a right-side low configuration—more fuel ends up on the low (right) side of the fuel-cell, SIGNIFICANTLY reducing usable fuel.
- 7.11.8 It is imperative that a second person, besides the pilot (*i.e.*, fuel tender or helicopter support personnel) also monitor fuel levels, burn rate, and flight time during wire stringing operations.
- 7.11.9 As a best practice, a reverse grapple should be utilized during wire stringing, as conditions allow. The reverse-grapple allows the aircraft to leave the sock-line at a structure—disconnect, refuel and reconnect without aid from the ground. This tends to reduce pressure on the pilot to compete a pull because stopping to refuel does not impact crews or work.
- 7.11.10 The pilot is to designate an observer on EVERY wire pull job. The observer can be any of the following:
- The employee in charge (or alternate), in a location to maintain sight of the aircraft and the line at all times and maintaining constant radio contact.
 - Another aircraft/pilot; airborne for the complete duration of the pull and able to maintain sight of the pulling aircraft and the line at all times and maintaining radio contact with the pulling aircraft the entire time.
 - IF neither of the above is an option,
THEN and at the pilot's discretion, the pilot may elect to place a vendor crewmember inside the cabin to assist if needed and if it does not compromise available power.
- 7.11.11 The pilot's seat will remain between or above the closest conductor, and the tail rotor at all times. Pilots are not to pull in any manner that will put the tail rotor closer to the wire/structures than the pilot seat.



Chapter 7, General Requirements for External Loads (Cargo)

7.12 Work Involving Sling Loads Near Power Lines or Other Obstacles

CAUTION

Remember that higher elevation, warmer air temperature, humidity, and other weather conditions reduce the lifting capability of helicopters.

7.12.1 Ensure the following when load lines and slings are used:

- Helicopters must maintain a minimum approach distance of 10 feet from conductors, wires, or structures, and a minimum clearance of 30 feet between any energized power line and any part of the helicopter and load combination, unless under the direct supervision of a qualified electrical worker. Horizontal distance must be 1.5 times the rotor diameter, see section 1.12.
- During long-line operations, a helicopter pilot is responsible for ensuring a marker is affixed to the load line to indicate the 10-foot vertical distance. The marker must be attached 12 feet below the belly of the helicopter on the load line, allowing the pilot to see the marker and maintain the required safe working distance between the helicopter landing gear and any wire, conductor, or structures. If the load line is not pre-marked, secure a 2-foot red or orange covering over the load line (see Figure 7 on page 68 for an example). This covering serves as a visual indicator for the pilot and crew.

7.12.2 The responsible employee must ensure that the following are discussed when planning an external load job:

- The exact details of the work being performed (e.g., transporting materials or assorted equipment).
- The weight of the load to be lifted. Helicopter pilots are responsible for providing at least a 10 percent margin, or weight reduction, from the HOGE maximum stated in the selected aircraft performance chart. Example: If the helicopter can hover, OGE at a total weight of 3000 lbs., the maximum weight during PG&E lift operations would be 10 percent less or 2700 lbs.
- The elevation and approximate temperature of the staging area and work locations.
- Dust mitigation for LZ.
- The type of terrain where the work will be performed.
- The location of the staging area, landing zone, and work locations.

7.12.3 The employee in charge must ensure that the following actions are performed:

- The employee in charge, or designee, must verify with the pilot before starting the longline operation that the pilot has done a thorough aerial survey of the hazards and conditions at the receiving location(s) and that the pilot has done a hover test at the receiving location(s) to ensure that the longline length and clearances needed (both horizontal and vertical) are suitable before the work begins.

(List
Continues)



Chapter 7, General Requirements for External Loads (Cargo)

(7.12.3, continued)

- A tailboard briefing has been conducted as described in Chapter 5, Tailboard Briefing for Crews.
- Lift operations are aborted when LZ-Lead or any member of the crew thinks that the lift cannot be performed safely.
 - Visually inspect the helicopter long line from the load to the helicopter during every lift, to ensure the line is suspended correctly during the flight. (*i.e.*, not caught over skid or other).
- PG&E employees must wear the appropriate PPE as described in Chapter 5, Tailboard Briefing for Crews, paragraph 5.4.6.
- The pilot and LZ-Lead must verify that all rigging (*e.g.*, the tag lines, slings, and cargo nets) are inspected prior to use. Tag lines must be shorter than the load line or secured in such a manner that they cannot be drawn into the rotors.
- One of the following methods is used to avoid producing a static charge on a suspended load:
 - A protective grounding device
 - Class 2 rubber gloves are worn
 - Pilot touches the load to the ground
- Establish an escape route at each work site before beginning work and review periodically during the operation as conditions change.
- Radio communications, or hand and head signals, between the pilot and employees must be understood before work begins. Hand and head signals are illustrated in Appendix 6, Helicopter Hand and Head Signals.
- No personnel are transported, if the helicopter has a sling load, except as provided for in [14 CFR §133.35](#) (an essential crew member).
- Only approved synthetic or wire rope is used for the main lift line.

7.12.4 The helicopter pilot must ensure that the helicopter is capable of lifting the intended load based on the information provided by PG&E.

Chapter 8, Requirements for Human External Cargo

Chapter 8, REQUIREMENTS FOR HUMAN EXTERNAL CARGO

Training Required: TECH-0061, TECH-0062, TECH-0088.

8.1 Introduction – HEC History

- 8.1.1 Originally referred to as EHL (external human load), in 2012 PG&E adopted the industry standard term HEC (human external cargo).
- 8.1.2 Chapter 8 applies to helicopter operations involving human external cargo (HEC)—previously known as EHL (external human load). It covers the general provisions and the special safety requirements for HEC employees when they work from outside of the helicopters. Specifically, this chapter addresses the procedural requirements for safety and work issues affecting helicopter workers. HEC employees must use the procedures contained in this manual when performing work that involves a helicopter. Pacific Gas and Electric Company work procedures are written to be in compliance with the Federal Aviation Administration (FAA) regulations contained in [14 CFR Part 133](#), Class B, external loads.
- 8.1.3 The FAA distinguishes between the external carriage of industrial/utility employees versus the common public. A Part 133 external-load operator may transport externally electrical/power utility company personnel (*i.e.*, linemen) when performing patrols, maintenance, and repairs of electrical power lines. The linemen are transported in an external-load harness or sling.
- 8.1.4 Under 14 CFR §133.35, an operator with a Class B approval is authorized to externally carry a crewmember, a person essential to the external-load operation, or a person who is necessary to accomplish the work activity directly associated with that operation with a single-engine or multiengine rotorcraft, in accordance with applicable operating limitations. If the Rotorcraft Flight Manual (RFM) or Rotorcraft Flight Manual Supplement (RFMS) operating limitations, markings, or placards contain language prohibiting use for human external cargo (HEC), operators of civil rotorcraft must comply with those limitations in accordance with part 91, §91.9(a) (*e.g.*, an RFMS limitation such as, “the cargo hook is approved for non-human cargo, Class B RLCs only”). The RFM or RFMS may also include additional limitations indicating certification for HEC (*e.g.*, “the external load system meets the 14 CFR part 27 certification requirements for human external cargo (HEC)”). The operator may carry the persons in the following examples as a Class B external load, which must be jettisonable:
 - a) Power line patrol/maintenance personnel.
 - b) Rescue personnel who are performing emergency medical and rescue services.



Chapter 8, Requirements for Human External Cargo

8.2 Communications

- 8.2.1 Review Chapter 3, Communications for additional information.
- 8.2.2 Maintain good communication between the crew and the pilot, and between the pilot and the HEC employee. Communication may be in the form of hand signals, head signals, or radio communication. Whenever practical, use radio equipment to ensure the best possible communication between the HEC employee and the pilot.
- 8.2.3 Each HEC employee is required to carry a PG&E approved mobile radio while conducting HEC missions. Establish and maintain radio communications during each HEC mission. HEC personnel may use a lapel microphone, a TEA earpiece (#24 in Specialized Equipment, Chap 16), or transmit and receive directly from the mobile radio.
- 8.2.4 Order PG&E mobile radios on-line at: <http://www.t2/myitservices/forms/intake/353>
- 8.2.5 All HEC personnel and pilots should be constantly aware of the HEC rope and its potential contact with any foreign object (conductors, shield wires, structures, guy wires, etc.). All inadvertent contact should be avoided and mitigated. If a contact does occur, immediately inspect the rope cover—onsite—for any damage from abrasion or heating.

8.3 Contractors Performing HEC

- 8.3.1 It is important to note that a requirement contained in the FAA's exemption approval is "Crewmembers working on or around the helicopter must receive initial and annual recurrent documented training by a competent person."
- 8.3.2 PG&E contracted line crews are not permitted to perform HEC on PG&E property until the Helicopter Operations Department has validated that their company's HEC training program meets FAA training requirements.
 - Crewmembers working on or around the helicopter must receive initial and annual recurrent documented training by a competent person in the following areas:
 - Acceptance or rejection criteria of HEC attaching means to include long lines, chairs, and/or harnesses
 - Task-specific operations
 - Hazard identification, risk analysis, and mitigation
 - CRM (Crew Resource Management)
 - Communication:
 - Emergency procedures pertinent to Class B HEC operations
 - Ground
 - Flight
 - Mock-up training and review of:
 - Rigging inspection and acceptance or rejection criteria of equipment
 - Communication procedures
 - Simulation of task (both crew and pilot tasks)
 - Documented completed proficiency on all of the above

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8.4 Crew Foreman or Employee in Charge

- 8.4.1 The employee in charge has the obligation to verify that all roles are supported and that the other responsibilities are carried out by those assigned. The employee in charge:
- Must be qualified in HEC.
 - Checks the radio to verify it is operating correctly and on the correct frequency to communicate with the line crew and landing zone crew.
 - Conducts a detailed tailboard briefing of the work to be done by all workers and pilots including the *Emergency Action Plan*.
 - Coordinates all work activities pertaining to the line work.
 - Approves qualified personnel for job responsibilities, including verification that all employees involved in HEC operations have completed the required training.
 - Maintains communications with the line switching center as necessary.
 - Reports any accidents or emergencies.
 - Stops work anytime unsafe conditions or behaviors are observed until the job can be completed safely.
 - Inspects rigging.
 - Keeps AVI-3001M *Helicopter Operations Field Manual*, *Code of Safe Practices*, and sign-up sheet on site and in possession.
 - Is directly involved with ground survey.
- 8.4.2 The employee in charge must review each line-worker's helicopter identification card before that worker is allowed to perform the work. Additionally, the employee in charge must review the pilot(s) identification card to ensure that the pilot has completed the required training and is approved to perform the requested helicopter operation.

8.5 Debriefing

- 8.5.1 After every mission, a "hot debrief" should be conducted. The hot debrief should address the following:
- Provide feedback to all involved personnel.
 - Identify areas of concern for follow-up.
 - Reinforce lessons learned.
 - Reinforce a job well done.
- 8.5.2 Research has shown that a hot debriefing is a key ingredient to successful teams and improvement in both quality and safety.

8.6 Emergency Cutting Device

- 8.6.1 The rescue knife is a blunt tipped fixed-blade knife, with a serrated blade and sheath, and of sufficient size to cleanly cut the diameter of the rope or strap used, with minimal effort. (See Appendix 3, Specialized Tools and Safety Equipment, item #16.)



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(8.6, Emergency Cutting Device, continued)

- 8.6.2 All HEC employees are required to carry a rescue knife to be used solely for emergencies. The rescue knife will be secured with a lanyard and will be readily accessible during HEC flights and specifically dedicated to cut the “A” frame assembly in an emergency situation.
- Emergencies may include (but not limited to):
 - Loss of tail rotor function
 - Transmission failure
 - Compressor stall
 - Engine failure
 - Hydraulic boost pumps failure
 - In an emergency, the Pilot will:
 - Declare the emergency over the PG&E radio.
 - Attempt to get HEC on the ground.
 - Attempt to maneuver helicopter away from personnel on the ground.
 - Once on the ground, the HEC will rapidly unhook or cut lines and seek protection/shelter. **Care and Access of Cutting Device**
1. Frequently inspect the rescue knife/cutting tool to ensure that the rescue knife is serviceable and sharp.
 2. Secure the rescue knife to the HEC harness in a readily accessible location in the chest area, accessible with either hand with the cutting edge away from the body.

8.7 Emergency Procedures

WARNING

HEC operations are inherently hazardous and could be fatal. This must be discussed in detail during training and refresher courses. Release of the HEC line is a possible consideration while human external cargo is attached beneath the aircraft. In case of an aircraft emergency, the pilot may attempt to land with HEC attached to the HEC line.

- 8.7.1 Preplanning for emergency procedures is a critical component of risk management. Accordingly, each HEC project must evaluate and discuss potential scenarios and actions that may best mitigate any associated hazards.
- 8.7.2 It is imperative that everyone involved in HEC understand how instantaneously an in-flight emergency may occur. Survival of HEC personnel during an in-flight emergency is best accomplished by having suspended personnel remain attached to the rope while the pilot attempts emergency landing.



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8.8 General Provisions

- 8.8.1 PG&E employees will never be forced or required to perform or undertake helicopter HEC activities. Helicopter HEC must be performed by volunteer employees only. No action will be taken against any employee who fails or refuses to volunteer for helicopter HEC work. If the number of volunteers for helicopter HEC work exceeds the number of employees needed, the volunteers will be selected on the basis of seniority as defined in the International Brotherhood of Electrical Workers (IBEW) contract. The most senior volunteer will be selected first, the next most senior volunteer will be selected second, etc., until the number of employees needed for the project has been filled.
- 8.8.2 Follow all of the provisions contained in "Letter Agreement No. R1-03-31-PGE" for selecting volunteer employees and determining the compensation they receive. An exception to "Letter Agreement No. R1-03-31-PGE" and "Letter of Agreement No. LA-05-16-PGE" is that helicopter work will no longer qualify Electric Transmission and Operations (ETO) transmission line employees for a daily 10% premium pay, as the 5% increase paid by the classification will negate the prior agreement involving helicopter work. ETO employees will still be selected on a volunteer basis but will not be selected on the basis of seniority and will not receive any additional pay for performing the procedures within this manual according to the "Letter of Agreement No. LA-05-16-PGE".

CAUTION

Remember that higher elevation, warmer air temperature, humidity, and other weather conditions reduce the lifting capability of helicopters.

- 8.8.3 Before each flight, the crew lead(s), the pilot, and the employee(s) must analyze and address any conditions specific to the work situation and agree on the safety measures required to address those conditions.
- The helicopter pilot must make a test flight to the area where the helicopter work will be performed. This verification does not mean that the employee in charge will ride in the helicopter. No passengers are allowed during external load operations. This includes the longline check flight.
 - The helicopter pilot and the employee in charge must calculate and verify that the length of the selected load line is adequate to maintain the required 10 feet safe working distance between the helicopter and nearest wire, conductor, or structure. This information will be documented in the tailboard briefing notes.
- 8.8.4 When determining and selecting the best work method to use, ensure that safe distances can be maintained between all parts of the helicopter and any energized conductors, de-energized conductors, co-workers, and/or the structure. If, at any time either before performing the work or while performing the work, the employee(s), or the pilot, believes that dangerous or unsafe conditions exist that could jeopardize the safety of the operation or warrant aborting of the operation, anyone has the right to postpone or stop the operation until those safety concerns have been addressed. These conditions include, but are not limited to, the following:
- (List Follows)

Chapter 8, Requirements for Human External Cargo

(8.8.4, continued)

- Inclement weather conditions
- Sustained high winds or gusts
- Insufficient visibility
- Insufficient clearances
- Exceeding helicopter load limitations
- Structure or conductor damage that causes safety concerns
- Any other condition that would adversely affect the safety of the operation

8.9 HEC Rope

- 8.9.1 Special rope is used to suspend HEC beneath the helicopter during HEC operations. This rope is used for attachment from the helicopter anchor to personnel on the end of the line in lengths that are safe and efficient for the specific needs of the HEC project (generally 60 feet, but 100-foot lengths are available and, if needed, two ropes can be connected, see section 8.9.6).
- 8.9.2 HEC ropes and components for use by PG&E employees are furnished to the approved Helicopter Operators by PG&E. These HEC ropes are not to be used outside of PG&E, without prior written consent of PG&E's Manager of Helicopter Operations.
- 8.9.3 PG&E de-energized HEC ropes have a distinctive royal blue protective jacket and a yellow marker, 12 feet from the top of the line (Figure 7). The marker allows the pilot a visual reference to maintain the required 10-foot safe working distance between the helicopter landing struts and any wire, conductor, or structure.

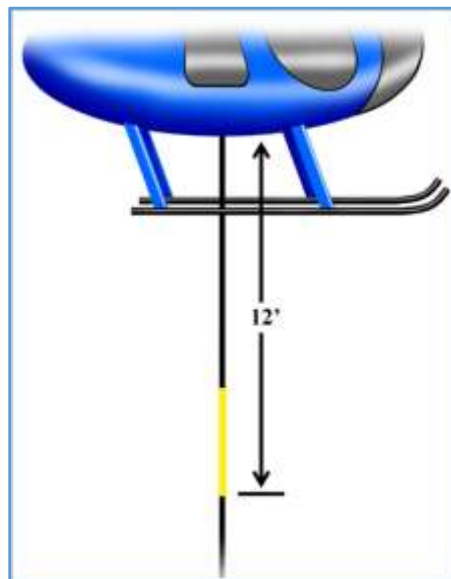


Figure 7: Colored HEC Rope Marker



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- 8.9.4 The HEC rope is constructed of synthetic material, which may include nylon, polyester, or high molecular weight polyethylene (e.g., Spectra™ or Dyneema™). Cordage will be single braid or greater and of low-stretch, kernmantle (braided core with outer sheath), or braid-on-braid construction.
- 8.9.5 Any deployed and unloaded HEC rope will have a weight bag of at least 25 pounds attached at the end, to prevent excessive trailing behind the aircraft during forward flight. Additional weight should be considered for rope lengths in excess of 100 feet. Forward flight should not exceed 70 knots when the HEC rope is deployed.
- 8.9.6 **Connect no more than two ropes in series for any HEC lift.** When conditions require two HEC ropes to be joined together for increased length (e.g., to clear tall trees, steep terrain, etc.), the only approved connector is the Yates Gear ISC Wizard, 3-stage, 15k lb. carabiner (Figure 8). Operations Department supplies Yates 3-stage carabiners to HEC approved operators.



Figure 8: Yates ICS 3-Stage Carabiner

- 8.9.7 For requirements regarding rope wear, inspection, care, and maintenance refer to manufacturer's specifications and guidelines. In addition:
- Ropes will be marked in a non-destructive manner for identification: **For HEC Use Only.**
 - HEC rope use history will be documented by the pilot (or their designee) following each use. Documentation will include the date, specific type of use, and cycles/lifts.
 - Rope history will begin when the rope is purchased and placed into service, noting the date of manufacture. Useful service life is based on date of manufacture.
 - Retirement of a HEC rope may be dictated by age, documented use history, or visual inspection.
 - HEC ropes will always receive a safety inspection prior to use, and a thorough recorded inspection (by someone other than the person doing the prior-to-use safety inspections) at intervals recommended by the manufacturer.

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(8.9, HEC Rope, continued)

- 8.9.8 HEC ropes issued to helicopter operators are managed by the PG&E Helicopter Operations Department; this provides PG&E oversight of required inspections, life cycles, replacements, and documentation.
- 8.9.9 Never use HEC rope for cargo work. (Except as allowed for helicopter Barehand work procedures.)

8.10 Helicopter Fueler / Support

- 8.10.1 When helicopter fuel support, or any support vehicle, is on site, the driver:
- Actively participates in tailboard.
 - Has radio communications with pilot.
 - Installs a wind indicator at the landing zone.
 - Attaches rigging to helicopter as appropriate.
 - Checks to verify release systems are operational and working correctly (in conjunction with the pilot).
 - Verifies the operational integrity of the electric hook system (in conjunction with the pilot).
 - Provides support as requested by the pilot.
 - Ensures no smoking or open flames get any closer than 100 feet of the fuel truck at any time.
 - Stops work anytime unsafe conditions or behaviors are observed until the job can be completed safely.
 - Complies with their company's emergency fuel spill plan.

8.11 Landing Zone Locations

- 8.11.1 Review Chapter 4, Selecting a Landing Zone.
- 8.11.2 Landing zone locations, used for helicopter work projects, must be located as close as conditions will allow to the work area. This helps limit the amount of time the HEC employee is being supported from the helicopter on a long line.
- 8.11.3 When selecting the landing zone, do not compromise on the suitability of the location in an effort to place the landing zone closer to the work site. Follow all the provisions in Selecting a Landing Zone.



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8.12 Landing Zone Requirements

- 8.12.1 Each work site must have someone in charge (the LZ Lead or EIC) as the person responsible for all helicopter operations in and around the LZ—**this person must be HEC qualified**. Responsibilities include:
- Maintain **at the work site**, the current *Helicopter Operations Field Manual*
 - Maintain **at the work site**, the current *Code of Safe Practice (CSP)*
 - Maintain **at the work site**, a current department specific Emergency Response Plan or Emergency Action Plan
 - Must have radio communications with the pilot and workers at all times
 - Must remain at the landing zone during all helicopter operations
 - Ensure that all crew have proper PPE
 - Ensure that during any change in condition a new tailboard is given
- 8.12.2 For site safety, the LZ Lead, along with the EIC, must also ensure that the available ground crew is enough to handle the intended scope of work.

8.13 Linemen / Towermen

- 8.13.1 The responsibilities of the linemen/towermen include, but not limited to:
- Actively participates in tailboard.
 - Remains a safe distance from the helicopter and in plain view of the flying pilot when approaching the helicopter prior to being lifted.
 - Communicates pertinent information to the pilot:
 - Structure number and what level or position
 - When they are free of the HEC rope and everything is in the clear
 - Notifies the pilot when their work is completed, and they are ready to be moved.
 - Inspects the HEC rope rigging to ensure all connections are in place and not side-loaded before being lifted.
 - Checks the fitting, connections, and the integrity of their harness to ensure they are safe to use.
 - Snap hooks closed and locked
 - Carabiners closed and locked
 - Ensures all required PPE is in place.
 - In conjunction with the pilot and via head/hand communications as tail-boarded, maintains working distances from all lines (energized and de-energized).
 - Stops work anytime unsafe conditions or behaviors are observed until the job can be completed safely.

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8.14 Line Work Support Personnel (Groundmen)

- 8.14.1 Responsibilities of the line work support personnel include, but not limited to:
- Actively participates in tailboard.
 - Provides support as needed.
 - Remains a safe distance from the helicopter and in plain view of the pilot when working near the LZ.
 - Prepares loads to be flown out (e.g., ladders, grounds, tools, travelers)
 - Wets down the LZ to control dust when appropriate.
 - Stops work anytime unsafe conditions or behaviors are observed until the job can be completed safely.
 - Watches to make sure no civilians approach or enter the landing zone. Acts as guard to keep the landing zone clear of unauthorized personnel when required.

8.15 Maximum Time Suspended in HEC Harness

- 8.15.1 **Regardless of distance, HEC employees must not be suspended in their harness for more than 15 minutes.** This applies to HEC transfers (ground to ground, ground to structure/pole, and structure/pole to structure/pole) and while performing minimal work from their HEC harness (dampers, spacers, bird diverters, etc.)
- 8.15.2 This minimizes the exposure to the HEC employee of orthostatic intolerance. If the scope of the planned HEC work will last longer than 15 minutes, an alternative work method must be utilized (e.g., sky chairs, helicopter platform, aerial lifts, etc.).

8.16 Orthostatic Intolerance (a.k.a., Suspension Trauma)

- 8.16.1 Prolonged suspension from fall arrest systems can cause suspension trauma, which, in turn, can result in serious physical injury, or potentially, even death. Research indicates that suspension in a fall arrest device can result in unconsciousness, followed by death, in less than 30 minutes. Suspension trauma may be defined as “the development of symptoms such as light-headedness, palpitations, tremulousness, poor concentration, fatigue, nausea, dizziness, headache, sweating, weakness, and occasionally fainting during upright standing”. While in a sedentary position blood can accumulate in the veins, which is commonly called “venous pooling,” causing suspension trauma. Orthostatic intolerance also can occur when an individual suddenly moves after being sedentary for a long time.
- 8.16.2 **Hazard** – Suspension trauma may be experienced by workers using fall arrest systems. Following a fall, a worker may remain suspended in a harness. The sustained immobility may lead to a state of unconsciousness. Depending on the length of time the suspended worker is unconscious or immobile and the level of venous pooling, the resulting orthostatic intolerance may lead to death. While not common, such fatalities often are referred to as “harness induced pathology” or “suspension trauma.”



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(8.16, Orthostatic Intolerance, continued)

- 8.16.3 For more detail on suspension trauma, refer to Appendix 8, OSHA Bulletin – Suspension Trauma.

8.17 Personal Flotation Device

- 8.17.1 Approved PFD (personal floatation device) must be readily available by each individual on board the aircraft when conducting operations beyond the gliding distance to shore when operating over water, and during all helicopter hovering flights over water sources such as lakes, and coastal waters. (Refer to 2.13, “Water Safety”).
- 8.17.2 HEC employees are required to wear automatic inflation PFD when operating over water.
- 8.17.3 Automatic inflation (water activated) PFDs are not allowed inside the cabin of the aircraft.

8.18 Personnel Safety Check

- 8.18.1 Each individual will check themselves and their partner before any operations commence. Inspection will be visual and physical (see and pull) from head to toe and will adapt to specific equipment used. The 11-point buddy check includes:
1. Helmet properly fitted; chinstrap fastened.
 2. Approved eye protection secured.
 3. Flash resistant clothing properly worn.
 4. Gloves on.
 5. Chest harness properly fitted and snug.
 6. Leg straps securely fastened and snug.
 7. All buckles attached and secured.
 8. Snap hooks (carabiners) attached to A-frame and locked.
 9. Rescue knife secure and easily accessible.
 10. Hearing protection available and in use.
 11. Radio operational and on correct frequency.

Chapter 8, Requirements for Human External Cargo

(8.18, Personnel Safety Check, continued)

- 8.18.2 Double-check the follow-through buckles; two points of attachment are properly secured to harness and locking carabiners are functional. Figure 9 shows an HEC employee ready to lift off.



Figure 9: HEC Ready to Lift Off

8.19 Pilot Responsibilities

- 8.19.1 Helicopter pilots **must not** perform any work procedures for which they are not trained and qualified. Helicopter pilots that fail to produce their helicopter identification cards will not be allowed to perform any helicopter human external cargo procedures.

- Contributes to tailboard on flight operations.
- Inspects HEC equipment and rigging prior to the job or mission.
- Computes helicopter performance margins.
- Completes an equipment and aircraft check.
- Inspects the HEC rope and all attachments of the HEC rope to the aircraft.

(List
Continues)

Chapter 8, Requirements for Human External Cargo

(8.19.1, continued)

- Checks to verify release systems are operational and working correctly (in conjunction with the helicopter support personnel).
- Verifies the operational integrity of the electric hook system (in conjunction with the helicopter support personnel).
- Secures loose equipment or removes items from the cabin.
- Checks the radio to verify it is operating correctly and on the correct frequency to communicate with the line crew and landing zone crew.
- Knows the approved forms of communications used for this type of work method and fully understands the head and hand signals as approved.
- Completes a communications check between the aircraft and the lineman as applicable:
 - Head signals
 - Hand signals
 - Radio
- In conjunction with the lineman and via head/hand communications as tail-boarded, maintains working distances from all lines (energized and de-energized).
- Stops work anytime unsafe conditions or behaviors are observed until the job can be completed safely.

8.19.2 For safe operations while conducting HEC:

- The intentional abrupt change in a helicopter's attitude, or abnormal attitude, or abnormal acceleration not necessary for HEC operation is prohibited.
 - Angles of bank exceeding 30 degrees and pitch attitudes exceeding 15 degrees are considered abnormal and unjustified for HEC operations.
- Increased airspeed and rates of descent, relative wind components, and other factors, which are conducive to settling with power or loss of tail rotor effectiveness, should be avoided.
- Helicopter manufacturers provide airspeed limitations for external load operations. In all cases, exceeding the aircraft's external load airspeed limits, or 70 knots whichever is less, is prohibited.
- Observed violations of these requirements (by anyone) require an immediate stop-work and corrective action.

8.19.3 These pilot requirements apply to all helicopter external load operations conducted on behalf of PG&E. However, a helicopter contractor may request an exception based on the unique requirements of a particular job, provided that the exception is granted in advance of the work being performed. Contact Helicopter Operations at 707-449-5832.



Chapter 8, Requirements for Human External Cargo

8.20 Planning Factors

- 8.20.1 Besides identifying the type of helicopter work to be performed, be aware of the following when selecting the type of helicopter:
- How much load the helicopter will be lifting?
 - At what altitude will the work be performed?
 - What temperatures are forecast at and near the work site?
- 8.20.2 Required performance reserve for all helicopter lift operations:
- Helicopter operators/pilots are responsible for determining the helicopter's specific performance chart, which provides the maximum total combined weight of aircraft and load, hovering-out-of-ground-effect (HOGE).
 - Helicopter operators/pilots are required to have, at the job site, accurate weight information on the aircraft as configured for lift and all other data/parameters needed to determine HOGE performance. It is acceptable for the operator to use the stated weight of the cargo (ready to fly) by the PG&E employee.
 - Helicopter operators/pilots are responsible for providing at least a 10 percent margin, or weight reduction, from the HOGE maximum stated in the selected aircraft performance chart. Example: If the helicopter can hover, OGE at a total weight of 3000 lbs., the maximum weight during PG&E lift operations would be 10 percent less or 2700 lbs.
 - Helicopter operators are responsible for providing training for all pilots to these standards before any flight. Understanding the known variables is fundamental to the required training.
 - Oversight: Helicopter pilots will carry sufficient information to each daily PG&E Safety Briefing to satisfy any person involved in the lift operation of compliance with the scope and intent of this policy.
- 8.20.3 **Helmets** – It is critical that all employees use an approved helicopter helmet while performing the work methods described in this manual. Using the helicopter helmet will prevent the possibility of a hard hat being blown off and contacting the helicopter rotor blades. (See Appendix 3, Specialized Tools and Safety Equipment, Item #2.)
- 8.20.4 **Hearing Protection** – Helicopters produce a high level of sound or mechanical noise. Employees must use either approved hearing protection or an approved flight helmet or gear while working from a helicopter. All employees must wear hearing protection while working near helicopters, as well.

Chapter 8, Requirements for Human External Cargo

(8.20, Planning Factors, continued)

- 8.20.5 **Inspections** – When the HEC employee procedures involve either transferring a worker from a helicopter or performing work on conductors, the employees assigned to perform the work must inspect the supporting structures and conductors before performing the work. This inspection will identify any condition that might jeopardize an employee's personal safety or raise concern for any employee, or the pilot. If potentially unsafe conditions are discovered during the inspection process, the conditions must be corrected before performing the helicopter work procedures. If these conditions cannot be corrected, use an alternate work method.
- 8.20.6 **Safeties** – All lanyards and positioning straps used by HEC employees must be positioned to prevent possible hang-ups while performing transferring procedures.
- 8.20.7 **Tools** – HEC employees must not carry tools by hand. HEC employees may carry tools, which are secured from falling, in a tool bag or attached by a lanyard to the tool belt as long as tools do not impede their movement or that might hang up during HEC transfers.

8.21 Roles and Responsibilities

- 8.21.1 Each worker involved in HEC activities has specific duties and responsibilities, established for each classification of worker on this type of project.
- Crew foreman or employee in charge (see 8.4)
 - LZ-Lead (see 7.12.3 and 8.22)
 - Pilot (see 8.19)
 - Lineman/Towerman (see 8.12)
 - Line work support personnel (groundmen) (see 8.14)
 - Helicopter support (e.g., fueler, mechanic) (see 8.10)

8.22 Safety

- 8.22.1 Before each flight, the crew lead(s), the pilot, and the employee(s) must analyze and address any conditions specific to the work situation and agree on the safety measures required to address those conditions. When determining and selecting the best method to use, ensure that safe distances can be maintained between all parts of the helicopter and any energized conductors, de-energized conductors, co-workers, and/or the structure. If, at any time either before performing the work or while performing the work, the employee(s), or the pilot, believes that dangerous or unsafe conditions exist that could jeopardize the safety of the operation or warrant aborting of the operation, anyone has the right to postpone or stop the operation until those safety concerns have been addressed.
- 8.22.2 Helicopters designed to suspend an HEC employee must attach the load line to the helicopter using two separate attachment points.



Chapter 8, Requirements for Human External Cargo

(8.22, Safety, continued)

- 8.22.3 Each attachment point must have its own release mechanism controlled by the pilot. This system prevents inadvertent release and provides the HEC employee with an additional level of safety. This system also provides the pilot with an opportunity to release the load line during an emergency, while the HEC employee is attached to both a structure and the helicopter.
- 8.22.4 Federal requirements for HEC training and safety can be found in FAA Advisory Circular (AC) 133-B1, dated 5/31/17, beginning with section 3.4.2.6.1, at:
https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_133-1B.pdf

Chapter 9, Transporting Ground to Ground

Chapter 9, TRANSPORTING GROUND TO GROUND

Training Required: TECH-0088. Sections below are in order of event.

9.1 Safety Check

- 9.1.1 Each individual will check themselves and their partner before operations commence. Inspection will be visual and physical (see and pull) from head to toe and will adapt to specific equipment used.
- Helmet properly fitted; chinstrap fastened.
 - Eye protection secured.
 - Flash resistant clothing properly worn.
 - Radio operational and on correct frequency.
 - Gloves on.
 - Sleeves down.
 - Harness properly fitted, buckles correctly fastened, no twists, loose straps secured—tighten all screw links.
- 9.1.2 Double-check on follow-through buckles. Two separate points of attachment are properly secured to harness and locking carabiners are functional.

9.2 Departure

- 9.2.1 After HEC employee signals it is clear to take off, the pilot must ensure that nothing is hanging from HEC employee's belt that could tangle on any obstructions as helicopter moves away.
- The pilot will always move helicopter away from ground in slow and cautious manner.
 - IF something does catch,
THEN the helicopter can be maneuvered back easily and HEC employee can free the obstruction.

9.3 Taking Off

- 9.3.1 The helicopter hovers above the HEC employee while the employee attaches to the helicopter load line. Be aware of blade wash and flying debris.
1. The pilot positions the helicopter above HEC employee allowing access to helicopter load line.
 2. The HEC employee attaches lanyard between the harness's front D-ring and helicopter load line.
 3. When securely attached, HEC employee signals to the pilot that it is safe to lift off.
 - HEC stands firmly on ground, straight up, without jumping, sitting, or leaning back, allowing pilot to pull up.
 4. The pilot lifts the HEC employee slowly, ensuring that nothing hangs up as helicopter departs.



Chapter 9, Transporting Ground to Ground

9.4 Transporting

- 9.4.1 While the HEC employee is suspended from helicopter ensure:
- Load line is clear of any obstructions
 - HEC employee may turn, twist, swing, etc., while suspended

9.5 Landing

- 9.5.1 The HEC employee must be prepared to land properly:
- Knees bent
 - Chest up
 - Arms bent at elbow
 - Assume a good athletic stance
 - Land on the balls of feet
- 9.5.2 When the HEC employee is on the ground:
- Remove helicopter load line from harness immediately
 - **Only after load line is detached**—signal to pilot that it is safe to depart



Chapter 10, Transferring To Pole or Structure

Chapter 10, TRANSFERRING TO POLE OR STRUCTURE

Training Required: TECH-0061.

10.1 General Provisions

- 10.1.1 Chapter 10 describes special requirements that must be followed when transferring an HEC employee to a pole or structure using a helicopter with a suspended load line. This chapter specifically addresses transferring an HEC employee from the ground to a pole or structure, as well as from a pole or structure to another location.
- 10.1.2 These procedures minimize the risks involved when transferring HEC employees between a helicopter and steel structures or wooden poles.
- 10.1.3 The harness method provides a fast, easy, and safe way for a helicopter to position an HEC employee on a pole or structure using common work tools.
- 10.1.4 Before each flight begins, the pilot, the employee in charge, and an HEC employee must analyze and address specific work conditions and agree on the safety measures to take when addressing those conditions.
- 10.1.5 If a special condition exists, it may be necessary to adjust these procedures slightly to provide greater safety. Adjustments to these procedures should be considered only as a temporary exception for the duration of the special condition.
- 10.1.6 In the Tower Department, employees must hold the permanent classification of “towerman”, prior to being eligible for structure transfer work.

10.2 Procedures for Steel Structures

NOTE

Although reference is made to a single HEC employee, there could be two HEC employees performing these procedures.

- 10.2.1 When the helicopter and suspended HEC employee are clear of the structure and related conductors, the pilot must return to the landing zone or proceed to the next location.

Insertion Procedures for Steel Structures

1. Before using this work method, the pilot and HEC employee must ensure that the double release system mounted on the helicopter is working properly and that all rigging components are in good condition and are not defective.

(Steps
Continue)

Chapter 10, Transferring To Pole or Structure

(10.2.1, Insertion Procedures for Steel Structures, continued)

2. The HEC employee must ensure that the pilot knows the exact structure location where work is to be performed. Before beginning the transfer, the HEC employee and the pilot must:
 - Discuss and address all the special conditions, safe working distances, and hazards associated with the structure. HEC employee and must be aware of minimum approach distances (MAD) as identified in TD-2999B-037 and any current changes.
 - Agree on the methods to implement when dealing with the specific job conditions.
3. The pilot must position the helicopter above the HEC employee, allowing the HEC employee easy access to the helicopter load line.
4. The HEC employee must attach a lanyard between the harness's front D-ring and the helicopter load line. Once securely attached, the HEC employee must signal to the pilot that it is safe to lift off.
5. After the pilot receives the signal that it is safe to lift off, the pilot will lift the HEC employee slowly, ensuring that nothing hangs up as the helicopter departs.
6. When the HEC employee is suspended from the helicopter load line and is clear of any obstructions, the pilot will proceed to the location where the HEC employee is to be positioned.
7. As the pilot moves the HEC employee into position for the transfer, the HEC employee must signal the pilot. This helps the pilot to place the HEC employee in the proper location for the transfer.
8. When the HEC employee is on the structure, the employee must attach either the fall-arrest lanyard or the positioning strap to the structure immediately. After the HEC employee is attached to the structure, the next step is to remove the helicopter load line from the harness immediately. When the load line is detached, the HEC employee must signal the pilot that it is safe to depart.
9. After the HEC employee signals it is clear to take off, the pilot must ensure that nothing is hanging from the HEC employee's belt that could tangle on the structure as the helicopter moves away. The pilot must always move the helicopter away from the structure in a slow and cautious manner. If something does catch accidentally, the helicopter can be maneuvered back to the structure easily and the HEC employee can free it from the structure.

Extraction Procedures for Steel Structures

1. When the HEC employee is ready to leave a structure, the employee must communicate the pick-up location to the pilot. The HEC employee then should assume a position on the structure that allows easy access for the helicopter load line and avoids hazards or conditions that would impair the transfer.
2. The pilot must approach the structure slowly and position the helicopter load line so the HEC employee can reach and attach the lanyard to the harness easily.

*(Steps
Continue)*

Chapter 10, Transferring To Pole or Structure

(10.2.1, Extraction Procedures for Steel Structures, continued)

3. The HEC employee then connects the lanyard to the harness's front D-ring and immediately disconnects the positioning strap or fall-arrest lanyards from the structure. Once the HEC employee is disconnected from the structure, the employee must signal the pilot that it is safe to lift off.
4. After the HEC employee signals it is clear to take off, the pilot must ensure that nothing is hanging from the HEC employee's belt that could tangle on the structure as the helicopter moves away. The pilot always must move the helicopter away from the structure in a slow and cautious manner. If something does catch accidentally, the helicopter can be maneuvered back to the structure easily and the HEC employee can free it from the structure.

10.3 Procedures for Wood Poles

- 10.3.1 Line workers must follow Utility Procedure TD-2923P-01, Climbing Wood Poles, when involved in HEC operations.
- 10.3.2 The LOB supervisor/superintendent must verify employees are qualified for wood pole transfers before performing Insertion/Extraction procedures.

Insertion Procedures for Wood Poles

1. Before using this work method, the pilot and HEC must ensure that the double-release system mounted on the helicopter is working properly and that all rigging components are in good condition and are not defective.
2. The HEC must ensure that the pilot knows the exact pole number and the location on the pole where work is to be performed. Before beginning the transfer, the HEC and the pilot must:
 - Discuss and address all the special conditions, safe working distances, and hazards associated with the pole. HEC employee and must be aware of minimum approach distances (MAD) as identified in TD-2999B-037 and any current changes.
 - Agree on the methods to implement when dealing with the specific job conditions.

NOTE

Wood poles must be inspected and tested, as described in *Code of Safe Practices* Rule 417, "Testing Poles and Stubs," before making the transfer. This is required to ensure that the pole will support the additional load of the worker.

3. The pilot must position the helicopter above the HEC, allowing the HEC easy access to the helicopter load line.
4. The HEC must attach a lanyard between the harness's front D-ring and the helicopter load line.
5. Once securely attached, the HEC must signal to the pilot that it is safe to lift off.

(Steps
Continue)

Chapter 10, Transferring To Pole or Structure

(10.3.2, Insertion Procedures for Wood Poles, continued)

6. After the pilot receives the signal that it is safe to lift off, the pilot must lift the HEC slowly, ensuring that nothing hangs up as the helicopter departs.
7. When the HEC is suspended from the helicopter load line and is clear of any obstructions, the pilot must proceed to the location where the HEC is to be positioned.
8. As the pilot moves the HEC into position for the transfer, the HEC must signal the pilot. This helps the pilot to place the HEC in the proper location for the transfer.
9. When the HEC is placed on the pole, the HEC must attach their fall restraint equipment (FRE) to the pole immediately prior to disconnecting from the helicopter HEC lanyards.
10. After the HEC is attached to the pole, the next step is to remove the helicopter load line from the harness immediately.
11. When the load line is detached, the HEC signals the pilot that it is safe to depart.
12. If the pole type requires the pilot to lower the HEC between the conductors, the pilot must ensure that the worker is at a safe distance from the pole before proceeding. The HEC must not contact the conductors and the pole at the same time. Because there is no personal ground installed, this places the HEC in series with the conductor and the pole.
13. After the HEC is at a safe distance below the conductors, the pilot can maneuver the HEC to the pole for the transfer. The pilot must position the HEC on the pole so that the FRE strap will not slip over the top of the pole. Follow all applicable "Fall Protection" rules, as well as the *Code of Safe Practices*, Rule 8, "Fall Protection."
14. After the HEC signals it is clear to take off, the pilot must ensure that nothing is hanging from the HEC's belt that could tangle on the pole as the helicopter moves away. The pilot always must move the helicopter away from the pole in a slow and cautious manner. If something does catch accidentally, the helicopter can be maneuvered easily back to the pole and the line-worker can free it from the structure.

Extraction Procedures for Wood Poles

1. When the helicopter line-worker is ready to leave a pole, the line-worker must communicate the pick-up location to the pilot. The line-worker then should assume a position on the pole that allows easy access for the helicopter load line and avoids hazards or conditions that would impair the transfer.
2. The pilot must approach the pole slowly and position the helicopter load line so the line-worker can reach and attach the lanyard to the harness easily.
3. The line-worker then connects the lanyard to the harness's front D-ring and immediately disconnects the FRE strap from the pole. After the line-worker is disconnected from the pole, the line-worker must signal the pilot that it is safe to lift off.
4. After the line-worker signals it is clear to take off, the pilot must ensure that nothing is hanging from the line-worker's belt that could tangle on the pole as the helicopter moves away. The pilot always must move the helicopter away from the pole in a slow and cautious manner. If something does catch accidentally, the helicopter can be maneuvered back to the pole easily and the line-worker can free it from the skid. When the helicopter and suspended line-worker are clear of the pole and related conductors, the pilot must return to the landing zone or proceed to the next location.



Chapter 10, Transferring To Pole or Structure

10.4 Safety – Grounding Precautions

- 10.4.1 When employees cannot maintain the required safe working distances (see TD-2999B-037), they must install bracket grounds before making the transfer. Employees must follow *all* applicable protective grounding rules before performing any work. (Refer to TD-2345M-JA05.)

10.5 Safety Check – Personnel

- 10.5.1 Each individual will check themselves and their partner before operations commence. Inspection will be visual and physical (see and pull) from head to toe and will adapt to specific equipment used.
- Helmet properly fitted; chinstrap fastened.
 - Eye protection secured.
 - Flash resistant clothing properly worn.
 - Radio operational and on correct frequency.
 - Gloves on.
 - Sleeves down.
 - Harness properly fitted, buckles correctly fastened, no twists, loose straps secured—tighten all screw links.
- 10.5.2 Double-check on follow-through buckles. Two separate points of attachment are properly secured to harness and locking carabiners are functional.

10.6 Special Precautions and Equipment

- 10.6.1 The harness used for transferring to a structure must be equipped with both a front D-ring (e.g., front sternal D-ring) and a rear dorsal D-ring. The D-ring located on the backside of the harness may be used only for fall arrest or for an emergency rescue. The harness also is equipped with side-positioning D-rings. These side-positioned D-rings are used for work positioning while on a structure. Employees must use only PG&E-approved harnesses. For additional information on these approved harnesses, see Appendix 3, Specialized Tools and Safety Equipment, item #5.
- 10.6.2 When an HEC employee is suspended from a helicopter, the employee must be suspended using only the harness's front sternal D-ring, as illustrated in Figure 10.



Chapter 10, Transferring To Pole or Structure

(10.6, *Special Precautions and Equipment, continued*)



Figure 10: HEC Employee Suspended Using the Front Sternal D-Ring

10.6.3 Helicopters designed to suspend an HEC employee must attach the load line to the helicopter using two separate attachment points:

- The helicopter's cargo hook (attached to helicopter air frame).
- A personal safety Device.

Chapter 10, Transferring To Pole or Structure

(10.6, Special Precautions and Equipment, continued)

- 10.6.4 Each attachment point should have its own release mechanism that is controlled by the pilot. This system prevents accidental releases and provides the HEC employee with an additional level of safety. This system also provides the pilot with an opportunity to release the load line during an emergency while the HEC employee is attached to both a structure and the helicopter.
- 10.6.5 Because the pilot has the means to release the load line in an emergency, the HEC employee must attach either the positioning strap or the fall-arrest lanyard to the pole or structure before disconnecting the helicopter load line. However, HEC employee should minimize the time that they are attached to both the helicopter and the structure.
- 10.6.6 Up to two HEC employees may be transferred at the same time to a steel structure using this work method. The pilot and the HEC employees all must agree that it is safe to transfer both workers simultaneously. If either the pilot or the workers feel it is unsafe, the pilot will limit the transfer to one worker at a time.
- 10.6.7 When this work method is used to transfer line-workers to a wood pole, only one worker may be transferred at a time. This will prevent the workers from accidentally being injured by co-workers' gaffs.
- 10.6.8 Each worker must have a lanyard system (Figure 11, next page) attached between the front D-ring of the harness and the helicopter load line. The lanyard, and the means for attaching it, must have a minimum breaking strength of 5,000 pounds and provide an easy disconnect for the line-worker.



Figure 11: Approved Lanyard for Helicopter HEC Employee



Chapter 10, Transferring To Pole or Structure

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Chapter 11, Working from Bosun Chairs

Chapter 11, WORKING FROM BOSUN CHAIRS

Training Required: TECH-0062, TECH-0086.

11.1 Introduction

- 11.1.1 The success of your job depends on your ability to follow these work procedures; however, adjustments may be required because of changes in field conditions that are not identified or communicated at the time of your tailboard briefing.
- 11.1.2 Before each flight, the employee in charge, the pilot, and the helicopter line-worker(s) must analyze and address any conditions specific to the job and agree on the safety measures required to address those conditions.
- 11.1.3 If a special condition exists, it may be necessary to adjust these procedures to ensure the safety of the employees working on the job. Any changes to these procedures should be considered only a temporary measure for the specific job.
- 11.1.4 All HEC employees must know their total body weight when fully suited for an HEC mission. **Include these weights in the daily HEC tailboard** with the pilot (see Appendix 8, OSHA Bulletin – Suspension Trauma). Not all aircraft are equipped with a load cell; therefore, pilots cannot always verify total weight at the initial lift. Known weights of rigging include:
- 60' PG&E HEC Rope, A-Frames and Weight Bag = 49 lbs.
 - 100' PG&E HEC Rope, A-Frames and Weight Bag = 55 lbs.
 - ARS Air Chairs (Double Chairs) = 85 lbs.
 - Air Chairs with 60' rope = 109 lbs.
 - Air Chairs with 100' rope = 115 lbs.

NOTE

In the remainder of this chapter, the term “bosun chair” is used in the singular, although some projects allow for two bosun chairs (Figure 12).



Chapter 11, Working from Bosun Chairs

(11.1.4, continued)

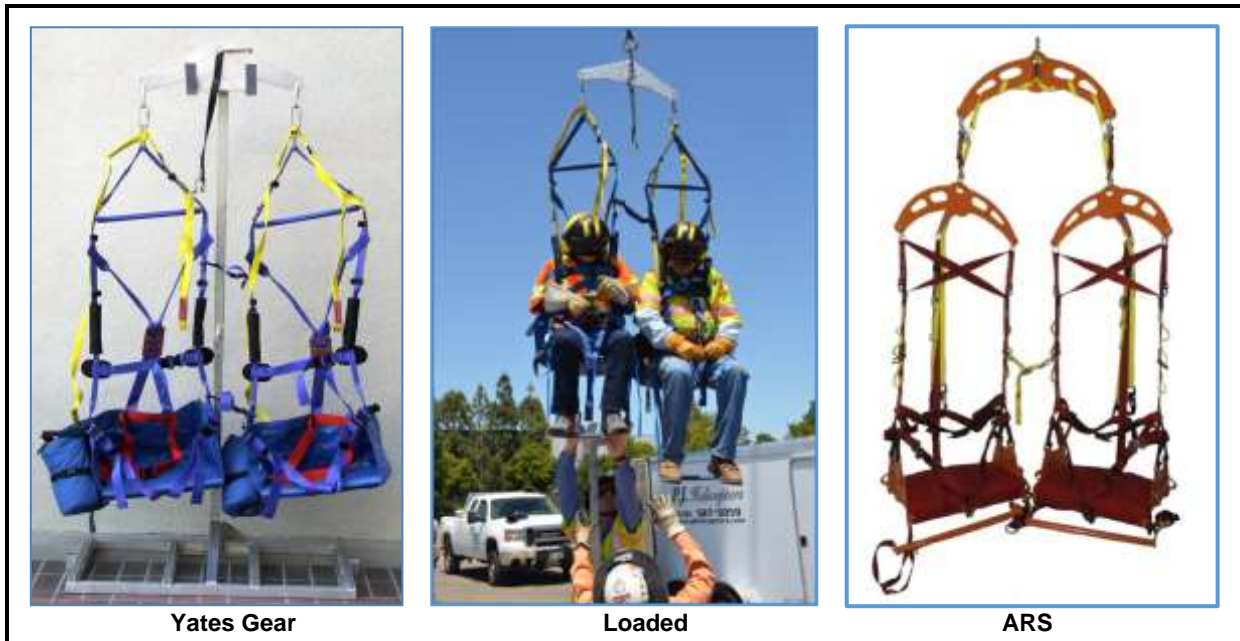


Figure 12: Bosun Chairs

11.2 Bonding Requirements

- 11.2.1 Unlike performing other energized bare-hand procedures, helicopter line-workers suspended from sky chairs are *not* required to bond on to the energized lines.
- 11.2.2 When performing bare-hand work procedures from a helicopter platform, Condor, or ladder, bonding on *is* required because it brings the helicopter's or Condor's metal mass to the same line potential as the conductor. Or, during ladder work, the bond on process is required because of the difference in potential of the metals, as described in the previous sentence, as well as the ground potential.
- 11.2.3 When working from sky chairs, only the line-workers' suits and chairs are brought to the same line potential. Neither a bonding wand nor cable with a clamp is required or used for such work. Bonding occurs each time contact is made with energized conductors.
- 11.2.4 A line-worker performing energized work while suspended from a sky chair may feel some sensation when making contact with an energized conductor; the line-worker must instruct the pilot to move away from the energized conductors immediately and return to the landing zone when experiencing discomfort. To ensure safety, the connections in the bare-hand suit bonds must be verified.

Chapter 11, Working from Bosun Chairs

11.3 Communication

- 11.3.1 Refer to Chapter 3, Communications for additional information.
- 11.3.2 Good communications are essential for all helicopter work. To maintain communication, all helicopter line-workers must be equipped with radio communication devices (or other communications devices approved by the Joint Helicopter Working Committee), as shown in Appendix 3, Specialized Tools and Safety Equipment, item #14. The radios allow helicopter line-workers to give clear and concise positioning instructions to the pilot during work activities.
- 11.3.3 Check communications with the pilot before the flight.

11.4 Personnel Safety Check

- 11.4.1 Each individual will check themselves and their partner before operations commence. Inspection will be visual and physical (see and pull) from head to toe and will adapt to specific equipment used.
- Helmet properly fitted; chinstrap fastened.
 - Eye protection secured.
 - Flash resistant clothing properly worn.
 - Radio operational and on correct frequency.
 - Gloves on.
 - Sleeves down.
 - Harness properly fitted, buckles correctly fastened, no twists, loose straps secured—tighten all screw links.
- 11.4.2 Double-check on follow-through buckles. Make sure two separate points of attachment are properly secured to harness and locking carabiners are functional.

11.5 Preflight Check

- 11.5.1 Before the helicopter takes off, the pilot and the helicopter line-workers must ensure that all of the required equipment and clothing listed below are available and prepared for the work:
- The double-release system is mounted on the helicopter and functioning properly.
 - The radio communication devices are working properly.
 - All special equipment is available and attached correctly.
 - All rigging components are in good condition and without defects.
 - The line-workers' bare-hand suits are bonded together and to the sky chairs.
 - The external load hot rope is clean and in good repair.

Chapter 11, Working from Bosun Chairs

(11.5, Preflight Check, continued)

- 11.5.2 After completing the checks and all systems are ready, the helicopter line-workers must notify the pilot that it is safe to take off.

11.6 Preplanning Non-energized Work

- 11.6.1 AVI-3001M, *Helicopter Operations Field Manual*, must be on site. The employee in charge, the pilot, and the line-worker(s) must discuss all aspects of the work to be performed, including, but not limited to, the following topics.
- The type of work.
 - The emergency plan.
 - The positions of any energized conductors near the work location, and the safe working distances that must be maintained. (See TD-2999B-037)
 - The type of construction (e.g., vertical or horizontal).
 - The phase(s) to be worked on and the specific work location(s).
 - The length of load line required to maintain a safe work position for the helicopter, if overhead ground wire(s) or optical ground wires are present. (See Chapter 8, section 8.9.6, for connecting rope/load lines.)
 - The proximity to any potential foreign ground (e.g., pole or structure).
 - At no time during mid-span/vertical construction may any work be performed utilizing barehand work methods when workers or material cannot maintain mandatory minimum clearance (Table 5) as stated in the *Electric Transmission Live Line Barehand Work Procedure Manual*, safety section.

Table 5: Mandatory Minimum Clearances

Voltage ¹	Phase-to-Ground ²	Phase-to-Phase ³
46.1 – 72.5kV	5' 3"	5' 3"
72.6 – 121kV	5' 3"	5' 3"
230 – 242kV	5' 3"	8' 5"
500 – 552kV	11' 3"	20' 4"
¹ Insulator replacements are not permitted on voltages 60 kV through 115 kV, using bare-hand work methods, unless insulated and framed for 230 kV and above. ² Phase-to-ground distances established by Cal OSHA ³ Phase-to-phase distances established by IEEE Standard 516 – 1995 “ <i>IEEE Guide for Maintenance Methods on Energized Power Lines Table 14 – Minimum Approach Distance, AC Energized Work.</i> ”		

WARNING

While performing external load operations (e.g., HEC and/or external load/cargo), do *not* perform other types of work that could create an unsafe environment for the pilot or helicopter. This includes, but is not limited to, moving the wires/conductors, setting structures/structure members, pulling lines (e.g., sock line/conductors), or delivering tools and/or equipment.



Chapter 11, Working from Bosun Chairs

(11.6, Planning Non-energized Work, continued)

- 11.6.2 Install all grounds according to the requirements specified in the current *Protective Grounding Manual*. The only exception to protective grounding requirements is when line-workers are working on overhead conductors from a helicopter and there is *no* possibility of contacting a foreign ground potential. In this instance, personal grounds are *not* required.

Procedure

1. Before taking off, the pilot and the helicopter line-worker must ensure that:
 - Work site has been surveyed.
 - The double-release system mounted on the helicopter is functioning properly.
 - Radio communications are working properly (pilot/HEC/LZ-Lead).
 - All sky chair components in use are correctly attached.
 - All rigging components are in good condition and there are no defects.
2. Once the checks have been completed and all systems are ready, the helicopter line-worker must communicate to the pilot that it is safe to take off.
3. The pilot must maneuver the helicopter directly above the helicopter line-worker(s) and slowly lift the worker, ensuring that nothing gets caught during the move. The pilot then must proceed to the work site and hold a position that allows the line-worker to access the work site easily and safely. The helicopter line-worker must help the pilot to position the helicopter at the work site by providing detailed instructions to the pilot.
4. The helicopter line-worker must communicate any required position changes to the pilot. The line-worker must communicate with the pilot after the project is completed and inform the pilot that it is now safe to depart.
5. After the pilot is informed that the work is complete and that it is safe to depart, the pilot must leave the work site slowly, ensuring that nothing gets caught, and then proceed to the next work site or landing zone, as appropriate.

11.7 Preplanning Energized Work Activities

- 11.7.1 AVI-3001M, *Helicopter Operations Field Manual*, must be on site. The employee in charge, the pilot, and the helicopter line-worker(s) must discuss all aspects of the work to be performed, including but not limited to, the following topics:
- The emergency plan.
 - The energized voltage to be worked.
 - The phase separation.
 - The presence of conductors near or within the work site, and the required safe working distances. (See TD-2999B-037)
 - The type of construction (e.g., vertical or horizontal).
 - The phase(s) to be worked on and the specific work location(s).
- (List Continues)

Chapter 11, Working from Bosun Chairs

(11.7.1, continued)

- Length of the load line required to maintain a safe work position for the helicopter, if overhead ground wire(s) or optical ground wires are present. (See paragraph 8.9.6, for connecting rope/load lines.)
- The type of energized work to be performed.
- The proximity to a foreign ground (e.g., pole or structure).
- At no time during mid-span/vertical construction may any work be performed utilizing barehand work methods when workers or material cannot maintain mandatory minimum clearance (Table 6) as stated in the *Electric Transmission Live Line Barehand Work Procedure Manual*, safety section.

Table 6: Mandatory Minimum Clearances

Voltage	Phase-to-Ground ¹	Phase-to-Phase ²
46.1 – 72.5kV	5' 3"	5' 3"
72.6 – 121kV	5' 3"	5' 3"
230 – 242kV	5' 3"	8' 5"
500 – 552kV	11' 3"	20' 4"
Note: Insulator replacements are not permitted on voltages 60kV through 115kV, using bare-hand work methods, unless insulated and framed for 230kV and above. ¹ Phase-to-ground distances established by Cal OSHA. ² Phase-to-phase distances established by IEEE Standard 516 – 1995 “IEEE Guide for Maintenance Methods on Energized Power Lines Table 14 – Minimum approach distance ac energized work”.		

11.8 Performing Energized Work

- 11.8.1 Before each flight, the employee in charge, the pilot, and the helicopter line-worker(s) must analyze and address any conditions specific to the job and agree on the safety measures required to address those conditions.
- 11.8.2 If a special condition exists, it may be necessary to adjust these procedures to ensure the safety of the employees working on the job. Any changes to these procedures should be considered only a temporary measure for the specific job.
- 11.8.3 The work procedures are intended for use on energized transmission conductors and associated hardware or components.
- 11.8.4 A non-test is required either when working on energized transmission conductors using a helicopter as a work platform, or when working on external load energized work procedures.

11.9 Special Precautions

- 11.9.1 When a helicopter line-worker is suspended from a helicopter, PG&E requires that the load line be attached to the helicopter using two separate attachment points, each having a separate release button that is controlled by the pilot. This system prevents an accidental release and provides an additional level of safety for the helicopter line-worker.

Chapter 11, Working from Bosun Chairs

(11.9, *Special Precautions, continued*)

NOTE

In the remainder of this chapter, the term “sky chair” will be used in the singular, although some projects allow for two sky chairs.

- 11.9.2 A line-worker performing energized bare-hand work procedures from a sky chair must wear approved bare-hand clothing, including coveralls or pants, a jacket, gloves, boots, and socks.
- 11.9.3 The spreader bracket attached to the two-person sky chair must be attached to the helicopter by a nonconductive load line. A fall-arrest lanyard must also be attached to the sky chair’s top D-ring. The other end of the fall-arrest lanyard is connected to the dorsal D-ring of the HEC’s harness. A deceleration device is not needed between the harness and the fall-arrest lanyard when utilizing the Sky Chairs.

11.10 Transporting to the Work Site and Performing Energized Work

- 11.10.1 The pilot must maneuver the helicopter directly above the helicopter line-worker and slowly lift the worker, ensuring that nothing gets caught during the move. The pilot then must proceed to the work site and hold a position that allows the line-worker to access the work site easily and safely. The helicopter line-worker must help the pilot to position the helicopter at the work site by providing detailed instructions to the pilot.
- 11.10.2 The helicopter line-worker must communicate any required position changes to the pilot. The line-worker must contact the pilot after the project is completed and inform the pilot that it is now safe to depart.
- 11.10.3 After the pilot is informed that the work is complete and that it is safe to depart, the pilot must leave the work site slowly, ensuring that nothing gets caught, and then proceed to the next work site or landing zone, as appropriate.



Chapter 11, Working from Bosun Chairs

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Chapter 12, Training

Chapter 12, TRAINING

12.1 Introduction

12.1.1 Chapter 12 describes the overall training involved for both helicopter vendors (pilots) and PG&E employees (Table 7). The beginning of each chapter in this manual also identifies training requirements for the process described in that particular chapter.

12.1.2 Employees must be profiled by their supervisor to be included in Academy Helicopter Operations recurrent training requirements.

Table 7: Authorized Training Courses

Code ¹	Name	Frequency	Subject Area	Delivery Method
ELEC-0061WBT	Helicopter Load Harness Transfers Web Based Training (WBT)	24 months	Electric Construction	WBT (Internal)
SAFE-0256	Patrolling in the Utility Environment (wire patrols) (See section 12.5)	36 Months	Patrol	Instructor Led Training
SAFE-0256WBT	Patrolling in the Utility Environment Refresher (wire patrols) (See section 12.5)	12 Months (see 12.5.1)	Patrol	WBT
TECH-0002WBT	Basic Helicopter Safety (See section 12.6)	24 months	General Safety	WBT
TECH-0003	Helicopter External Load Operations (See section 12.7)	Initial Only	Electric Construction	Instructor Lead Training
TECH-0061	HEC Ground to Structure Transfer – De-energized	Initial Only	Electric Construction	Instructor Led Training
TECH-0062	HEC Sky Chair De-energized	Initial Only	Electric Construction	Instructor Led Training
TECH-0086 *	HEC Barehand Energized	Initial Only	Electric Construction	Instructor Led Training
* Prerequisite for TECH-0086				
ELEC-0188	Barehand Training	Initial Only	Electric Construction	Instructor Led
TECH-0088	HEC Ground to Ground Transfer	Initial Only	Electric Construction	Instructor Led Training
TECH-2000WBT	HEC – Ground to Ground and Ground to Structure Transfer Refresher	12 Months (see 12.3.2)	Electric Construction	WBT
TECH-3002A	HEC Ground to Structure Transfer – Field Check	24 Months (see 12.3.2)	Electric Construction	Instructor Led
TECH-3002A-GG	HEC Ground to Structure Transfer – Field Check	24 Months (see 12.3.2)	Electric Construction	Instructor Led

¹ Course numbers and/or titles are subject to change. In all cases, use the most recent replacement. Check with PG&E Academy.

Chapter 12, Training

12.2 Academy Training

- 12.2.1 Academy training is for PG&E employees. Training is classified as initial and refresher. All training must be documented in My Learning.
- Initial training will be managed and delivered by the PG&E Academy employees or instructors who have been approved by the Joint Helicopter Working Committee.
- 12.2.2 The training must be entered in the training server's database with the date, location, and the type of training. Helicopter qualification cards will be issued after the training is completed—**individuals cannot perform work without a valid Learning Academy issued helicopter qualification card**. The card identifies the work method(s) for which the cardholder is trained.
- 12.2.3 The employee in charge, or designee, must review each line-worker's helicopter qualification card before that individual is allowed to perform the work. Additionally, the employee in charge must review the pilot(s) qualification card.

12.3 HEC Line Worker Qualification

- 12.3.1 All employees assigned to HEC long-line helicopter work procedures must be trained and qualified by attending the Joint Helicopter Working Committee approved helicopter work procedure-training course (see Table 7) **and be in possession of a helicopter qualification card (issued by the Learning Academy) before performing helicopter line work**. The training must include a review of the appropriate sections of AVI-3001M, *Helicopter Operations Field Manual*, related to the method(s) that employees are assigned to perform.
- 12.3.2 Figure 13 shows the training life cycle approved by the Joint Helicopter Working Committee for all HEC qualified employees—initial training (once and done), then a continuous annual cycle of Web Based Refresher / Practical Assessment Field Check and Web Based Refresher / Web Based Refresher / Practical Assessment Field Check and Web Based Refresher /etc. This cycle is applicable to both TECH-0061 and TECH-0088.

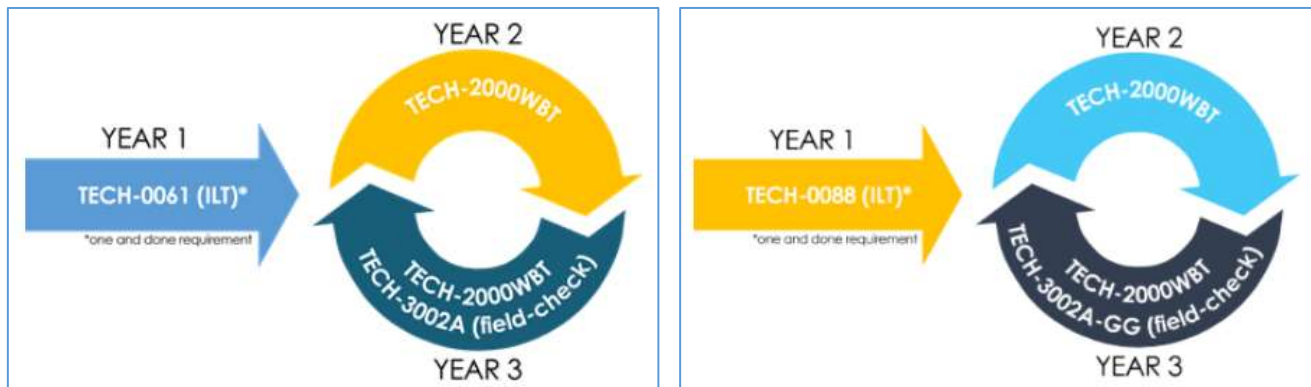


Figure 13: HEC Training Cycle for TECH-0061 and TECH-0088

Chapter 12, Training

12.4 Pilot Qualification

- 12.4.1 Once approved for helicopter procedures, helicopter pilot(s) receive a helicopter qualification card. There are separate qualifications for HEC (AVH-010) and material cargo (AVH-012). Helicopter pilots must show their helicopter qualification card (card identifies both or either qualification) to the PG&E employee in charge of helicopter operations **at each tailboard briefing**.
- 12.4.2 Helicopter pilots must not perform any work procedures for which they are not trained and qualified. Helicopter pilots that fail to produce their PG&E helicopter qualification card will not be allowed to perform any helicopter human external cargo procedures.
- 12.4.3 Pilots who perform helicopter operations for PG&E, on PG&E facilities, must be properly trained (by their company) before they are allowed to use the work methods described in this manual.
- 12.4.4 HEC pilot qualification may be conducted in conjunction with the helicopter line-workers training program. Pilots will participate in the skill proficiency exercise conducted by the Helicopter Operations Department. Proficiency qualification will be performed at the Livermore Training Facility and/or other approved training location. Only those pilots who successfully complete the evaluation and satisfactorily demonstrate the skills needed to safely perform this work are qualified.
- Each pilot must hold a valid FAA Commercial pilot Certificate and a Second-Class Medical Certificate. During the term of their contract, each pilot must also hold a current and valid authorization by the FAA to conduct operations as pilot-in-command under 14 CFR Part 133 (Class A and/or Class B external load operations) and 14 CFR Part 135.
- 12.4.5 Helicopter pilots (operating under 14 CFR Part 133) may be required to re-test (AVH-010 or AVH-012, as appropriate) if Helicopter Operations receives two or more performance complaints from field personnel in any 90-day period, or at any time at the discretion of Helicopter Operations management.
- 12.4.6 Pilots must perform regular power checks (trending) as identified in the job aid AVI-3001M-JA02, "Power Check and Trending".

12.5 SAFE-0256 Requirements

- 12.5.1 SAFE-00256, "Flying in a Wire-Obstruction Environment" cycles in two parts: Instructor Led Training (ILT) and WBT². The Instructor Led Training course is required every 36 months. The WBT is an annual refresher for two years, followed by a repeat of the ILT course (Figure 14, on the following page).

² Profiled employees will see the requirement on their My Learning dashboard.

Chapter 12, Training

(12.5.1, continued)



Figure 14: SAFE-0256 Training Cycle

12.5.2 The SAFE-0256 “Flying in a Wire-Obstruction Environment” training is required for any employee who will sit in the front of an aircraft or who will lead a patrol from the rear of an aircraft, engaged in the act of patrolling or inspecting a PG&E facility. This includes but is not limited to the following:

- Hydro flume, ditch, penstock or canal patrols
- Dam inspections
- Snow surveys
- Electric Transmission/Distribution patrols
- IR patrols
- Insulator wash
- Gas Transmission/Distribution patrols
- Vegetation patrols
- Emergency restoration patrols
- Engineering pre-construction inspections
- Pre-bid reconnaissance flights

12.5.3 Supervisors assign training. Classifications include, but not limited to:

- Hydro (Water System Repairperson, Meteorological Instrument Repairperson, Water System Operator, Hydrographer)
- Transmission Troubleshooter
- Distribution compliance inspector or Troubleshooter
- Crew foremen (only those actively engaged in aerial operations)
- Lineman (only those actively engaged in aerial operations)
- Gas Aerial Patroller

Chapter 12, Training

(12.5, SAFE-0256 Requirements, continued)

- 12.5.4 Employees are issued a qualification card upon successful completion of this training. Only those employees in possession of a current card are allowed to sit in the front seat of an aircraft or lead a patrol from the rear seat of an aircraft, while flying low level conducting a patrol.
- 12.5.5 SAFE-0256 is not required for general passenger transport (ferry) from one LZ directly to a second.

12.6 TECH-0002WBT Requirements

- 12.6.1 All employees (CEO and below) working in or around helicopters (this includes riding in a helicopter) must complete TECH-0002WBT, Helicopter Safety Training. This training must be completed every two years.
- Training will afford the employee the ability to safely work around a helicopter and identify and mitigate risks and potential hazards that may be encountered.
 - Training is a self-paced, web-based training module. The responsible superintendent and supervisor will ensure that their employees have completed this training prior to any helicopter exposure.
- 12.6.2 Contract non-employees flying in helicopters can take TECH-0002WBT through ISN. Non-employees without ISN access must sign a waiver (AVH-009, available from Helicopter Operations) that includes the TECH-0002WBT briefing, contact Helicopter Operations (707-449-5832). Non-employees not flying in a helicopter, but just working on ground operations are not required to take TECH-0002WBT. There are three liability waivers:
- AVH-009a (Passengers) – most common, for general passengers
 - AVH-009b (Media) – specifically for media personnel only
 - AVH-009c (UAS) – for observers of UAS operations (drones); this waiver does not require or include TECH-0002 presentation

Objective

- 12.6.3 The overall training objective is to educate the employee on helicopter safety. This will afford the employee the ability to work safely around a helicopter and to identify and mitigate risks and potential hazards that may be encountered.

Description

- 12.6.4 This training maximizes safety by enabling employees and contractors to successfully, and safely, follow proper protocol and safety requirements when coming in contact or being exposed to a helicopter.

Chapter 12, Training

(12.6, TECH-0002WBT Requirements, Description, continued)

- 12.6.5 TECH-0002WBT is not approved to be taken instructor-led or in a group setting. Participants are required to complete the course, individually, online, through the My Learning portal in order to earn a completion.

12.7 TECH-0003 Requirements

- 12.7.1 TECH-0003, Helicopter External Load Operations, is a helicopter safety course for PG&E employees performing Part 133 helicopter external cargo load operations, covering:
- Safety Habits and Rigging
 - Proper Communications
 - Trust with Team Members
 - Thorough Tailboards
- 12.7.2 The course is designed as a one-off course—once and done. However, at any time the supervisor feels it advisable, an employee may be authorized to retake this instructor led course.
- 12.7.3 To enroll in TECH-0003, arrange approval with your supervisor and the PG&E Academy. To enroll in the class, employees can go to MyLearning to register or they can always reach out to the Academy. The Academy schedules courses periodically when a minimum number of employees are available to fill a class.



Helicopter Operations Field Manual

Definitions

(Refer to Appendix 1, Glossary)

**Implementation
Responsibilities**

Helicopter Operations manager communicates to Helicopter Specialist and affected Lines of Business through the Joint Helicopter Working Committee.

**Governing
Document**

NA

**Compliance
Requirement/
Regulatory
Commitment**

NA

**Reference
Documents**
Developmental References:

NA

Supplemental References:

SAFE-1012S,

SAFE-1016S, Rigging Safety Standard

TD-4412P-07, Patrolling Gas Pipelines

TD-1466P-02, Electric Operating Instructions

TD-2923P-01, Climbing Wood Poles

TD-2327P-01, Selecting and Caring for Ropes, Knots, Splices, and Slings

TD-2345M-JA05,

TD-2888B-095, Cribbing for Rigging Component Protection

TD-2999B-037, New Minimum Approach Distances for Energized Equipment

Fall Protection Reference Manual

Helicopter Operations Field Manual

Reference Documents (continued)

Fall Protection Users Guide (M62-1073)

PG&E Code of Safe Practice

Appendices

Appendix 1, Glossary

Appendix 2, Job Aids

Appendix 3, Specialized Tools and Safety Equipment

Appendix 4, Selecting an Aircraft

Appendix 5, Helicopter Safety Chart

Appendix 6, Helicopter Hand and Head Signals

Appendix 7, Preventive Maintenance for Helmet Users

Appendix 8, OSHA Bulletin – Suspension Trauma

Appendix 9, Tailboard Checklists

Appendix 10, Loose Items Storage System

Appendix 11, Helicopter Pole Rigging Guidelines

Appendix 12, DCPD

Appendix 13, Edwards AFB Pilot Briefing

Appendix 14, MULETAPE® Restriction and Warning

Appendix 15, ARS Air Reach Seat Manual

Appendix 16, Segmented Patrol

Attachments

AVI-3001M-JA01, Helicopter Planning Aid

AVI-3001M-JA02, Power Check and Trending

AVI-3001M-JA03, LZ Preparation Checklist

AVI-3001M-JA04, Yellow-Green LZ Requirements

AVI-3001M-JA05, HO-Vendor FRAT Requirements

AVI-3001M-F01, Helicopter Operations Tailboard

AVI-3001M-F02, Patrol/Ferry Tailboard Checklist

AVI-3001M-F03, LZ Maintenance Checklist

Helicopter Operations Field Manual

Document Recision Replaces TRAN-4004M, Helicopter Operations Field Manual
 Including bulletins (these bulletins are now obsolete):
 TRAN-4004B-002, HEC Rescue Knife
 TRAN-4004B-003, Securing Loose Items
 TRAN-4004B-004, Pilot's Briefing
 TRAN-4004B-005, Helicopter Pole Rigging
 TRAN-4004B-006, Wood Pole Transfers
 TRAN-4004B-007, Incident / Accident Reporting
 TRAN-4004B-008, TEA Bone Mic in SRM
 TRAN-4004B-009, Yates Carabiner
 TRAN-4004B-010, DCPD Instructions
 TRAN-4004B-011, HEC Training Currency
 TRAN-4004B-012, HEC Parachute System (Void) (done)
 TRAN-4004B-013, Restricted Muletape Use
 TRAN-4004B-014, Door Off or Open
 TRAN-4004B-015, Horizontal Safe Working Distance and Side Pull Std
 TRAN-4004B-016, Appendix 11, HO Tailboard
 TRAN-4004B-017, Longline Clearance Verification
 TRAN-4004B-018, Passenger Manifest
 TRAN-4004B-019, Ropes and Radios
 TRAN-4004B-020, HEC Parachutes
 TRAN-4004B-021, Patrol-Ferry Tailboard
 TRAN-4004B-022, Patrolling
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Helicopter Operations Field Manual

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REVISION NOTES

Where?	What Changed?
All	New Manual



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APPENDIX 1, GLOSSARY

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Term	Definition
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A

Abort:	To terminate a preplanned aircraft maneuver, for example, an aborted takeoff.
Acknowledge:	To let one know that one has received and understood another's message.
Advancing Blade:	That half of the rotor disc in which the rotation of the blade is moving in the same direction as the movement of the helicopter
Advisory:	Advice and information provided to assist a pilot in the safe conduct of flight and aircraft
Aerial Survey	Survey conducted by helicopter to identify approach, egress, obstacles/hazards, and minimum allowable horizontal and vertical clearances.
Affirmative:	Yes
Aft:	Rearward; in the back.
AGL:	(See Altitude)
(Above Ground Level)	
Aircraft Accident:	An occurrence associated with the operation of an aircraft that takes place between the time any person boards the aircraft, with the intention of flight, and all such persons disembark and in which any such person suffers an injury requiring more than basic first aid, other serious injury, or death, or in which the aircraft receives any damage. This includes but not limited to the following: HEC, pole setting, wire stringing, general construction, and ground-men handling sling loads.
Aircraft Incident:	An occurrence, other than an accident, associated with the operation of an aircraft that affects or could affect the safety of operations, or injury only requiring basic first aid, not requiring a doctor's attention.
Aircraft:	The term aircraft is used to refer to both airplanes and helicopters.

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Appendix 1, Glossary

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Term	Definition
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A (Continued)

Airspeed: The speed of an aircraft relative to its surrounding air mass. The unqualified term “airspeed” means one of the following:

1. **Indicated Airspeed:** The speed shown on the aircraft airspeed indicator. This is the speed used in pilot/controller communications under the general term “airspeed”.
2. **True Airspeed:** The airspeed of an aircraft relative to undisturbed air. It is used primarily in-flight planning and the enroute portion of flight. When used in pilot/controller communications, it is referred to as “true airspeed” and not shortened to “airspeed”.

Allowable Payload: The allowable payload represents the amount of weight that is available for personnel and/or cargo. On the load calculation form, the allowable payload is the operating weight subtracted from the selected weight.

ALSE: Includes PPE and other items like personnel flotation devices/vests, oxygen units, survival vests. (see PPE)
(Aviation Life Support Equipment)

Altimeter Setting: The barometric pressure reading used to adjust a pressure altimeter for variations in existing atmospheric pressure or to the standard altimeter setting (29.92 inches).

Altitude: The height of a level point or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL).

1. **MSL Altitude:** Altitude in feet measured from mean sea level.
2. **AGL Altitude:** Altitude measured in feet from above ground level, that is, the vertical height of the aircraft above the ground.
3. **Indicated Altitude:** The altitude as shown by an altimeter. On a pressure or barometric altimeter, it is altitude as shown uncorrected for instrument error and uncompensated for variation from standard atmospheric conditions.

Angle of Attack: The acute angle measured between the chord of an airfoil and the relative wind.

Approach-Departure Path: The clear path selected for flight extending upward and outward from the touchdown pad and safety circle. The approach and departure path should not overfly structures, inhabited areas, personnel, and vehicle parking areas. See Chapter 4, Selecting a Landing Zone for recommended specifications.

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Appendix 1, Glossary

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Term	Definition
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A (Continued)

APU:	Auxiliary Power Unit
ATA: (Actual Time of Arrival)	Term used in flight planning and flight following to document the time of arrival at a point
ATC: (Air Traffic Control)	A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.
ATD: (Actual Time of Departure)	Term used in flight planning and flight following to document the actual time of departure from a given point.
ATE: (Actual Time Enroute)	Term used in flight planning and flight following to document the actual time spent flying from one point to another
Authorized Passenger:	Passengers who may be transported in an aircraft only if they meet definition of an official. See Official Passenger. See Unauthorized Passenger.
Autorotation:	A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion. No engine power is supplied to the main rotor, and lift is developed from the free turning of the rotor blades, which are driven by aerodynamic forces. Rotor inertia is used as the helicopter nears the ground to check the descent.
Aviation Hazard:	Any condition, act or set of circumstances that compromises the safety of personnel or resources engaged in aviation activities. These hazards include inadequacies, deficiencies, or unsafe practices pertaining to all aspects of aviation operation and activities.
Aviation Mishap:	An unplanned, unintended event involving aircraft operations that results in damage to aircraft, injuries to personnel, or presents the potential for such. Mishaps include aircraft accidents, aircraft incidents, aviation hazards, and aircraft maintenance deficiencies

B

Bearing:	The horizontal direction to or from any point, usually measured clockwise from true north, magnetic north, or some other reference point through 360 degrees.
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Term	Definition
B (Continued)	
Below Minimums:	Weather conditions below the minimums prescribed by regulation for the particular action involved (for example, landing minimums, takeoff minimums, VFR (visual flight rules) flight minimums).
Blade Loading:	The load placed on the rotor blades of a helicopter, determined by dividing the gross weight of the helicopter by the combined area of all the rotor blades.
Blade Stall:	The stall condition on the retreating blade, which occurs at high forward speeds.
Blind Spot:	An area from which radio transmissions and/or radar echoes cannot be received.
Broadcast:	Transmission of information for which an acknowledgement is not expected.
Bucket:	A rigid, collapsible, or collapsible-foldable container slung below a helicopter, usually to transport water, foam, or retardant

C

Cargo Hook:	Term commonly used to identify the load-carrying device mounted beneath the helicopter to which external cargo is attached. Cargo hooks usually have both manual and electrical quick-release mechanisms operated by the pilot.
Cargo Net:	A net used in external load operations.
Cargo Rack or Basket:	A structure attached externally to a helicopter for transport of cargo
Category:	As used with respect to certification of aircraft, means a grouping of aircraft based upon intended use or operating limitations. Examples include: transport, normal, utility, acrobatic, limited, restricted, and provisional
Ceiling:	The height above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obstruction," and not classified as "thin" or "partial".
Centrifugal Force:	The force created by the tendency of a body to follow a straight-line path against the force which causes it to move in a curve, resulting in a force which tends to pull away from the axis of rotation.

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Term	Definition
C (Continued)	
Certificated Gross Weight:	See Maximum Certificated Gross Weight.
CFR: (Code of Federal Regulations)	That body of regulations contained in the United States Code (USC) of regulations.
CG: (Center of Gravity)	An imaginary point where the resultant weight forces in the body may be considered to be concentrated for any position of the body. Consideration of center of gravity limitations is important in the loading of all aircraft, but it is particularly important and critical in helicopters. In an airplane, the load is balanced over a horizontal wing area and has comparatively wide range. In a single main rotor helicopter, it is carried under a single point, like a pendulum. Therefore, very little out-of-CG loading can greatly affect the controllability of the helicopter.
Chase Truck:	Helicopter crew vehicle, also known as a "helitender," that carries crew gear, supplies, and operational equipment for initial/extended work and helispot/helibase operations.
Civil Aircraft:	Aircraft that are not public aircraft.
Collective Pitch Control:	The method of control by which the pitch of all rotor blades is varied equally and simultaneously. The collective regulates the pitch angle, or angle of attack, of the main rotor blades. It is used as the primary power control. As the pitch of the blades is increased, lift is induced, causing the helicopter to lift off the ground, hover, or climb, as long as sufficient power is available.
Contract Aircraft:	<p>An aircraft that has been approved for use by a formal contract. Generally, there is no monetary limitation on the extent of use of the contract aircraft, Contract aircraft may be either exclusive-Use Contract or On-Call Contract aircraft.</p> <p>Exclusive-Use Contract Aircraft: An aircraft contracted for a specified period during which time it is under the exclusive use and control of the government. It may be released from the contract only through authorization by the Contracting Officer.</p> <p>On-Call Contract: An aircraft contracted for a specified number of hours, but which is not under the exclusive use and control of the government until the time of order (there may be a penalty incurred by the vendor for not meeting the order).</p>

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Term	Definition
C (Continued)	
Controlled Airspace:	Airspace within which some or all aircraft may be subject to air traffic control (see FAR Part 71 and/or the FAR/AIM)
Coordinates:	The intersection of lines of reference, usually expressed in degrees/minutes/seconds of latitude and longitude, used to determine or report position or location.
Copter:	Helicopter
Course:	The intended direction of flight in the horizontal plane measured in degrees from north. See Bearing and Radial .
Crashed Aircraft:	A crashed aircraft is one that is known or is suspected of having had an accident.
Crosswind Leg:	See Traffic Pattern.
CRM: (Crew Resource Management)	A set of training procedures for use in environments where human error can have devastating effects. Used primarily for improving air safety, CRM focuses on interpersonal communication, leadership, and decision making in the cockpit.
Cruise Speed:	The air speed, in knots, equivalent to 80 percent of maximum speed, at 5,000 feet, 80° F (26° C).
CTAF: (Common Traffic Advisory Frequency)	Radio frequency used for air-to-air communications and not-towered airports.
Cyclic Pitch Control:	The control, which changes the pitch of the rotor blades individually during a cycle of revolution by regulating the tilt of the rotor disc, and therefore, the direction and velocity of horizontal flight. The cyclic is used as the primary control for bank, horizontal movement, and speed. The main rotor system is tilted in the direction of stick movement, causing the helicopter to move in that direction

D

DA: Pressure altitude corrected for temperature and humidity.
(Density Altitude)

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Term	Definition
D (Continued)	
Deck:	That part of the helibase operational area that includes the touchdown pad, safety circle, hover lanes, and external cargo transport area. It is also usually roped off with flagging.
De-energized Line:	Any conductor that has been tested de-energized (no voltage) and grounded.
Disc Area:	The area swept by the blades of the rotor. This is a circle with its center at the rotor hub axis and a radius of one blade length.
Disc Loading:	The ratio of the helicopter gross weight to rotor disc area (total helicopter weight divided by the rotor disc area)
Distress:	A condition of being threatened by serious and/or imminent danger and requiring immediate assistance.
Dual-Rotor Helicopter:	Some helicopters have dual main rotors, mounted in tandem, side by side, or one above the other. Torque compensation is usually achieved by turning the rotors in opposite directions.

E

ELT: (Emergency Locating Transmitter)	A radio transmitter attached to the aircraft structure which operates from its own power source on 121.5 MHz and 243.0 MHz. It aids in locating downed aircraft by radiating a downward sweeping audio tone, 2-4 times per second. It is designed to function without human action after an accident.
Emergency:	Emergencies can be classified two ways: <ol style="list-style-type: none"> 1. Life-Threatening Emergency: A situation or occurrence of a serious nature, developing suddenly and unexpectedly and demanding immediate action to prevent loss of life. 2. Operational Emergency: An unforeseen combination of circumstances that calls for immediate action but is not life-threatening.
Empty Weight:	The weight of the helicopter including the structure, power plants, all fixed equipment, all fixed ballast, unusable fuel, un-drained oil, and total quantity of hydraulic fluid.
Energized Line:	Any conductor carrying 50V – 500kV. All conductors are considered energized until they have been tested de-energized and grounded.

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Term	Definition
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E (Continued)

Essential Passenger: The assigned Aircraft Flight Manager is responsible for ensuring that only passengers essential to the accomplishment of the mission, including trainees, are on board the aircraft.

ERP/EAP: Refers collectively to Hydro's Emergency Response Plan and Electric Operations Emergency Action Plan

ETA: Term used in flight planning and flight following to estimate the time of arrival at a point.
(Estimated Time of Arrival)

ETD: Term used in flight planning and flight following to estimate the time of departure from a given point.
(Estimated Time of Departure)

ETE: Term used in flight planning and flight following to estimate the time enroute from one point to another
(Estimated Time Enroute)

Exclusive-Use Contract: See **Contract Aircraft**.

Exhaust Gas Temperature: An exhaust gas temperature gauge measures, in degrees Celsius or Fahrenheit, the temperature of the exhaust gases at the exhaust manifold.

External Load: A load that is carried outside of the fuselage (normally suspended from a cargo hook).

F

FAA: Federal Aviation Administration

FAR: Regulations contained in [14 CFR](#) governing the operation of aircraft in the United States. For public aircraft, FAR 14 CFR Parts 47 and 91, Subpart B, are the only regulations mandated by the FAA. Agencies gain compliance with other FAR's by incorporating them, by reference, into manual directives and contracts
(Federal Aviation Regulations)

FAR/AIM: See Airman's Information Manual.

Final Approach: See Traffic Pattern.

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Term	Definition
F (Continued)	
First Aid:	Any attention that involves no medical bill. If a physician prescribes medical treatment for less than serious injury and makes a charge for this service, that injury becomes Medical Attention. Also see Medical Attention and Serious Injury.
Flight Following:	The method(s) and process(es) through which an aircraft is tracked from departure point to destination. Flight following is the knowledge of the aircraft location and condition with a reasonable degree of certainty such that, in the event of mishap, those on board may be rescued. Flight following may be accomplished through filing of flight plans with FAA and/or agency offices, or by an automated satellite reporting system. Though the end result of position check-ins is often the same, "flight following" should be differentiated from "resource tracking".
Flight Path:	A line, course, or track along which an aircraft is flying or intended to be flown.
Flight Plan:	Specified information relating to the intended flight of an aircraft that is filed with FAA or an agency office
Floats:	Landing gear that can be used on water (some floats are equipped with retractable wheels for use on land). There are two types of floats, fixed and pop-out. Pop-outs are inflated only as needed.
Floor Loading:	The pounds-per-square-inch (PSI) maximum load limit on the floor of the helicopter.
Forced Landing:	A landing necessitated by failure of engines, systems, or components which makes continued flight impossible and which may or may not result in damage.
FPM: (Feet Per Minute)	Feet per minute, usually in reference to ascent or descent.
Fuel Capacity:	The maximum amount of fuel that can be carried in the helicopter's fuel tank(s).
Fuel Consumption:	Fuel consumption, given in pounds per hour, is computed for 5,000 ft. pressure altitude, 80° F (26° C). Fuel weight is computed at 6 pounds per gallon for general aviation gas and 7 pounds per gallon for jet fuel.

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Term	Definition
G	
General Use:	This involves point-to-point transportation of personnel and/or cargo, and all other flights not categorized as special use. See Special Use.
GPS: (Global Positioning System)	A world-wide navigation system that uses satellite signals to determine position. GPS is replacing LORAN as the preferred system for determining aircraft position.
Gross Weight Limit:	The maximum weight limit for takeoff and landing.
WAT Limit: (Weight/Altitude/Temperature)	The maximum gross weight limit for external loads. Limitations may vary for HIGE, HOGE, and HOGE-J.
Gross Weight:	See Maximum Certificated Gross Weight
Ground Effect:	When a helicopter is operated near the surface, the downwash velocity created by the rotor blades cannot be fully developed due to the proximity of (interference with) the surface. This restraint of rotor downwash occurs as the helicopter reaches a relatively low altitude – usually one-half a rotor diameter. A cushion of air beneath a helicopter hovering or operating near the surface results as air is pushed downward by the main rotor system and semi-compressed against the surface. The net result is a beneficial increase in lift and a lower power requirement to support a given weight. This ground cushion is normally effective, although diminishing, up to a height above the surface equal to the radius of a main rotor blade. Ground effect is adversely affected by uneven terrain below the rotor disc, vegetation (tall grass), etc. See Hover-In-Ground-Effect and Hover-Out-Of-Ground-Effect
Ground Speed:	The speed of an aircraft relative to the surface of the earth.
Grounded:	Refers to an aircraft that is not airworthy, usually due to maintenance problems. May also refer to a pilot who is not able to perform pilot duties because of medical reasons.
Groundmen:	Support personnel for linemen and towermen.
Gust Spread:	The difference between the lowest and highest wind speed.

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Term	Definition
H	
Hand Signals:	Standard signals authorized for use by ground crews to direct a helicopter during takeoff, landing, or while in a hover. In some cases, helicopter hand signals differ from those prescribed for airplanes.
Hard Point:	An approved attachment point designed to carry a load.
Hazard Map:	Map of the area of operations that shows all of the known aerial hazards, including but not limited to power lines, military training areas, hang gliding areas, etc.
Hazardous Materials:	Hazardous materials are substances that are identified, classified, and regulated in the Code of Federal Regulations, Title 49, Parts 100 – 185. A hazardous material is a substance or material that has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce and which has been so designated
Heavy Helicopter:	A helicopter with a certified gross weight of over 12,500 pounds. Under the ICS helicopter typing system, a heavy helicopter is a Type 1 helicopter and must have an allowable payload at 59° F. at sea level of 5000 pounds, 16 passenger seats (unless restricted category), and a minimum retardant or water-carrying capability of 700 gallons.
HEC: (Human External Cargo)	The transport of one or more persons externally suspended below a helicopter. The use of a helicopter and an externally attached line (length varies) for the purpose of inserting and/or extracting personnel to areas that are inaccessible to a normal landing. Used primarily for search and rescue operations or life-threatening emergencies.
Helispot:	A helispot is a natural or improved takeoff and landing area intended for temporary or occasional helicopter use. It may or may not have road access. In many cases, helispots do <u>not</u> meet the requirements of a helibase and thus should not be referred to as helibases. (see Temporary Landing Zone.)
Helicopter:	Rotorcraft that, for its horizontal motion, depends principally upon its engine-driven rotors.
Helicopter Type:	The FAA typing of helicopters (heavy, medium, light) denotes categories of maximum takeoff and landing weight. See Appendix 4, Selecting an Aircraft
Helicopter Specialist:	Helicopter Operations Technical Field Expert supporting all LOBs that utilize helicopters at PG&E.

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Term	Definition
H (Continued)	
Heliport:	A permanent facility for the operation of helicopters which has been built to FAA standards and which are marked on aeronautical charts. Natural resource agencies refer to agency heliports as Permanent Helibases.
Helipad:	See Touchdown Pad
Hertz:	The standard radio equivalent of frequency in cycles per second of an electromagnetic wave. Kilohertz (KHz) is a frequency of one thousand=cycles per second. Megahertz (MHz) is a frequency of one million cycles per second.
HIGE: (Hover-In-Ground-Effect)	Operating at such an altitude (usually one-half the rotor diameter above the surface or lower) that the influence of ground effect is realized. When considering aircraft payload, the applicable aircraft performance chart must be referenced to determine hover height (typically skid height less than 5 feet). Additionally, the aircraft must be operated over a smooth, level, flat surface, in no wind or favorable wind conditions.
Hobbs Meter:	Flight hour recording device that is activated when power is applied.
HOGE: (Hover-Out-of-Ground-Effect)	Hovering without the benefit of the ground effect cushion. For any given altitude, hovering out of ground effect takes more power than hovering in ground effect.
Hook Person:	Ground person who attaches external loads to cargo hooks on helicopters.
Hot and High:	A term commonly used to mean an increase in the International Standard Atmosphere to 95° at 5000 feet MSL.
Hover Ceiling:	The highest altitude at which a helicopter can hover at maximum gross weight. In and out of ground effect hovering ceilings are computed at maximum gross weight in a standard atmosphere and calm air. The value given is density altitude
Hover Check:	Used to describe when a helicopter requires a stabilized hover to conduct a performance/power check prior to hover taxi, air taxi, or takeoff. Altitude of the hover will vary depending upon the purpose of the check
Hover Hookup:	Method of hooking an external load to a cargo-carrying device, usually a cargo hook, beneath a hovering helicopter

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Term	Definition
H (Continued)	
Hover Taxi:	Used to describe a helicopter movement conducted above the surface and in ground effect at airspeeds less than approximately 20 knots. The actual height may vary, and some helicopters may require hover taxi above 25 feet AGL to reduce ground effect turbulence or provide clearance for cargo sling loads.
Hover:	A condition of flight where the helicopter remains fairly stationary over a given point on the ground, moving neither vertically nor horizontally
I	
IAS:	Indicated Air Speed. (See Airspeed).
IFR: (Instrument Flight Rules)	Rules governing the procedures for conducting instrument flight. Also, a term used by pilots and controllers to indicate type of flight plan. See Visual Flight Rules and Instrument Meteorological Conditions.
IGE: (In-Ground Effect)	(See HIGE).
IMC: (Instrument Meteorological Conditions)	Meteorological conditions which can be expressed in terms of visibility, distance from cloud, and ceiling less than specified minima for visual meteorological conditions.
Internal Load:	<p>A load that is carried inside the fuselage structure.</p> <p>An internal, non-jettisonable load is generally associated with cargo being transported inside the helicopter.</p> <p>Freight secured in external cargo compartments is a non-jettisonable internal load.</p> <p>Cargo secured in a basket on the side of the helicopter is also defined as non-jettisonable, although it also technically classified as a Class A external loads under 14 CFR Part 133.</p>
IR:	Infrared

J

Jet-Fuel: Fuel used in natural resource agency turbine helicopter operations.

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Term	Definition
J (Continued)	
Jettisonable Load:	<p>One that can be released by the pilot from normal flight position. [See Internal Load.]</p> <p>Anything attached to the cargo hook and capable of being released at any time by the pilot (i.e., cargo, slings load lines, long-line with remote hook). A jettisonable load may be classified as Class B, C, or D in accordance with 14 CFR Part 133. External Load Classes include. A jettisonable load is usually associated with being an external load that can be released from the cargo hook:</p> <p>Class A Rotorcraft Load: The external load cannot move freely, cannot be jettisoned, and does not extend below the landing gear (for example, fixed water tank, cargo rack, etc.).</p> <p>Class B Rotorcraft Load: The external load is jettisonable and is lifted free of land or water during the rotorcraft operation (for example, water bucket, sling load, etc.).</p> <p>Class C Rotorcraft Load: The external load is jettisonable and remains in contact with land or water during the rotorcraft operation (for example, a snow sled).</p> <p>Class D Rotorcraft Load: The external load is other than a Class A, B, or C and has been specifically approved by the FAA for that operation.</p>
Joint Helicopter Working Committee:	A committee made up of members from the Management of PG&E and members of the IBEW, Local 1245 Union. Since inception, the committee has governed all decisions related to PG&E Helicopter Operations regarding work procedures, initial and annual training, incident analysis, Cal OSHA presentations, etc.

K

Knots: A measurement of speed in nautical miles per hour
(1.151 x knots = MPH)

L

Light Helicopter: A helicopter with certified gross weight of less than 6,000 pounds• Under the ICS helicopter typing system, a light helicopter is a Type 3 helicopter and must have an allowable payload at 59° F. at sea level of 1000 pounds, 2-5 passenger seats, and a retardant or water-carrying capability of 100 gallons.

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Term	Definition
L (Continued)	
Load Calculation:	Written documentation of a helicopter's lifting capability for a given altitude and temperature.
Long-line:	A line or set of lines, usually in 50' increments, used in external load operations that allow the helicopter to place loads in areas in which the helicopter could not safely land.
LZ: (Landing Zone)	The landing and takeoff area containing touchdown pads and safety circles and includes that part of the helibase complex where flight operations are concentrated.
LZ-Lead: (Person responsible for Landing Zone)	Each work site must have someone in charge as the person responsible for all helicopter operations in and around the LZ. Responsibilities include maintaining copies of the Helicopter Operations Field Manual (HOM) and Code of Safe Practice (CSP) at the work site, along with the current department specific Emergency Response Plan or Emergency Action Plan.

M

Main Rotor:	The rotor or rotors that supply the lifting force for the helicopter.
Maintenance Deficiency:	A defect or failure causing mechanical difficulties encountered in flight operations. Not specifically identified as an incident or aviation hazard.
Maximum Certificated Gross Weight:	Maximum certificated gross weight is the absolute maximum allowable weight (crew, passengers, fuel, oil, fluids, cargo, and special equipment) as established by the manufacturer and approved by the Federal Aviation Administration. Some helicopter models have higher gross weights for jettisonable external loads. If no number appears in the external weight block, the weight is the same as internal. See Maximum Computed Gross Weight.
Mayday Call:	The international distress signal indicating that the pilot of an aircraft is experiencing an in-flight emergency. When repeated three times, it indicates imminent and grave danger and that immediate assistance is requested. Dispatch or other flight following personnel must listen closely since the pilot or other air crew will be relaying location information essential to the dispatch of rescue.

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Term	Definition
M (Continued)	
Medical Attention:	An injury, less than serious, for which a physician prescribes medical treatment and charges for the medical service. Also see First Aid and Serious Injury.
Medium Helicopter:	A helicopter with a certified gross weight between 6,000 and 12,500 pounds. Under the ICS helicopter typing system, a medium helicopter is a Type 2 helicopter and must have an allowable payload at 59° F. at sea level of 2500 pounds, 6-10 passenger seats (unless restricted category), and a minimum retardant or water-carrying capability of 300 gallons.
Memorandum of Understanding:	A written agreement between two or more parties.
Minimums:	Weather condition requirements established for a particular operation (for example, landing minimums, takeoff minimums, VFR flight minimums).
Missing Aircraft:	A missing aircraft is one that has not made a check-in, and which has exceeded the fuel endurance specified on the flight plan or which was relayed to the flight following facility upon departure.
MOA:	Military Operations Area. See Interagency Airspace Coordination Guide.
MSL: (Mean Sea Level)	Commonly used in conjunction with a number of feet and, thereby indicating altitude above mean sea level, such as 10,000 feet MSL

N

NAVAID: (Navigational Aid)	Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight.
Negative:	“No,” or “permission not granted,” or “that is not correct.”
Night:	The time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time. Civil twilight ends in the evening when the center of the sun’s disk is 6-degrees below the horizon and begins in the morning when the center of the sun’s disk is 6-degrees below the horizon.

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Term	Definition
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N (Continued)

NOTAM: A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

(Notice to Airmen)

1. **NOTAM (D):** A NOTAM given (in addition to local dissemination) distant dissemination beyond the area of responsibility of the Flight Service Station. These NOTAM's will be stored and available until cancelled,

2. **NOTAM (L):** A NOTAM given local dissemination by voice and other means, such as telegraph and telephone, to satisfy local user requirements.

3. **FDC NOTAM:** A NOTAM, regulatory in nature, transmitted by USNOF and given system wide dissemination.

NTSB: The organization charged with the responsibility to investigate all civil transportation mishaps including air, ground, water rail, and pipeline and those public transportation mishaps which have high public interest.

(National Transportation
Safety Board)

NVG: Night Vision Goggles

O

OGE: (See HOGE)
(Out-Of-Ground-Effect)

One-Skid Landing: The maneuver of placing one skid of the helicopter on the ground, while the other is still above the ground. Caused by steep changes in terrain, power is still maintained to the rotor system. Requires agency authorization and training.

Operating Weight: The equipped weight plus the weight of the crew and fuel

OSHA: Occupational Safety and Health Administration.

Overdue Aircraft: An overdue aircraft is one that fails to meet a check-in specified on the flight plan.

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Term	Definition
P	
Passenger:	Any person aboard an aircraft who does not perform the function of a flight crew member or air crew member. See Air Crew Member and Flight Crew Member.
Patrolling:	The use of a helicopter to observe wires, pipelines, canals, lakes, landing zones, job sights, <i>etc.</i> , for safety defects, obstructions, and/or potential hazards.
Payload:	Payload is established by subtracting the equipped weight of the helicopter, including two hours of fuel and pilot from the computed gross weight for a calm day, 5,000-foot pressure altitude, 80° F. (26° C., 7,400 feet density altitude), two hours fuel, and a pilot. Downloading is <u>not</u> included in this computation.
Performance Chart:	A chart, table, or graph provided by the helicopter manufacturer for use in determining an aspect of helicopter performance.
PFD: (Personal Flotation Device)	A twin-cell, self-righting, life preservers providing a minimum of 35-pound buoyancy; with two CO2 charging cartridges and provision for back-up inflation by mouth; meeting the standards of TSO-C13.
Pilot Qualifications Card:	Documentation carried by the pilot listing the type of helicopters for which the pilot is approved, as well as the different types of missions that he/she is approved to fly.
Pilot-in-Command (PIC):	The pilot responsible for the operation and safety of an aircraft during flight time. The pilot-in-command has final authority over any flight mission.
Pitch Angle:	The angle between the chord line of the rotor blade and the reference plane of the main rotor hub or the rotor plane of direction.
Point-to-Point Flight:	Typically, the flight originates at one developed airport or permanent helibase, with flight route being direct to another developed airport or permanent helibase. The flight is conducted solely for the purpose of transportation of persons or cargo for administrative travel purposes and does not involve mission-type flight. See Mission Flight.
PPE: (Personal Protective Equipment)	Includes clothing and equipment that provides protection to an individual on board an aircraft or who is engaged in ground-based aviation support activities
Precautionary Landing:	A landing necessitated by apparent impending failure of engines, systems, or components which makes continued flight inadvisable.

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Term	Definition
P (Continued)	
Private Aircraft:	Any aircraft owned by an individual, partnership, or club.
Procurement Document:	Contract or rental agreement.
Project:	A non-risk incident mission or task which utilizes aviation assets. Used in this guide to differentiate from fire or another all-risk incident uses.
Public Aircraft:	An aircraft used exclusively in the service of any Government or of any political subdivision thereof, including the Government of any state, territory, or possession of the United States, or the District of Columbia, but not including any Government-owned aircraft engaged in carrying persons or property for commercial purposes. °Used exclusively in the service of' means for, other than the Federal Government, an aircraft which is owned and operated by a Governmental entity for not less than 90 continuous days.

Q, R

Radio Altimeter:	Aircraft equipment, which makes use of the reflection of radio waves from the ground to determine the height of the aircraft above the surface.
Remote Hook:	Cargo hook that is attached to the end of a long line that has both electrical and manual releases.
Restricted Category Aircraft:	Includes aircraft that were surplus military aircraft of the U.S. Armed Forces (manufactured in the United States) and currently registered for civilian use under the restricted category classification. Additionally, restricted category aircraft are aircraft that do not qualify for inclusion in any other category because of design, intended use, or flight tests have not been conducted to qualify for other categories of operation. This type aircraft is generally used for cargo, retardant dropping, agricultural operations, survey work, and other specific projects. FAA regulations prohibits persons onboard who are not essential crew members for the assigned mission. The pilot determines if a person is an essential crew member. FAA regulations also limits use of restricted category aircraft overpopulated areas.
RFM	Rotorcraft Flight Manual
RFMS	Rotorcraft Flight Manual Supplement

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Term	Definition
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R (Continued)

- Roger:** "I have received all of your last transmission." It should not be used to answer a question requiring a yes or no answer.
See Affirmative and Negative.
- Rotor:** An assembly of airfoils (blades) together with a hub and attachments, that rotates about an axis to provide lift and/or thrust for a helicopter.

S

- Safety Circle:** A safety zone that provides an obstruction-free area on all sides of the touchdown pad. For helispots and helibases, the only items that should be within the safety circle are a fire extinguisher, a pad marker, and, if applicable, external or internal loads awaiting transport. The Parking Tender may also be within the safety circle. The size of the safety circle depends on the size of the helicopter.
- SAR:** Search and Rescue
- Seating:** The number of seats in the helicopter, including pilot's seat.
- See and Avoid:** A visual procedure wherein pilots of aircraft flying in visual meteorological conditions (VMC), regardless of the type of flight plan, are charged with the responsibility to observe the presence of other aircraft and to maneuver their aircraft as required, to avoid the other aircraft. Right-of-way rules are contained in [FAR Part 91](#). See Instrument Flight Rules, Instrument Meteorological Conditions, visual flight rules, and Visual Meteorological Conditions.
- Separation:** In air traffic control, the spacing of aircraft to achieve their safe and orderly movement in flight and while landing and taking off.

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Term	Definition
S (Continued)	
Serious Injury:	<p>An injury that, when determined by a physician, may cause death or:</p> <ul style="list-style-type: none"> - Requires hospitalization for more than 24 hours, commencing within 7 days from the date the injury was received; or - Results in a fracture of any bone (except simple fractures of fingers, toes or nose); or, - Involves lacerations causing severe hemorrhages, nerve, muscle or tendon damage; or, - Involves injury to any internal organ; or - Involves second or third-degree burns, or any burns affecting more than 5% of the body surface; or - Involves loss of any member of the body or serious degree of permanent disfigurement (includes tissue damage without loss of bone) <p>See First Aid.</p>
Service Ceiling:	Altitude at which the aircraft can no longer climb at a minimum rate of 100 feet per minute.
SIC:	Second-In-Command (Co-pilot of the aircraft)
Single-Rotor Helicopter:	The most common design of helicopter uses a single main rotor, which imparts lift and thrust. Except for newer helicopters with no tail rotor, torque is countered by a smaller tail rotor.
Skids:	Most common type of landing gear used in light- and medium-class helicopters.
Sling Load:	An external load supported by a sling, net, bag, line, or combination of these.
Slip:	The controlled flight of a helicopter in a direction not in line with its fore and aft axis.
Small Helicopter:	See Light Helicopter.
SOP:	Standard Operating Procedures.
Special Use:	Operations which require special considerations due to the functional use of the aircraft. This may require deviation from normal operating practices when authorized by the agency. Special pilot qualifications and techniques, special aircraft equipment, and personal protective equipment are required to enhance the safe transportation of personnel and properly. See General Use.

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Term	Definition
S (Continued)	
Squawk:	Activate specific modes/codes/functions on the aircraft transponder, for example, "Squawk three/alpha, two one zero five, low."
Stall:	(See Blade Stall)
Staging Area:	An area in which participants, tools, equipment, and material are assembled and readied.
Stand By:	Means the controller or pilot must pause for a few seconds, usually to attend to other duties of a higher priority or to determine information requested. If a delay is lengthy, the caller should reestablish contact.
Standard Use Helicopter:	Helicopter authorized to perform employee transportation, external and internal cargo missions.
STC: (Supplemental Type Certificate)	A document issued by the Federal Aviation Administration approving a product (aircraft, engine, or propeller) modification. The STC defines the product design change, states how the modification affects the existing type design, and lists serial number affectivity.
Step-Out Landing:	Employees/air crew members exit the helicopter while it is at a low hover, stepping off the skid or float. Requires agency authorization and training.
Sunset and Sunrise:	The mean solar times of sunset and sunrise as published in the Nautical Almanac, converted to local standard time for the locality concerned. Within Alaska, the end of evening civil twilight and the beginning of morning civil twilight, as defined for each locality. See Night.
Swivel:	Helicopter accessory used with external jettisonable loads that attach to the cargo hook or the remote hook. The swivel allows the load to oscillate in flight without binding the lines.

T

Tailboard: A pre-work meeting or discussion held in a safe location, (usually at the job site), to discuss job activities before starting the work and again at any time conditions at the job site change (e.g., work scope or activities change, crew members change, new equipment introduced, contractor activities change, etc.).

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Term	Definition
T (Continued)	
Tail Rotor:	The force that compensates for torque and keeps the fuselage from turning in the direction opposite to the main rotor is produced by means of an auxiliary rotor called a tail or anti-torque rotor located on conventional helicopters at the end of the tail boom. The tail rotor produces thrust in the direction opposite to torque reaction produced by the main rotor. Foot pedals in the cockpit permit the pilot to increase or decrease tail-rotor thrust, as needed, to neutralize torque effect. Operation of the pedals also provides a measure of directional control. See Torque.
Taxi:	The surface movement of helicopters equipped with wheels. See Hover Taxi.
TBO:	See Time Before Overhaul.
Technical Standard Order:	A Technical Standard Order (TSO) is a minimum performance standard issued by the FAA for specified materials, pads, processes, and appliances used on civil aircraft.
Time Before Overhaul:	Specified period of time for aircraft components at the end of which they must be overhauled or replaced.
Tip Speed:	The speed of the rotor at its blade tips.
Tip-Path Plane:	The plane in which rotor blade tips travel when rotating.
Toe-In Landing:	The front part of the skids (toes) are placed on some type of ground surface to stabilize the helicopter. Requires agency authorization and training.
Torque:	A force or combination of forces that tends to produce a countering rotating motion. Looking down on the helicopter, in a single rotor helicopter where the main rotor turns counterclockwise, the fuselage tends to rotate clockwise. Use of anti-torque controls affect the tail rotor, which counters the effects of torque produced by the main rotor. Pedal movement induces pitch changes to the tail rotor blades, thereby accomplishing heading and directional control in a hover. With forward movement, the pilot must blend pedal action with other control movements to produce coordinated flight. On dual-rotor helicopters, the problem of torque control is solved through the counter rotation of the main rotor system.



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Term	Definition
T (Continued)	
Touchdown Pad:	A designated area, usually with a prepared or improved surface, on a heliport, airport, takeoff/landing area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters.
Traffic Pattern:	<p>The traffic flow that is prescribed for landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.</p> <ol style="list-style-type: none"> 1. Upwind Leg: A flight path parallel to the landing area in the direction of landing. 2. Crosswind Leg: A flight path at right angles to the landing area in the direction opposite to landing. 3. Downwind Leg: A flight path parallel to the landing area in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. 4. Base Leg: A flight path at right angles to the landing area off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended approach path centerline. 5. Final Approach: A flight path in the direction of landing along the extended approach path centerline. The final approach extends from the base leg to the extended approach path centerline. An aircraft making a straight-in approach is also considered to be on final approach.
Transitional Lift:	The additional lift obtained through airspeed because of increased efficiency of the rotor system, whether it be when transitioning from a hover into horizontal flight or when hovering into a wind. The rotor system produces more lift in forward flight because the higher Inflow velocity supplies the rotor disc with a greater mass of air per unit time upon which to work than it receives while hovering. Translational lift is present with any horizontal movement, although the increase will not be noticeable until airspeed reaches approximately 15-20 knots.
Transponder:	The airborne radar beacon receives transmitter portion of the Air Traffic Control Radar Beacon System that automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond.
TSO: (Technical Standard Order)	A minimum performance standard Issued by the FAA for specified materials, parts, processes, and appliances used on civil aircraft.

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Term	Definition
U	
Unauthorized Passenger:	All personnel who are not official or unofficial passengers are considered unauthorized personnel and are not authorized to be transported in any aircraft owned or operated on behalf of the agency.
Uncontrolled Airspace:	Uncontrolled airspace is that portion of the airspace that has not been designated as continental control area, control area, control zone, terminal control area, or transition area and within which the Air Traffic Control has neither the authority nor the responsibility for exercising control over air traffic. See Controlled Airspace.
Unimproved Landing Site or Area:	A landing spot used for the first time at the discretion of the pilot and to which no improvements (for example, pad leveling, obstruction removal, placement of wind indicator) have been made. If it is to be used on a recurring basis, approval is necessary, and improvements should be made.
Useful Load:	This number, in pounds, is established by subtracting the average equipped weight of the helicopter from gross weight.

V, W, X, Y, Z

Vendor:	Operator of aircraft who provides aircraft services through a procurement document.
Vertical Separation:	Separation established by assignment of different altitudes or flight levels. See Separation.
Visibility:	The ability as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night, Visibility is reported as statute miles, hundreds of feet, or meters. Refer to FAR Part 91 .
VFR: (Visual Flight Rules)	Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.
VMC: (Visual Meteorological Conditions)	Meteorological conditions, which can be expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.




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APPENDIX 2, JOB AIDS AND CHECKLIST

AVI-3001M-JA01, Helicopter Planning Aid


Example only; use latest job aid in the Guidance Document Library.

 Helicopter Planning Aid AVI-3001M – JA01	
<p>This is an aid to help prepare for any long-line or HEC work—to help setup a successful new project using a helicopter. Chapter references are to the <i>Helicopter Operations Field Manual</i>, AVI-3001M</p>	
	Yes No N/A
Have individuals completed the required Basic Helicopter Safety training TECH-0002WBT? (See Chapter 12, 12.6. Required every two years.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Verify that all affected employees are current with required training and in possession of valid cards prior to work. (See Chapter 12.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has all needed information been provided to the Helicopter Operations scheduler? (Location, Type of work, Hours-days needed, Dept.) (See Chapter 1, sections 1.10 and 1.13.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has a suitable landing zone been selected? (See Chapter 4, section 4.11; Appendix 2, AVI-3001M-JA03.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has the LZ-Lead been identified? (See Chapter 5, paragraph 5.2.1.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has dust mitigation been considered? (Does the LZ need a water truck?) (See Chapter 4, section 4.11; Appendix 2, AVI-3001M-JA03.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Are all employees using the appropriate personal protective equipment? Safety glasses, goggles, ear protection, snug-fitting clothing, hard hat with chin strap, gloves, and dust mask protection (if necessary). (See Chapter 5, paragraph 5.4.6.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Does helicopter need additional fuel for assignment and/or has fuel truck been requested? (See Chapters 1, 1.5.5; 4, 4.11.1, 4.12.2; 8, 8.10.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Be sure the pilot reviews all HEC or patrol work and request instructions, (See Chapter 1, sections 1.8 & 1.9.; Chapter 5, 5.4.1, 5.4.8, 5.4.9.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Is there adequate clearance from energized conductors? (QEW needed if within 30 feet.) (See Chapter 5, 5.4.9 & 5.4.10; Chapter 7, 7.9.5)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have the specific hazards of the tasks to be performed been identified? The pilot should be involved in the tailboard. (See Chapter 5, 5.2.2, 5.3, 5.4; Chapter 4, section 4.11.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have safe horizontal and vertical working distances for helicopters been reviewed? (Vertical 10' marker on long-line below helicopter skid; horizontal half the rotor diameter.) (See Chapter 1, 1.12 and Chapter 7, 7.11 and 7.12.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have the details of HEC, or long-line work involving sling loads, been identified? (See Chapters 7, 8, 10, and 11.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have radio checks been considered between air and ground personnel? Be sure the pilot discusses head & hand signals with crew. (See Chapter 3; Appendix 6.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Remember to inspect all slings and cargo nets before use. (See Chapter 7.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Consider public safety (i.e., Flight path, roads, hiking trails, livestock, schools, etc.). (See Chapter 5, paragraphs 5.4.14, 5.4.15, and 5.4.16.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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AVI-3001M-JA02, Power Check and Trending

Example only; use latest job aid in the Guidance Document Library.

	Pacific Gas and Electric Company	<i>Helicopter Operations</i> AVI-3001M-JA02
<h2 style="margin: 0;">Power Check and Trending</h2>		
<h3 style="margin: 0;">PG&E Power Assurance Check Policy</h3>		
<p>Power checks should be performed every 10 hours (+/- 2.5 hours) hours of operation. Perform power assurance checks in accordance with the Rotorcraft Flight Manual (pilot's operating handbook) or approved company performance monitoring program. The pilot must record the results in a standard log. Helicopters with power output below minimum approved limits will be removed from service until the cause of the low power condition is corrected.</p>		
<p>Power checks should be completed during the ferry time to or from a job site—do not interrupt work in progress to perform power assurance checks.</p>		
<p>Power assurance checks may be reviewed on an annual basis during PG&E's vendor audits or at any time Helicopter Operations asks to review the power check documents.</p>		
<p>If unable to complete power assurance check within the 10-hour (+/- 2.5 hours) interval, please notify PG&E Helicopter Operation and provide an estimated time/date of completion along with a verbal and written reason for the delay. Send written explanation of delay to the following e-mail address within 24 hours: Helicopteroperations@pge.com.</p>		
<p>PG&E encourages the use of digital TOT and torque gauges for the most accurate trending.</p>		
<div style="display: flex; justify-content: space-between;"> AVI-3001M-JA02 (v2) Date: 10/26/2016 </div>		

AVI-3001M-JA03, LZ Preparation Checklist


Page 1 of 4. **Example only**; use latest job aid in the Guidance Document Library.

	<h2 style="text-align: center;">LZ Preparation Checklist</h2>
<p>Helicopter Operations</p>	<p>AVI-3001M - JA03</p>
<h3 style="text-align: center;"><u>Helicopter Landing Zone Job Walk Guidelines</u></h3>	
<p>Introduction</p>	
<p>This job aid is for land agents, supervisors, project managers, crew leads, or anyone else planning a job requiring a helicopter. The checklist that follows guides you into setting up a good landing zone (LZ).</p>	
<p>The job walk is the first step in assessing the landing zone for the planned helicopter work. From the beginning, the fact-finding mission of the job walk needs to focus on the safest, most appropriate application of the helicopter work method(s) selected. Your plan to solve the problems of a job must eventually be understandable to everyone involved.</p>	
<p>As you review the elements of the job, learn as early as possible in the planning process if all safety standards can be resolved (refer to the <i>Helicopter Operations Field Manual</i>, LZ chapter).</p>	
<p>This guide is intended to be used as a starting point for planning a project using a helicopter. This plan will also help determine if a Congested Area Plan is needed (a flight plan filed by the helicopter vendor). If you have trouble determining if one is needed, then contact Helicopter Operations (HeliOps) scheduling and dispatch for assistance.</p>	
<ul style="list-style-type: none"> • If the LZ is near or over roads, buildings, parks, etc., then a Congested Area Plan should be needed—contact Helicopter Operations. 	
<p>This guideline/checklist is designed to answer basic questions, so that someone other than the person doing the job-walk can perform the work.</p>	
<p>Finally, the information you gather from the job walk is a critical resource for operations, dispatch planning, and scheduling.</p>	
<p>Key Elements</p>	
<p><u>Create File:</u> Keep a record of each job. You may wish to review previous work.</p>	
<p><u>Detailed Map Provided to Helicopter Scheduler:</u> Along with photos, street maps and other pictorial tools, a detail map is normally required for a Congested Area Plan. A detailed map must show all buildings, any buildings that may need to be evacuated (as determined by the FAA), pick up and drop off points, and it must show the north arrow direction as a reference. The detail map must define the operational area.</p>	
<p><u>Developing the Congested Area Plan:</u> The information you collect will help the HeliOps Schedulers determine if a Congested Area Plan is needed. The Scheduler will contact the helicopter contractor assigned to the project. The helicopter contractor develops the Congested Area Plan. The contractor will submit to the FAA for the permit. Some Congested Area Flight Plans take up to six weeks to get approvals. If a Congested Area Flight Plan is suspected, start the LZ assessment as soon as possible. Provide this information immediately to the scheduler with the request.</p>	
<p><u>Elevation of Work:</u> Elevation at the work site can be very different from the LZ elevation and affect the performance of the helicopter, another performance planning element.</p>	
<p><u>Equipment Needed for Job Walk:</u> In general, the minimum is a hand-held GPS, digital camera, notepad, and local maps.</p>	
<p><u>Function/Work Order #:</u> Provide a work order number. This number will cover the cost of any upgrades to improve the LZ before or during helicopter operations. Provide Helicopter Operations schedulers with the order number for scheduling the helicopter.</p>	
<p><u>Job Location:</u> GPS and street map information are normally needed for all jobs.</p>	
<p><u>Landing Zone:</u></p>	
<ol style="list-style-type: none"> 1. GPS and road system access into LZ for ground support. 2. Who owns and has the authority to let PG&E use the land there? Has the use agreement been documented? 3. Elevation and other performance planning elements. 	
<p>Note: Tailboard location, LZ, material pick-up site, and work site, could easily be in different locations.</p>	
<p>(v24)</p>	<p>Revision Date: 8/27/2019</p>
<p>Page 1 of 4</p>	

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Appendix 2, Job Aids

Job aid, **AVI-3001M-JA03**, page 2 of 4. **Example only**; use latest job aid in the Guidance Document Library.

 <h1 style="display: inline;">LZ Preparation Checklist</h1>	
Helicopter Operations	AVI-3001M - JA03
<p><u>Occupied Dwelling or Bystanders:</u> Do not perform any helicopter lift work (<i>e.g.</i>, pole settings) within 300' of an occupied dwelling or gathering of bystanders.</p> <p><u>Road Crossings:</u> Use police/CHP to participate in traffic control. A line-pull across a freeway would be one example. In general PG&E hires companies who specialize in this service. The key question is whether the job requires flying across a road, and who has the authority to allow it. Have any required permits been secured?</p> <p><u>Safety Compliance:</u> If the job has unusual issues involving safety, an internal safety audit may first be warranted. It is always appropriate to invite a safety representative to any portion of the job.</p> <p><u>Schools (Public and Private):</u> The State of California has a law governing landings and departures of helicopters at children's schools. Public Utilities Code (PUC) Section 21662.5 states, in part, that, with limited exemptions, "no helicopter may land or depart in any area within 1,000 feet, measured by air line, of the boundary of any public or private school maintaining kindergarten classes or any classes in grades 1 through 12, without approval of the department [<i>i.e.</i>, Caltrans]."</p> <p><u>Who's in Charge:</u> You need all the names and contact information available.</p>	
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Appendix 2, Job Aids

Job aid, AVI-3001M-JA03, page 3 of 4. **Example only**; use latest job aid in the Guidance Document Library.

PG&E		LZ Preparation Checklist	
Helicopter Operations		AVI-3001M - JA03	
Date:	_____ Job name: _____		
Elevation:	_____ Geo coordinates: _____		
Nearest Physical Address:	_____		
Landowner's Name:	_____ Contact #: _____		
Person completing checklist:	_____		
Take this checklist with you to help select a landing zone (LZ).			
Answer the following questions.			
If you are not sure about a question, contact a Helicopter Operations Specialist.			
Y	N	Check off each question as you answer it: Y (Yes) N (No)	
		How many LZs associated with this project: _____	
		■ Have they all been reviewed?	
		Is the selected landing zone relatively level?	
		■ Where is the proposed LZ located? Ridge Top <input type="checkbox"/> Valley <input type="checkbox"/> In the forest <input type="checkbox"/>	
		Is the LZ pickup location significantly different in elevation than the receiving location?... By how many vertical feet? _____	
		If using a prepared landing zone on a hillside or within a forested area, will the largest rotor clear the hillside/ trees by a distance equal to the rotor's horizontal radius? Verify slope 6° or less.	
		Have safe and effective means been implemented to control dust at the helicopter's selected landing zone?	
		Is a water truck needed for dust mitigation? Nearest tank fill location: _____	
		Is the landing zone accessible to a fuel truck or trailer?	
		Are bridges and culverts able to support the weight of the fuel or water truck for accessing the LZ?	
		Are there any schools within 1000 feet of LZ? (See <u>Schools</u> under Key Elements .)	
		Are there nearby highways or roads?	
		■ Is traffic control needed?	
		Are there nearby campgrounds?	
		Are there hiking trails? Direction _____ How far away? _____	
		Is there pedestrian access?	
		Is there a built-up landing pad or structure?	
		■ Is it capable of supporting the helicopter? Last inspected? (verify)	
		■ The landing pad area should be 50% percent greater than the helicopter skids. Refer to the table on the last page.	
		Is there parking for vehicles and other needed equipment at the LZ?	
		Is there gated access?	
		■ Is there a PG&E lock on the gate?	
		Will the helicopter material pickup location be separate from the helicopter fueling location?	
		If there is more than one helicopter to support the work, is the LZ area large enough for additional helicopters?	
		Is the helicopter LZ on Private <input type="checkbox"/> , State <input type="checkbox"/> , USFS <input type="checkbox"/> , BLM land <input type="checkbox"/> ? (check boxes)	
		Does landowner need to be notified when the work starts? (private, state, US Government)	
		Is there communication at the LZ.? Cell phone <input type="checkbox"/> Radio <input type="checkbox"/>	
		Is there restricted airspace near the LZ and flight path?	
		Is there a nearby hospital? Address to hospital or urgent care? _____	
		If the LZ is near or over roads, buildings, parks, etc., then consider a Congested Area Flight Plan. Contact Helicopter Operations to determine if a congested area flight plan is needed for your project.	

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Appendix 2, Job Aids

Job aid, AVI-3001M-JA03, page 4 of 4. **Example only**; use latest job aid in the Guidance Document Library.



Helicopter Operations

LZ Preparation Checklist

AVI-3001M - JA03

Look around the landing zone and note the following hazards. Refer to Table 1 for acceptable clearances.

<input type="checkbox"/>	Trees – Short (less than 40') <input type="checkbox"/> Tall (more than 40') <input type="checkbox"/> None <input type="checkbox"/>
<input type="checkbox"/>	Need clearing/trimming Yes <input type="checkbox"/> No <input type="checkbox"/>
<input type="checkbox"/>	Fences – Short (less than 6') <input type="checkbox"/> Tall (more than 6') <input type="checkbox"/> None <input type="checkbox"/>
<input type="checkbox"/>	Powerlines (distribution or transmission) within 200 feet of LZ?
<input type="checkbox"/>	Are there nearby wire hazards? North <input type="checkbox"/> -South <input type="checkbox"/> -East <input type="checkbox"/> -West <input type="checkbox"/> . How far? _____
<input type="checkbox"/>	Are there dead trees on the perimeter of the LZ or just beyond, which could fall into the LZ?
<input type="checkbox"/>	■ Will these trees be removed?
<input type="checkbox"/>	Any boulders or stumps in the LZ that need to be removed? No objects behind the helicopters rear doors may protrude higher than 2' above the ground.
<input type="checkbox"/>	Is there loose material or debris on the perimeter of the LZ that needs to be removed to avoid flying from the helicopter rotor wash?
<input type="checkbox"/>	Livestock – Close by <input type="checkbox"/> None <input type="checkbox"/> Landowner: _____
<input type="checkbox"/>	Will a "helicopter at work" sign be needed on private or public roads to warn traffic of upcoming work?

Table 1 identifies the height of trees, hillsides, etc. (5-40ft, 40-80ft, and 80ft or higher), that may intrude into the flightpath around the LZ. Use this table as a reference to identify the LZ site, that needs to be clear of vegetation (trees), building material, or other debris for aircraft type (light, medium, or heavy).

Table 1: LZ Obstacle Clearance

Obstacles (trees or hill side) around the perimeter of the LZ			
	Height of trees, hillside, obstacles		
	5 to 40 feet	40 to 80 feet	80+ feet
Aircraft Type	Then the recommended LZ diameter for a single aircraft is:		
Type 3 (Light)	75 feet	115 feet	150 feet
Type 2 (Medium)	100 feet	150 feet	200 feet
Type 1 (Heavy)	150 feet	225 feet	300 feet
UH-60	110 feet	185 feet	260 feet

Comments:

Helicopters are grouped for easy reference. In any helicopter group, some models are slightly smaller than others; the largest size is identified, and skid widths are rounded up before adding the 50% safety dimension (also rounded up). Do not confuse landing touch-down pad size with LZ size. **The LZ size for rotor clearance must meet standards identified in Table 1.**

Table 2 identifies the touch-down pad size. After determining the helicopter type, clear the area as noted in the **Touch-Down Pad Size** column, where the helicopter will touch down. You still need to have the horizontal rotor clearance recommend for the helicopter type (Table 1).

Table 2: Touch-Down Pad Size by Helicopter Group

Group	Skid/Wheelbase Length (L) and Width (W) in Feet	Touch-Down Pad Size (LxW + 50%)
Bell 206B3, 206L3, 206L4, 407; As350 B2 or B3	10.5L x 7.87W	17'L x 12'W
Bell 212, 214, Huey UH1H	12.1L x 8.8W	20'L x 14'W
MD 500 & 530N	8.1L x 6.8W	14'L x 11'W
S-61, S-64 Sky Crane	24.4L x 19.8W	38'L x 30'W
UH-60 Blackhawk	29L x 8.9W	44'L x 14'W


(v24)

Revision Date: 8/27/2019

Page 4 of 4

AVI-3001M-JA04, Yellow / Green / Red Landing Zones

Example only; use latest job aid in the Guidance Document Library.



Yellow / Green / Red Landing Zones

AVI-3001M - JA04

Helicopter Operations

Landing zones (LZs) primarily designed for passenger transport and landings.

LZs are classified as yellow (amber) and green.

Pilot training requirements are different for each classification of LZ.

Yellow (Amber) LZ

- Below minimum rotor blade safe working distance
- Landing on top of dam upper surface less than 15' wide
- Raised Platform
- Performance limited (i.e., reduced number of Pax or fuel)
- No glide slope, hover hole
 - Raised Platform
 - Landing on top of dam
 - Performance limited

Pilot training requirements for yellow LZs:

- Desktop review of LZ data plate
- Review Video of landing site
- Pilot must have 250 hours or more of Mountain flying experience
- Familiarization flight to include:
 - Landing with Chief Pilot, Training officer, previous approved pilot, or HO Specialist prior to passenger landing.
 - Pilot can also fly to yellow site alone and land at a new yellow site with no passengers. Then return to pick up passengers and land at this specific yellow landing zone.

Green LZ

- Permitted LZ
- Not permitted, but meets the minimum requirements as stated in the Helicopter Operations Manual
- Marked helipad
- Has wind indicator (i.e., sock, cone, water, or vegetation that provides wind indication)
- Clear approach path

Pilot training requirements for green LZs:

- Desk top review of LZ data plate
- Review Video of landing site
- Pilot must have 250 hours or more of Mountain flying experience

Red LZ

- LZ is closed
- To upgrade status, improvements must be made per AVH-040 (LZ Review Checklist)

(v5)

Revision Date: 09/28/2018

Page 1 of 1

AVI-3001M-JA05, HO Vendor FRA Required Elements

Page 1 of 2. **Example only**; use latest job aid in the Guidance Document Library.



Helicopter Operations

HO Vendor FRA Required Elements

AVI-3001M - JA05

Listed below are the minimum required elements of a flight risk assessment (FRA) for all vendors. Vendors must use a system (Flight Risk Assessment Tool – FRAT) for risk-ranking flights that, at minimum, will assess unacceptable risk vs. acceptable risk through quantitative analysis. Each vendor may choose to risk-assess more elements. Score and thresholds for Low/Medium/High may not be identical for each vendor. High risk-ranked flights indicate the need to change elements of the request or cancel the flight.

Identification block

- Date
- PG&E Request number
- Unique FRAT control number
- PIC (pilot in command)
- Aircraft type
- Origin
- Destination(s)
- Crew (if any)

Dispatch / Request Briefing

- Landing Zone
- Mission

Time induced pressure

- Short call out
- New information

Weather

- Ceiling
- Wind
- Density Altitude
- Temperature

Pilot

- Experience
- Aircraft familiarity
- Hours rest
- Fatigue factor

Mission Type

- Cargo
- Construction
- HEC
- Patrol
- Ferry

Terrain

- Elements at vendors' discretion

(v1)

Revision Date: 10/03/2018

Page 1 of 2

Job aid, AVI-3001M-JA05, page 2 of 2. **Example only**; use latest job aid in the Guidance Document Library.



Helicopter Operations

HO Vendor FRA Required Elements

AVI-3001M - JA05

Prohibited Operations

- Any operation that would require immediate cancellation of flight per the vendor's operations specifications.
- No flight shall begin with a score above vendor's approved operating threshold.

Tracking/Reporting/Audit items

- All FRAT's be made available to PG&E upon request with 48 hours.
- All FRAT's shall be made available during audits upon request.

Prior to departure, the operator is required to check-in with Helicopter Operations dispatcher for a pilot's briefing. At this time, the Helicopter Operations dispatcher will ask if a Flight Risk Assessment has been completed. Yes/No


The Vendor is required to complete a new or revised Flight Risk Assessment if significant scope of work or conditions have changed.

AVI-3001M

Appendix 2, Job Aids

AVI-3001M-F03, LZ Maintenance Review Checklist

Page 1 of 1. **Example only**; use latest form in the Guidance Document Library.

 Pacific Gas and Electric Company		LZ Maintenance Review Checklist		
<p>When performing a specific landing zone (LZ) review, you must have a copy of the current data plate for reference (contact Helicopter Operations for the data plate); the data plate identifies the size of the LZ and hazards already noted. Please see notes and comments on the data plate.</p>				
Date: ____/____/____		Review LZ for maintenance issues every two years.		
Landing Zone Name: _____				
Person Conducting Review: _____				
		Y	N	n/a
1.	LZ Surface: Does surface need new gravel or rock for dust mitigation?			
2.	Dead Trees: Are there dead trees that can fall into the LZ?			
3.	Grass/ Weeds: Is there grasses or weeds exceeding 1' that can obstruct view of landing surface or get into the tail rotor?			
4.	LZ Marker: Is the LZ marker missing? (If previously installed)			
5.	Trees & Brush: Is there any new vegetation growth that needs to be removed within the perimeter of the LZ?			
6.	Elevated Platform: Has the elevated LZ structure been inspected? Last known date of inspection _____.			
7.	Marking Paint: Do the marking need to be re-stenciled or painted?			
8.	Signs: Are LZ warning signs missing or in bad condition? (If previously installed)			
9.	Windsocks: Are windsocks, windsock towers in good condition? (If previously installed)			
10.	Land: Has land ownership changed? (For access and maintenance work.)			
11.	Landing Zone: Is there any loose debris or material stored in or around the perimeter of LZ area?			
12.	Fire Extinguisher: Are monthly inspections and validations missing? (Permitted LZs)			
13.				
14.				
<p>Comments:</p>				
<p>The table below identifies the height of trees, hillsides, etc. (5-40ft, 40-80ft, and 80ft or higher), that may intrude into the flightpath around the LZ. Use this table as a reference to identify the LZ site, that needs to be clear of vegetation (trees), building material, or other debris for aircraft type (light, medium, or heavy).</p>				
Obstacles (trees or hill side) around the perimeter of the LZ				
	Height of trees, hillside, obstacles			
	5 to 40 feet	40 to 80 feet	80+ feet	
Aircraft Type	Then the recommended LZ diameter for a single aircraft is:			
Type 3 (Light)	75 feet	115 feet	150 feet	
Type 2 (Medium)	100 feet	150 feet	200 feet	
Type 1 (Heavy)	150 feet	225 feet	300 feet	
UH-60	110 feet	185 feet	260 feet	
<p>For example: A type 3 light helicopter needs a 75' diameter LZ if the nearest obstacle is up to 40' in height; it needs a 115' diameter LZ if the nearest obstacle is 40' to 80' in height; it needs a 150' diameter LZ if the nearest obstacle is over 80' in height.</p>				
AVI-3001M-F03 (v7)		Date: 4/24/2019		

Helicopter Operations Field Manual

APPENDIX 3, SPECIALIZED TOOLS AND SAFETY EQUIPMENT

Page 1 of 8


Appendix 3 identifies special helicopter equipment, tools, and devices for slinging loads, stringing conductors, and transporting tools and material available for use with different types of helicopters.

Special equipment, tools, and devices include:

- **Boxing Glove** – A device attached to the end of the lifting line for lifting conductors without damaging them.
- **Concrete Bucket** – Devices used to supply concrete either to the concrete bin or directly to a work site, depending on the size and location of job.
- **Concrete Pumping Bin** – Large bins used to receive concrete from the helicopter. The concrete can then be pumped from the bin through hoses to the location where it is needed. The bin is lightweight and designed to be moved by a helicopter when it is empty.
- **Gin Pole** – Portable booms that are transported and placed in the tower using a helicopter. Gin poles are used in building or modifying the tower at locations with difficult access by ground-support equipment.
- **Hairpin** – Devices that allow insulators, tools, and material to be placed on or picked up from the arm of a tower without assistance from employees climbing.
- **Needle/Rail** – Needles, also known as rails, are devices that allow the helicopter to thread sock line under a bridge of the tower. They are excellent for “V” string construction.
- **Tool Basket** – Devices that allow the helicopter to fly in tools to the work site and drop them off or pick them up without assistance from employees.
- **Wire Rack** – Devices that handle reels of wire. Racks can handle various wire sizes depending on the weight of wire and the size of reels. (Racks come with two methods of braking.)
- **External Load / HEC Equipment** – The load line, lanyards, and weight bag provided by PG&E Helicopter Operations Department to the vendors.
- **Secondary Emergency Release System** – Device allowing for manual release of HEC and provided by the helicopter vendor as part of the helicopter equipment.

Table 8 identifies safety equipment available through various sources.




Table 8: Specialized Equipment

Item	Example
<p>1 Inflatable Life Vest</p> <p>Requirements: Working over water</p> <p>PG&E Code: NA – Supplied by helicopter vendor.</p> <p>Supplier: Provided by Helicopter Service</p>	

Helicopter Operations Field Manual

Appendix 3, Specialized Tools and Safety Equipment

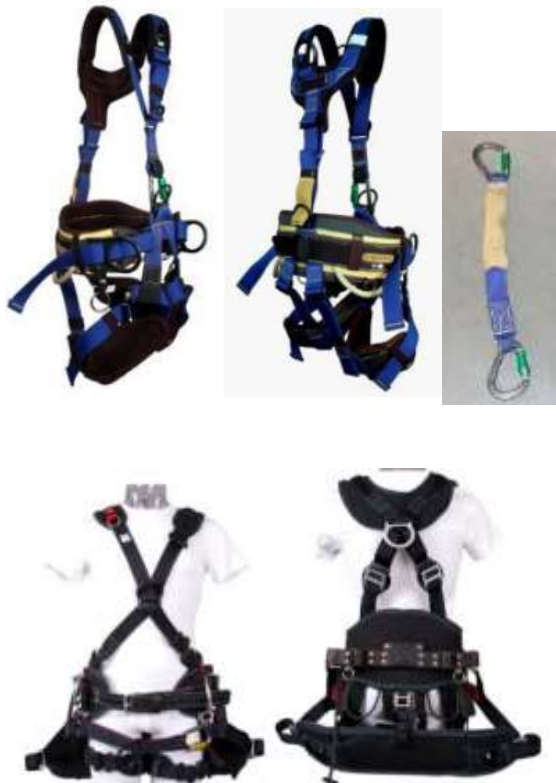

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Item	Example
<p>2 HEC Line Worker Helmet Requirements: All helicopter line-worker procedures PG&E Code: M203698 Manufacturer: Petzl A16/ Vertex Best</p>	
<p>3 Radio Chest Harness Requirements: As needed PG&E Code: NA Supplier: CMC Rescue</p>	
<p>4 HEC A-Frame (Two-man Transport) Requirements: Long-line harness work procedures PG&E Code: NA Supplier: Provided by PG&E Helicopter Operations Manufacturer: Lift-It Inc.</p>	

Helicopter Operations Field Manual

Appendix 3, Specialized Tools and Safety Equipment

Page 3 of 8

Item	Example
<p>5 Line Worker and Tower Rescue Harness</p> <p>Requirements: All HEC helicopter work must be arc flash rated.</p> <p>Yates Code: ARIBA #: Small: 390FRA-S SRM2805604 Medium: 390FRA-M SRM2805605 Large: 390FRA-L SRM2805607 XL: 390FR-XL SRM2805608 Shock Absorber PG&E02K 2649052</p> <p>Manufacturer: Yates Gear Inc. Note: Harness does not include deceleration device and lanyard.</p> <p>Buckingham Code: ARIBA #: Small: 61955Q1-S 202076 Medium: 61955K1-M 202087 Large: 61955Q1-L 202089 XL: 61955Q1-XL 202090</p> <p>Manufacturer: Buckingham Inc.</p>	 <p>The image shows two examples of harnesses. The top row features two blue and black harnesses with yellow accents, one shown from the front and one from the back, along with a separate yellow and blue lanyard. The bottom row shows two black harnesses, one from the front and one from the back, displayed on a white mannequin torso.</p>
<p>6 Long-line Grapple Hook</p> <p>Requirements: Grapple hooks must be tagged and rated.</p> <p>PG&E Code: NA – Supplied by helicopter vendor.</p> <p>Supplier: Provided by Helicopter Service</p> <p>Any light-weight items must be attached to retaining eyes.</p>	 <p>The image shows a bright green, heavy-duty metal grapple hook with a single eye at the top and four curved, pointed tines at the bottom.</p>

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Appendix 3, Specialized Tools and Safety Equipment

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Item	Example
<p>9 Helicopter Material Basket</p> <p>Requirements: As needed</p> <p>PG&E Code: NA</p> <p>Supplier: Supplied by Helicopter Contractor</p> <p>Must be stamped and rated for payload.</p>	
<p>10 Helicopter Material Basket Rated 2,500 Lbs.</p> <p>(3' x 3' x 2', 4' x 6' x 2', and 4' x 4' x 2')</p> <p>Requirements: As needed</p> <p>PG&E Code: NA</p> <p>Manufacturer: Moore's Blacksmith – Red Bluff</p>	
<p>11 Approved Helicopter Hot Rope</p> <p>Requirements: Certified for energized HEC work.</p> <p>PG&E Code: Contact Helicopter Operations Dept.</p> <p>Manufacturer: Various</p>	

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Appendix 3, Specialized Tools and Safety Equipment

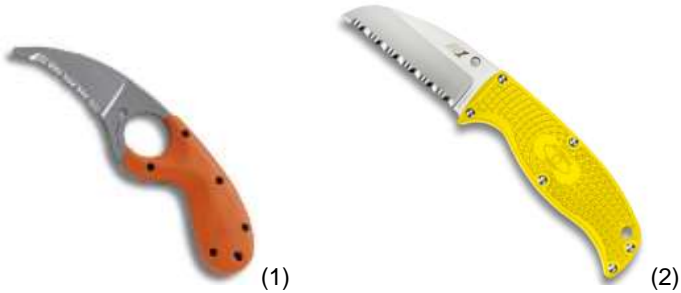


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Item	Example
12 Power Flare Requirements: Shell color: yellow LED light color: red Note: May be used in place of signal flares. Manufacturer Code: http://www.powerflare.com Supplier: PowerFlare	
13 HEC Rope Requirements: All components meet the 10:1 safety factor for HEC Manufacturer Code: 60' = D-HEC-TPR-5/8-TPR-60 100' = D-HEC-TPR-5/8-TPR-100 Manufacturer: Lift-It Manufacturing, Inc., Pomona, Ca. Request through Helicopter Ops. Dept., the only approved purchaser for PG&E.	
14 Bone Mic Requirements: As required for HEC Communications Manufacturer Code: M3H and U94 PTT Manufacturer: TEA Headsets Supplier: Zones , through SRM (specialty tools section): M3H, 101408978; U94, 101408980	
15 HEC Rope Connection Carabiner Requirements: For connecting two HEC ropes Specifications: 3-stage, 15k lbs. carabiner Manufacturer: Yates Gear Supplier: Contact Helicopter Operations Department	

Helicopter Operations Field Manual

Appendix 3, Specialized Tools and Safety Equipment


Page 7 of 8

Item	Example
<p>16 Rescue Fixed-Bladed Knife</p> <p>Requirements: Fixed blade – blunt point</p> <p>Manufacturers Code: (1) CRKT – 2510ER Overall Length 5.75" / Blade Length 2.375"</p> <p>(2) Spyderco – FB31YL Overall Length 6.75" / Blade Length 2.75"</p> <p>Supplier: Supplies and Solutions (S&S)</p> <p>Code: (1) CRKT2510ER (CRKT 2510ER) (2) 2779372 (Spyderco FB31YL)</p>	 <p>(1) (2)</p>
<p>17 Safety Goggles</p> <p>Requirements: High Impact Clear Safety Lens</p> <p>Manufacturer: Pyramex GB1810ST</p> <p>Order Code: PYRGB1810ST</p> <p>Supplier: Supplies and Solutions (S&S)</p>	
<p>18 Helicopter Landing Area Sign</p> <p>Requirements: Install on fence or post</p> <p>Specification: 21" x 28"</p> <p>Order Code: SRM2834432</p> <p>Supplier: MRO Solutions, LLC</p>	

Helicopter Operations Field Manual

Appendix 3, Specialized Tools and Safety Equipment

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Item	Example
<p>19 MoHook Short Haul Equipment System</p> <p>Requirements: For transfer of equipment to transmission towers during Short Haul Operations</p> <p>PG&E Code (ARIBA #): 2821827</p> <p>Specifications:</p> <ul style="list-style-type: none"> 1 MoHook w/shackle 1 691-RIF Reinforced 3' anchor loop 1x50ft ½" spec Static Rope sewn eyes, one thimble on carabiner end 1 1337-2 Two stage captive Eye Carabiner 2 2x3ft ½" Spec Static Rope sewn eyes, no thimbles 1 Kong 10mm Delta screw link 5 ISC RP203A Rope grab 5 1773 Steel Twist Lock Carabiner 1 468 S rope bag <p>Manufacturer: Yates Gear</p> <p>Supplier: Yates Inc.</p>	

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APPENDIX 4, SELECTING AN AIRCRAFT






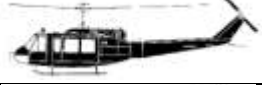
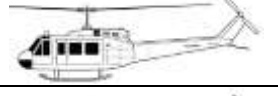


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The following tables provide guidelines for selecting a helicopter or fixed wing aircraft based on load capacity and operator. Type class is based on maximum take-off and landing weight; however, anomalies may appear in lift capacity and passenger count for a specific aircraft based on year manufactured.

When requesting a helicopter, provide as much detail as possible in the online work order description and Helicopter Operations will select an appropriate helicopter based on your needs and helicopter availability.

Type	Size/Load
1	Large / Heavy
2	Medium
3	Light

See Glossary, **Restricted Category Aircraft**, for use of restricted category aircraft.


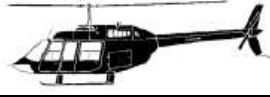








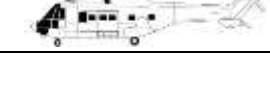


Type	Model ¹ Restricted Category	Main Rotor Diameter	Interior Capacity (Pounds or Passengers)	External Load Capacity	Profile (not to scale)
Hughes / MD					
3	MD500D, E	26.4'	600 lbs.	900	
3	MD-520 Notar	27.4'	1,764 lbs.		
3	MD-530F	27.4'	1,500 lbs.		
3	MD-600N	27.6'	2,000 lbs.		
3	MD-902	33.9'		3,000	
Bell					
2	¹ 204 (UH-1B)	48'	Passengers Not Allowed	3,100	
2	205 (UH-1D)	48'	9 Passengers	4,200	
2	¹ UH-1F	48'	Passengers Not Allowed	4,000	
2	¹ UH-1H	48'	Passengers Not Allowed	3,500	



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Appendix 4, Selecting an Aircraft

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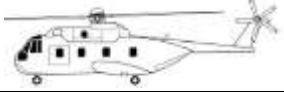
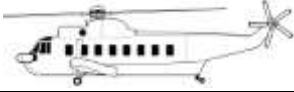
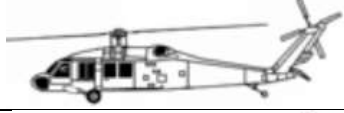

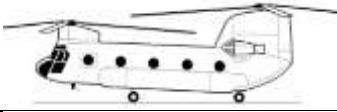
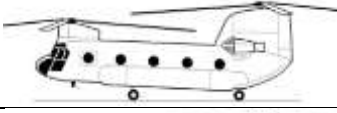
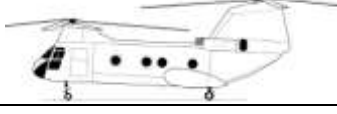

Type	Model ¹ Restricted Category	Main Rotor	Interior Capacity (Pounds or Passengers)	External Load Capacity	Profile (not to scale)
Bell					
3	206-B3 Jet Ranger	33.3'	4 Passengers	1,500	
3	206-L3 Long Ranger	37'	6 Passengers	1,100	
3	206-L4 Long Ranger	37'	6 Passengers	1,600	
2	212	48'	3,000 lbs.	3,000	
2	214B	50'	9 Passengers	6,000	
3	407	35'	6 Passengers	2,500	
Aerospatale / Airbus / EuroCopter					
3	AS350-BA (H125)	35.1'	900	1,200	
3	AS350-B3	35.1'	1,300	1,600	
3	AS350-D	35.1'	5 Passengers	1,700	
3	AS355 (twin engine version of the AS350)	35.1'	5 Passengers	2,000	
1	AS332 L1	53'	24 Passengers		
Leonardo (formerly AgustaWestland)					
3	AW109SP GrandNew	35.5'	6 Passengers		
	AW119	35.5'	6 Passengers	3,000	



Helicopter Operations Field Manual

Appendix 4, Selecting an Aircraft

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Type	Model ¹ Restricted Category	Main Rotor	Interior Capacity (Pounds or Passengers)	External Load Capacity	Profile (not to scale)
Sikorsky					
1	CH-54A	72'	NA	20,000	
1	S-64E	72'	NA	20,000	
1	S-61A	62'	10,000 lbs.	7,000	
1	S-61N	62'	5,000 lbs. (26 Pax)	10,000	
2	¹ Black Hawk (UH-60, S-70)	53.7'	8,000 lbs. (11 Pax)	9,000	
2	BHI H60	53.7'			
Boeing					
1	¹ Chinook (CH-47D)	60'	28,000	26,000	
1	Chinook 234 LR		28,000	20,000	
1	Vertol 107 II (CH-46)		5,000	10,000	
Kaman Aircraft					
2	K-Max	48.4'	NA	6,000	



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APPENDIX 5, HELICOPTER SAFETY CHART

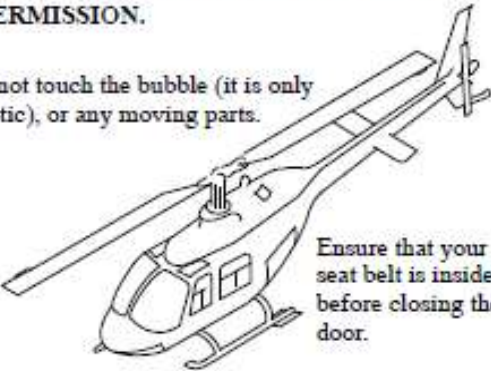
Page 1 of 1

BE ALERT

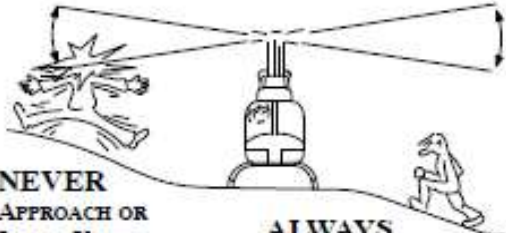
AROUND THE HELICOPTER

DO NOT SMOKE IN OR AROUND THE HELICOPTER WITHOUT THE PILOT'S PERMISSION.

Do not touch the bubble (it is only plastic), or any moving parts.




Ensure that your seat belt is inside before closing the door.




NEVER APPROACH OR LEAVE UPHILL

ALWAYS APPROACH FROM THE DOWNHILL SIDE.

KEEP LANDING AREAS CLEAN
The helicopter downwash will lift and move an amazing variety of things.

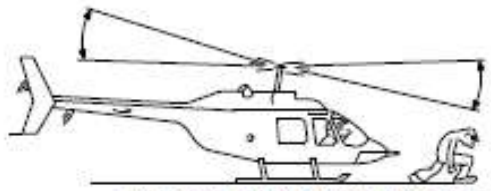


DO NOT SLAM THE DOORS, but close them gently and do not let them swing in the wind.



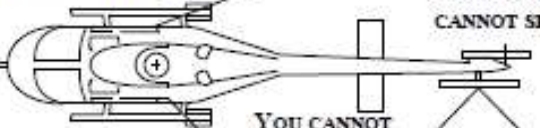
PROTECT YOURSELF

1. FASTEN SEAT BELT on entering helicopter and leave it fastened until the pilot signals to get out.
2. ASK THE PILOT about emergency exits and escape procedures.
3. DRESS for the operating environment.
4. KEEP WELL CLEAR of landing areas when the helicopter is landing or taking off, especially with external loads.
5. SHIELD YOUR EYES near a helicopter when it is landing or taking off.



Approach and leave the helicopter in a crouched position.

When directing the helicopter, stand with your back to the wind, arms outstretched in the direction of the pad.

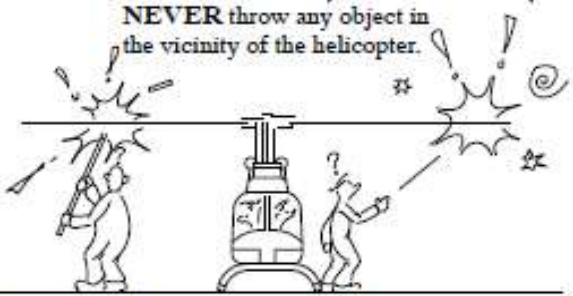


ALWAYS AVOID THIS BLIND AREA...THE PILOT CANNOT SEE YOU!

YOU CANNOT BE SEEN HERE, EITHER!

DO NOT GET CLOSE TO THE TAIL ROTOR!

NEVER throw any object in the vicinity of the helicopter.



Carry tools and other long objects horizontally below waist level, not upright or over the shoulder.

Hold on to your hat. Do not make campfires near the pad.



Helicopter Operations Field Manual

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Helicopter Operations Field Manual

APPENDIX 6, HELICOPTER HAND AND HEAD SIGNALS

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Hand and head signals are the most common means of communication with the helicopter.

When two employees are ready to lift off together (leaving a structure or the ground)—**both employees must signal up and down**—which informs the pilot that both are ready to lift off.

Raise

Head nodding up and down: Moving head up and down, means go up. When the head movement stops, the pilot will stop for the employee who is still maintaining control of the line or load. If the head movement continues and the employee lets go of the line or load, the pilot will continue to rise and either look for another signaler or leave the area with the load.



Lower

Head movements from side-to-side: Moving head side-to-side, means come down: When the head movement stops, the pilot will stop for the employee who is still maintaining control of the line or load.



Hold

Arms straight out at 90 degrees: This means stop going down or up, the load is at my elevation to receive or send. This signal helps the pilot know when they are in the right area to drop or receive a load when depth perception is difficult.



Helicopter Operations Field Manual

Appendix 6, Helicopter Hand and Head Signals Page 2 of 2

Capture

One arm wave or reaching: This signal is seen by the pilot looking down into a structure, where seeing the employee is difficult. When the pilot gets the load close to an obscured employee in a tall structure, the pilot will see a hand come out. The pilot will know they are close and can make adjustments. At times an employee may put an arm out, letting the pilot know the location they are in, before trying to take the load or hook in.



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APPENDIX 7, PREVENTIVE MAINTENANCE FOR HELMET USERS

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WARNING

Do not repair or use a helmet that is damaged beyond the limits set forth in this chart. Failure to comply may result in injury or death.

Inspection Standards: inspections to be conducted by helmet users.

B = Before (pre-flight) **A** = After (post-flight) **C** = Every 120 days (4 months)

Item	Not mission capable if:	Interval		
		B	A	C
Helmet Shell				
Inspect surface for chipped paint	Surface has chipped paint with penetration of fibers.	X	X	X
Inspect surface for de-lamination or cracks	Surface has de-lamination larger than a nickel, or cracks that are forked or branched.	X	X	X
	Surface has cracks, running front to back, measuring longer than 2-inches, or penetrating the light-colored inner fiber layers	X	X	X
	Surface has cracks running side to side, measuring 1-inch or longer, or penetrating the light-colored inner fiber layers.	X	X	X
Inspect the edge	Edge has any cracks	X	X	X
Inspect the ear dome area	Any cracks penetrating all fiber layers or any holes in the ear dome area.	X	X	X
TPL or SCL				
Check fit	Loose or improper fit.	X	X	X
Inspect plastic layers	Plastic layers have one or more plies that have been separated for the stack.	X	X	X
Check cover for dirt.	Cover is greasy, oily, or dirty.			X
Energy-absorbing Liner				
Check of holes and cracks	Liner has holes or compressions; gouges deeper than ¼" cracks in front, or cracks wider than ½" in rear.	X	X	X

Helicopter Operations Field Manual

Appendix 7, Preventive Maintenance Check for Helmet Users Page 2 of 3

Item	Not mission capable if:	Interval		
		B	A	C
Ear Cups				
Check fit	Ear seals are not properly compressed around wearer's ears.	X	X	X
Check for holes, cracks, and tears	Holes, cracks, or tears exist.	X	X	X
	Ear cup is cracked or broken; hook fasteners is loose or missing			X
Ear Seals				
Inspect for damage	Cuts or tears exist, seams are split, inner foam is exposed			X
Retention Assembly				
Check attachment	Not properly attached to helmet.	X	X	X
Check fit of nape assembly	Nape assembly is improperly fitted.	X	X	X
Check buckles	Buckle is broken, strap is torn or frayed, or name assembly has holes or cracks.	X	X	X
Check hardware	Hardware is broken, loose, or missing; seams are split; fabric is frayed, oily, greasy, or dirty.			X
Earphones				
Check operation in aircraft	Any malfunction exists	X	X	
Check using test set, intercommunications unit	Any malfunction exists			X
Microphone/Boom Assembly				
Check the attachment of hardware including set screws	Hardware is loose or missing or boom fails to hold microphone in lace.	X	X	
Check operation in aircraft	Microphone is malfunctioning.	X	X	
Check using test set, intercommunications unit	Any malfunction exists			X
Visor Assembly				
Check for dirt or scratches	Dirt or scratches interfering with vision exist.	X	X	X
Check operation	Visors do not move freely in tracts.	X	X	X
Check locking mechanism	Visor fails to lock in desired position.	X	X	X
Check housing for holes and cracks	Visor housing has any holes or cracks.			X



Helicopter Operations Field Manual

Appendix 7, Preventive Maintenance Check for Helmet Users Page 3 of 3

Item	Not mission capable if:	Interval		
		B	A	C
Helmet Bag				
Inspect for dirt, missing hardware, broken stitching.	Fabric is dirty; hardware is missing; stitching is broken.	X	X	X
MFS				
Check for holes, cracks, or other damage.	MFS has holes, cracks or any other damage.	X	X	X
Check function of latches	Latches do not function properly.	X	X	X

Cleaning Standards

Item	Condition	Cleaning
Helmet Shell	Dirt, grease, scuff marks	Use mild detergent and clean cloth
TPL or SCL		
Cloth cover	Dirt, stains	Machine wash (gentle cycle) or hand wash with warm water; air dry—do not use dryer
Plastic layer	Dirt	Wipe exterior layers with damp cloth. Replace double sided tape after cleaning.
Energy-absorbing Liner		
Ear Cups / Seals	Dirt, perspiration	Wipe with a damp cloth; for earphone protection, do not use too much water
Retention Assembly	Dirt, grease	Use clean cloth dampened with water; allow to dry thoroughly
Earphones	(see ear cups/seals)	
Microphone/Boom Assembly	(see retention assembly)	
Visor	Dust, grease, perspiration	Use soft cloth and mild soap solution; rinse thoroughly
Visor Assembly	Sediment, dirt, grease	Use clean cloth dampened with mild soap solution
Helmet Bag		
MFS	Dirt, dust	Wipe with a clean cloth dampened with a mild soap; air dry
Communications Cord	Dirt, grease	Wipe with damp cloth and dry thoroughly



Helicopter Operations Field Manual


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Helicopter Operations Field Manual

APPENDIX 8, OSHA BULLETIN – SUSPENSION TRAUMA


Page 1 of 4

 View webpage at <https://www.osha.gov/dts/shib/shib032404.html> for additional information.


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 (formerly Directorate of Science, Technology and Medicine)
 Office of Science and Technology Assessment

Suspension Trauma/Orthostatic Intolerance

Safety and Health Information Bulletin
 SHIB 03-24-2004, updated 2011

This Safety and Health Information Bulletin is **not** a standard or regulation, and it creates no new legal obligations. The Bulletin is advisory in nature, informational in content, and is intended to assist employers in providing a safe and healthful workplace. Pursuant to the *Occupational Safety and Health Act*, employers must comply with hazard-specific safety and health standards and regulations promulgated by OSHA or by a state with an OSHA-approved state plan. In addition, pursuant to Section 5(a)(1), the General Duty Clause of the Act, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.


Purpose

This Safety and Health Information Bulletin provides employees and employers with important information about the hazards of orthostatic intolerance and suspension trauma when using fall arrest systems. This bulletin:

- describes the signs and symptoms of orthostatic intolerance;
- discusses how orthostatic intolerance can occur while workers are suspended following a fall; and
- outlines recommendations for preventing orthostatic intolerance, as well as recommendations for worker training and rescue.

Background

Orthostatic intolerance may be defined as "the development of symptoms such as light-headedness, palpitations, tremulousness, poor concentration, fatigue, nausea, dizziness, headache, sweating, weakness and occasionally fainting during upright standing" [1,2]. While in a sedentary position, blood can accumulate in the veins, which is commonly called "venous pooling," and cause orthostatic intolerance [3]. Orthostatic intolerance also can occur when an individual moves suddenly after being sedentary for a long time. For example, a person may experience orthostatic intolerance when they stand up quickly after sitting still for a long time.



Helicopter Operations Field Manual

Appendix 8, OSHA Bulletin – Suspension Trauma

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A well-known example of orthostatic intolerance is that of a soldier who faints while standing at attention for long period of time. The moment the soldier loses consciousness, he or she collapses into a horizontal position. With the legs, heart, and brain on the same level, blood is returned to the heart. Assuming no injuries are caused during the collapse, the individual will quickly regain consciousness and recovery is likely to be rapid.

Venous pooling typically occurs in the legs due to the force of gravity and a lack of movement. Some venous pooling occurs naturally when a person is standing. In the veins, blood normally is moved back to the heart through one-way valves using the normal muscular action associated with limb movement. If the legs are immobile, then these "muscle pumps" do not operate effectively, and blood can accumulate. Since veins can expand, a large volume of blood may accumulate in the veins.

An accumulation of blood in the legs reduces the amount of blood in circulation. The body reacts to this reduction by speeding up the heart rate and in an attempt to maintain sufficient blood flow to the brain. If the blood supply is significantly reduced, this reaction will not be effective. The body will abruptly slow the heart rate and blood pressure will diminish in the arteries. During severe venous pooling, the reduction in quantity and/or quality (oxygen content) of blood flowing to the brain causes fainting. This reduction also can have an effect on other vital organs, such as the kidneys [3]. The kidneys are very sensitive to blood oxygen, and renal failure can occur with excessive venous pooling. If these conditions continue, they potentially may be fatal [3].



Description of Hazard

Orthostatic intolerance may be experienced by workers using fall arrest systems. Following a fall, a worker may remain suspended in a harness. The sustained immobility may lead to a state of unconsciousness. Depending on the length of time the suspended worker is unconscious/immobile and the level of venous pooling, the resulting orthostatic intolerance may lead to death. While not common, such fatalities often are referred to as **"harness-induced pathology"** or **"suspension trauma."**

Signs & symptoms that may be observed in an individual who is approaching orthostatic intolerance:

Faintness	Nausea
Breathlessness	Dizziness
Sweating	Unusually Low Heart Rate
Paleness	Unusually Low Blood Pressure
Hot Flashes	"Greying" or Loss of Vision
Increased Heart Rate	

References: Seddon, Paul. Harness Suspension: review and evaluation of existing information. Health and Safety Executive. Research Report 451/2002. 104 pp.

Sheehan, Alan. Suspension Trauma. Training handout.

Factors that can affect the degree of risk of suspension trauma:

Inability to move legs	Hypothermia
Pain	Shock
Injuries during fall	Cardiovascular disease
Fatigue	Respiratory disease
Dehydration	Blood loss

References: Seddon, Paul. Harness Suspension: review and evaluation of existing information. Health and Safety Executive. Research Report 451/2002. 104 pp.

Sheehan, Alan. Suspension Trauma. Training handout.

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Appendix 8, OSHA Bulletin – Suspension Trauma

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Unconscious/immobile workers suspended in their harness will not be able to move their legs and will not fall into a horizontal position, as they would if they fainted while standing. During the static upright position, venous pooling is likely to occur and cause orthostatic intolerance, especially if the suspended worker is left in place for some time. Venous pooling and orthostatic intolerance can be exacerbated by other circumstances related to the fall. For example, shock or the experience of the event that caused the fall, other injuries, the fit/positioning of the harness, the environmental conditions, and the worker's psychological state all may increase the onset and severity of the pooling and orthostatic intolerance [3,5]. Unless the worker is rescued promptly using established safe procedures, venous pooling and orthostatic intolerance could result in serious or fatal injury, as the brain, kidneys, and other organs are deprived of oxygen [3]. Recommended rescue procedures are outlined below in the **Conclusions and Recommendations** section.

Conclusions and Recommendations

Prolonged suspension from fall arrest systems can cause orthostatic intolerance, which, in turn, can result in serious physical injury, or potentially, death. Research indicates that suspension in a fall arrest device can result in unconsciousness, followed by death, in less than 30 minutes [4]. To reduce the risk associated with prolonged suspension in fall arrest systems, employers should implement plans to prevent prolonged suspension in fall protection devices. The plan should include procedures for: preventing prolonged suspension, identifying orthostatic intolerance signs and symptoms, and performing rescue and treatment as quickly as possible.

OSHA recommends the following general practices/considerations:

- Rescue suspended workers as quickly as possible.
- Be aware that suspended workers are at risk of orthostatic intolerance and suspension trauma.
- Be aware of signs and symptoms of orthostatic intolerance.
- Be aware that orthostatic intolerance is potentially life threatening. Suspended workers with head injuries or who are unconscious are particularly at risk.
- Be aware of factors that can increase the risk of suspension trauma.

Training

OSHA requires employers to train workers to use fall arrest systems and other personal protective equipment correctly while performing their jobs, in accordance with standards 29 CFR 1910.132 (Personal Protective Equipment) 29 CFR 1915.159 (Personal Fall Arrest Systems) and 29 CFR 1926.503 (Training Requirements for Fall Protection).

Workers who wear fall arrest devices while working, and those who may perform rescue activities, should also be trained in:

- How to ascertain whether their personal protective equipment is properly fitted and worn, so that it performs as intended;
- How orthostatic intolerance/suspension trauma may occur;
- The factors that may increase a worker's risk;
- How to recognize the signs and symptoms identified in this bulletin; and
- The appropriate rescue procedures and methods to diminish risk while suspended.

Rescue Procedures

Under 29 CFR 1926.502 (d) (Fall Protection Systems Criteria and Practices), OSHA requires that employers provide for "prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves." This should include identifying rescue procedures that address the potential for orthostatic intolerance and suspension trauma. Rescue procedures also should address how the rescued worker will be handled to avoid any post-rescue injuries.

Rescue procedures should include the following contingency based actions:

- If self-rescue is impossible, or if rescue cannot be performed promptly, the worker should be trained to "pump" his/her legs frequently to activate the muscles and reduce the risk of venous pooling. Footholds can be used to alleviate pressure, delay symptoms, and provide support for "muscle pumping."
- Continuous monitoring of the suspended worker for signs and symptoms of orthostatic intolerance and suspension trauma.
- Ensuring that a worker receives standard trauma resuscitation⁴ once rescued.
- If the worker is unconscious, keeping the worker's air passages open and obtain first aid.
- Monitoring the worker after rescue, and ensuring that the worker is evaluated by a health-care professional. The worker should be hospitalized when appropriate. Possible delayed effects, such as kidney failure, which is not unusual in these cases, are difficult to assess on the scene.



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Appendix 8, OSHA Bulletin – Suspension Trauma

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References

1. Robertson, David. Orthostatic Intolerance. Vanderbilt University, Nashville, Tennessee.
2. New York Medical College. Orthostatic Intolerance. Vahalla, New York.
3. Seddon, Paul. Harness Suspension: Review and evaluation of existing information. Health and Safety Executive. Research Report 451/2002. 104 pp.
4. Sheehan, Alan. Suspension Trauma. Training handout.
5. Weems, Bill and Bishop, Phil. Will Your Safety Harness Kill You? *Occupational Health & Safety*. 72(3): 86-88, 90, March, 2003.

³National Association of Emergency Medical Technicians (NAEMT). Provider Textbook section in: **PHTLS Basic and Advanced Prehospital Trauma Life Support *Fifth Edition*** St. Louis, MO: Mosby; 2003: Section 1. Summary available at: <http://phtls.org/datafiles/PHTLS%205ed%20Compendium.pdf>

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APPENDIX 9, TAILBOARD CHECKLISTS

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Conduct tailboards in accordance with CSP 1115 (always refer to current copy of CSP):

Tailboard briefings associated with helicopter operations shall be held at the immediate jobsite. (a) All crew personnel and helicopter company employees and associated contractors shall attend the tailboard briefing. If the work commences prior to the helicopter arriving, an additional tailboard shall be conducted prior to the commencement of helicopter work procedures. (b) All crew members and the helicopter company employees shall attend the tailboard to facilitate a common understanding of the work to be accomplished, the procedures which will be utilized to accomplish the work and role/responsibilities of all involved. During the tailboard all equipment including the helicopter shall be shutdown to allow all employees the ability to clearly hear, understand, and question the details of the planned work assignments during the tailboard discussion.

Tailboards are specific to the type of work. Each Line of Business (LOB) is responsible for their own tailboard templates.

When **any** LOB for uses a helicopter to assist in any work project, then in addition to the tailboard authorized for that LOB, the crew must incorporate a Helicopter Operations tailboard.


The following pages include:

- (1) A Helicopter Preplanning Checklist job aid: useful for the supervisor or crew lead in planning work with a helicopter.
- (2) A Helicopter Operations Tailboard/Job Aid: conduct at the job site or LZ location prior to utilizing a helicopter. All work crew members and helicopter crew members (generally just the pilot, but if present, the fuel truck driver and the mechanic), and any additional contractors **involved within 200 feet of helicopter operations or flight path of helicopter(s)**, must attend and sign the helicopter tailboard attendance sheet.



Helicopter Operations Field Manual

Helicopter Planning Aid, AVI-3001M-JA01. Example only, use the current version in the GDL.

 Helicopter Planning Aid AVI-3001M – JA01	
<p>This is an aid to help prepare for any long-line or HEC work—to help setup a successful new project using a helicopter. Chapter references are to the <i>Helicopter Operations Field Manual, AVI-3001M</i></p>	
	Yes No N/A
Have individuals completed the required Basic Helicopter Safety training TECH-0002WBT? (See Chapter 12, 12.6. Required every two years.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Verify that all affected employees are current with required training and in possession of valid cards prior to work. (See Chapter 12.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has all needed information been provided to the Helicopter Operations scheduler? (Location, Type of work, Hours-days needed, Dept.) (See Chapter 1, sections 1.10 and 1.13.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has a suitable landing zone been selected? (See Chapter 4, section 4.11; Appendix 2, AVI-3001M-JA03.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has the LZ-Lead been identified? (See Chapter 5, paragraph 5.2.1.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Has dust mitigation been considered? (Does the LZ need a water truck?) (See Chapter 4, section 4.11; Appendix 2, AVI-3001M-JA03.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Are all employees using the appropriate personal protective equipment? Safety glasses, goggles, ear protection, snug-fitting clothing, hard hat with chin strap, gloves, and dust mask protection (if necessary). (See Chapter 5, paragraph 5.4.6.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Does helicopter need additional fuel for assignment and/or has fuel truck been requested? (See Chapters 1, 1.5.5; 4, 4.11.1, 4.12.2; 8, 8.10.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Be sure the pilot reviews all HEC or patrol work and request instructions, (See Chapter 1, sections 1.8 & 1.9.; Chapter 5, 5.4.1, 5.4.8, 5.4.9.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Is there adequate clearance from energized conductors? (QEW needed if within 30 feet.) (See Chapter 5, 5.4.9 & 5.4.10; Chapter 7, 7.9.5)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have the specific hazards of the tasks to be performed been identified? The pilot should be involved in the tailboard. (See Chapter 5, 5.2.2, 5.3, 5.4; Chapter 4, section 4.11.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have safe horizontal and vertical working distances for helicopters been reviewed? (Vertical 10' marker on long-line below helicopter skid; horizontal half the rotor diameter.) (See Chapter 1, 1.12 and Chapter 7, 7.11 and 7.12.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have the details of HEC, or long-line work involving sling loads, been identified? (See Chapters 7, 8, 10, and 11.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Have radio checks been considered between air and ground personnel? Be sure the pilot discusses head & hand signals with crew. (See Chapter 3; Appendix 6.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Remember to inspect all slings and cargo nets before use. (See Chapter 7.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Consider public safety (i.e., Flight path, roads, hiking trails, livestock, schools, etc.). (See Chapter 5, paragraphs 5.4.14, 5.4.15, and 5.4.16.)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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Tailboard, AVI-3001M-F01, page 1 of 2. Example only, use the current version in the GDL.

Pacific Gas and Electric Company		Helicopter Operations
Helicopter Operations Tailboard		
<input type="checkbox"/> (Optional) See LOB tailboard for header information; X out duplicated information.		
Work Location	Time: ____:____ AM / PM	Crew Lead
	Date: ____/____/____	
Helicopter Contractor		First Line Supervisor
Pilot's Name	Tailboard Conducted by:	Landing Zone Lead (10.3.3; 11.13)
Pre-Job Planning (see AVI-3001M – JA01)		
Checklist Items:	Yes	No NA
Is the Code of Safe Practices and Helicopter Operations Field Manual on site?	<input type="checkbox"/>	<input type="checkbox"/>
Are all employees/contractors present, and listening (everyone participates)?	<input type="checkbox"/>	<input type="checkbox"/>
Has helicopter job scope and what is to be accomplished for the day, been reviewed?	<input type="checkbox"/>	<input type="checkbox"/>
Has the Landing Zone (LZ) Lead been identified?	<input type="checkbox"/>	<input type="checkbox"/>
Has Radio Communications with the Helicopter, LZ, Line Workers, Traffic Control been confirmed?	<input type="checkbox"/>	<input type="checkbox"/>
Have the escape routes been established while working under the helicopter?	<input type="checkbox"/>	<input type="checkbox"/>
Does the pilot need to perform a walk-down survey of the jobsite?	<input type="checkbox"/>	<input type="checkbox"/>
Did the pilot do an aerial inspection for hazards/conditions at jobsite site? (HOFM, 10.3.3)	<input type="checkbox"/>	<input type="checkbox"/>
Did the pilot verify the Helicopter Safe Working Distance?		
–Helicopter Horizontal Safe Work distance (1/2 diameter of rotor)	<input type="checkbox"/>	<input type="checkbox"/>
–Helicopter Vertical Safe work distance (10 feet marker below skid)		
Did the pilot verify long-line length adequate to complete work at receiving site?	<input type="checkbox"/>	<input type="checkbox"/>
Did the pilot confirm all load weights with EIC?	<input type="checkbox"/>	<input type="checkbox"/>
Has the pilot discussed Congested Area Flight Plan?	<input type="checkbox"/>	<input type="checkbox"/>
Did the pilot review with crew correct use and operation of grapple, snap hook, and remote hook?	<input type="checkbox"/>	<input type="checkbox"/>
Has pilot reviewed emergency shutdown of engines, battery, and use of rotor brake?	<input type="checkbox"/>	<input type="checkbox"/>
Is the LZ secured from debris and flying objects? (HOFM, Chapter 7, section 2)	<input type="checkbox"/>	<input type="checkbox"/>
Have ropes, shackles, and steel/fiber slings been inspected—approved and rated?	<input type="checkbox"/>	<input type="checkbox"/>
Note—Do not use Muletape® with any helicopter loads.		
Discuss static discharge with long-line work. (HOFM, Chapter 10, sect. 1.9 and 3.3)	<input type="checkbox"/>	<input type="checkbox"/>
Has public safety been addressed? (HOFM, Chapter 8, section 2.14)	<input type="checkbox"/>	<input type="checkbox"/>
Have Helicopter ID Cards (Pilot / HEC / Cargo) been inspected?	<input type="checkbox"/>	<input type="checkbox"/>
Discuss re-tailboarding if scope changes (additional tailboards)	<input type="checkbox"/>	<input type="checkbox"/>
Review Side Pull – section (HOFM, Chapter 10, section 11)	<input type="checkbox"/>	<input type="checkbox"/>
HEC employees must include their total flying weight on the signature sheet with their LanID.		
Personal Protective Equipment (PPE) and Critical Component Check List		
<input type="checkbox"/> Hard Hats with chinstraps	<input type="checkbox"/> Inspect HEC Harness	
<input type="checkbox"/> HEC Rescue Knives	<input type="checkbox"/> Inspect HEC rope, A-frame, and parachute	
<input type="checkbox"/> Conduct buddy check for HEC employees	<input type="checkbox"/> Assemble and inspect Air Chairs	
Note		
Report all helicopter incidents to responsible supervisor, Helicopter Operations (707-449-5832), and, if appropriate, the contract administrator. (HOFM Chapter. 1, section 9)		
AVI-3001M-F01 (v1)	Revision Date: 4/04/2018	Page 1 of 2

[illegible]



Helicopter Operations Field Manual

Patrol/Ferry Tailboard, AVI-3001M-F02, page 1 of 2. Example only, use the current version in the GDL.

Pacific Gas and Electric Company		Helicopter Operations	
Helicopter Patrol/Ferry Tailboard Checklist			
This tailboard follows the pilot's pre-flight briefing.			
Division / Watershed / Area		Type of Patrol*	
Date: ____/____/____		Time: _____	
Landing Location(s):		Vendor:	
		Weight (Cargo/Passengers)	
*Type of Patrols: gas pipeline, elec. transmission/distribution, conveyance, pen stock, upper lake, water survey, snow survey, environment, vegetation. If Ferry, write in FERRY.			
Y / NA		Y / NA	
	Pilot to Contact HO Dispatch prior to tailboard: 707-449-5833		Sterile cockpit situations (during landing and lift-off) – Do not disturb pilot--keep communications to a minimum.
	All parties present for this flight? New passengers picked up in route will be tail-boarded as well.		CRM roles and responsibilities of each crewmember.
	Description of today's mission/job scope/review hazards.		Secure all items for flight.
	Preflight hazard ID: weather, patrol sector, airspace, schools, etc.		Stop Work Authority: If a concern arises, anyone can say "STOP!"
	Distribution and transmission line maps – crossings identified: electronic <input type="checkbox"/> paper <input type="checkbox"/>		Discuss fuel: a) mission requirements; b) while in flight – every 30 minutes – fuel check and crew fatigue
	Planned landings, shutdowns, and fuel stops.		First Aid? Air-sick bags?
	Safe working distances during patrol (speed, altitude)		Discuss Emergency Response Plan
	All personnel well rested?		Mission evaluation Pre-flight – For Patrols ONLY.
	Review Flight Risk : Has pilot completed their daily FRAT?		Sat phone charged? Yes / No
	Open water – Review ditch procedures; PFD if needed?		Does Patroller need binoculars? Yes / No
			Have previously patrolled this area? Yes / No
			High recon over area needed? Yes / No
			If yes, area last patrolled, when? _____
			Has something changed? Yes / No
			Has crew previous experience with this patrol? Yes / No
			Review all line crossings in patrol area – Required.
	Inflight Communication – 3-way Comms		Mission evaluation Debriefing – For Patrols ONLY.
	How to ID a hazardous situation in flight to the pilot.		Discuss mission with all personnel on the flight
	Call out hazards using clock method per TECH-0002:		Identify any areas of concern to report to management
			Discuss any "lessons learned"? Yes / No
			(See back)
	Doors off or open? Requires HO Dispatcher Approval: NA <input type="checkbox"/> Yes <input type="checkbox"/> Declined <input type="checkbox"/>		
	Patrolling in vicinity of Restricted Air Space – TFRs, DCP, Military bases, prisons, Yosemite NP, other? YES <input type="checkbox"/> / NO <input type="checkbox"/> If yes, coordinate entry with HO Dispatcher prior to entry (707-449-5833).		
Review Code / Condition Standards			
	Code: Red – When a threat or perceived threat is observed IMMEDIATELY call Code Red and communicate.		Condition: Orange – When focused on a single specific issue, call condition orange, alerting others to adopt condition yellow.
	Condition: Yellow – General eyes alert condition, 360 degrees. To be maintained in wire environment as much as practical. (see condition orange)		Condition: White – Unfocused, daydreaming—avoid in wire environment.
Save Tailboard per EDRS and LOB policies.			
AVI-3001M-F02 (v10)		Date: 9/10/2019	



Helicopter Operations Field Manual

Patrol/Ferry Tailboard, AVI-3001M-F02, page 2 of 2. Example only, use the current version in the GDL.

Pacific Gas and Electric Company Helicopter Operations															
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Helicopter Patrol/Ferry Tailboard Checklist </div> <div style="border: 1px solid black; height: 250px; margin-bottom: 10px;"> <p style="margin-top: 5px;">Lessons Learned:</p> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="text-align: left; padding: 5px;">Assignment / First Initial and Last Name (print):</th> <th style="text-align: left; padding: 5px;">Signature (Required):</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Pilot -</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Aerial Patroller / EIC-</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Crew -</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Crew -</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Crew -</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Crew -</td> <td style="padding: 5px;"></td> </tr> </tbody> </table>		Assignment / First Initial and Last Name (print):	Signature (Required):	Pilot -		Aerial Patroller / EIC-		Crew -		Crew -		Crew -		Crew -	
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<div style="display: flex; justify-content: space-between; margin-top: 20px;"> AVI-3001M-F02 (v10) Date: 9/10/2019 </div>															

Helicopter Operations Field Manual

APPENDIX 10, LOOSE ITEMS STORAGE SYSTEM

Page 1 of 3

OBJECTIVES:

- Establish parameters to ensure that no baggage or internal cargo inadvertently exits the aircraft at any time
- Establish parameters to ensure that no unsecure or compromised baggage or cargo is placed in the aircraft (i.e., broken zippers, latches, buttons, etc.)

REQUIREMENTS:

- All items not being worn or used by the pilot or employees are required to be secured in the baggage compartment of the aircraft *OR* in the required aircraft-equipment bag, which is then securely connected to the aircraft by means of a seat belt, hard point entry handles, or an authorized Daisy Chain attached to existing aircraft hard points.
- **Authorized Daisy Chain:** Manufactured by Yates Gear Inc., the aircraft-specific Daisy Chain is a six-foot heavy-duty attachment system made of nylon webbing at an overall rating strength of 5000 lbs., with individual loop strength of 1000 lbs. per loop with 20 loops total. The Daisy Chain will remain installed in MD 500 model helicopters at all times (this includes the MD500 D/E, 520N, and 530F Models).
- All items in the MD 500 series will be attached to the Daisy Chain by means of a carabineer or the handles of the items with the Daisy Chain webbing running through them.
- **Authorized Carabineer Slings:** Two carabineers with 12-inch extension straps are attached to the Daisy Chain for use in attachment of aircraft-equipment bag and additional gear/cargo. Pilots are to minimize the extension of the strap whenever possible so that attached gear/cargo will not extend beyond the threshold of the door.
- **All Other Aircraft (other than MD500 series):** Loose items and gear/cargo will be placed in the cargo compartment *OR* attached to the aircraft via secure connection through a seatbelt. Employee packs or loose items must be placed in the aircraft-equipment bag and then secured via seatbelt or stowed in the baggage compartment.
- Loose items that are not required for the mission are NOT allowed in the cabin of the aircraft regardless of the door configuration (on/off/partial) *unless* stowed properly in the aircraft-equipment bag. An approved canvas bag will be supplied in aircraft, which will allow for the securement of loose items for either the pilot or personnel. The canvas bag will then be attached to the Daisy Chain, stored in the baggage compartment, or attached via seatbelt.
- All backpacks, suitcases, bags, etc., will at all times be securely closed and attached/stowed via the seat belt, baggage compartment, or Daisy Chain. All zippers and snaps on packs/bags must be in good working order and closed. There can be no holes or tears in packs/bags that would allow items to escape. Should a pack/bag have a hole or failed zipper, the pilot is to place that bag in the aircraft-equipment bag. If it will not fit in the aircraft bag or baggage compartment, it will not be taken on the flight. Pilot bags are checked by their management and those bags not approved will be removed from service and require replacement.

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Appendix 10, Securing Loose Items

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- Review photos (Figure 15, Figure 16, Figure 17, and Figure 18) for proper hookup procedures of the Daisy Chain and an example of the aircraft-equipment bag.



Figure 15: Daisy Chain



Figure 16: Daisy Chain Securing Cargo



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Appendix 10, Securing Loose Items

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Figure 17: Carabineer Strap Used to Secure Cargo to Daisy Chain



Figure 18: An Aircraft-Equipment Bag for Loose Items

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Helicopter Operations Field Manual

APPENDIX 11, HELICOPTER POLE RIGGING GUIDELINES

Page 1 of 6

The following work methods have been established for using remote hooks when rigging poles for lifting by helicopters. Using these work methods will help to mitigate any unexpected release or disconnection from the remote hook.

Remote Electric Hook

At the end of the helicopter long-line rope is a remote electric hook, similar to the cargo hook on the belly of the helicopter. An electrical line runs the length of the long-line rope and is plugged into the electrical system of the helicopter. The other end of the electrical line is plugged into the remote hook.

The remote electric hook **provided by the helicopter vendor** now comes in two configurations, described below. Be sure to identify which configuration you will be working with and how it works.

- **Self-cocking (current standard)** – This hook is self-cocking, that is, it should return to the “latched” closed position after the electrical release signal is removed. This hook is identified by the visible external coil spring connected to the load beam pivot arm (see Figure 19).

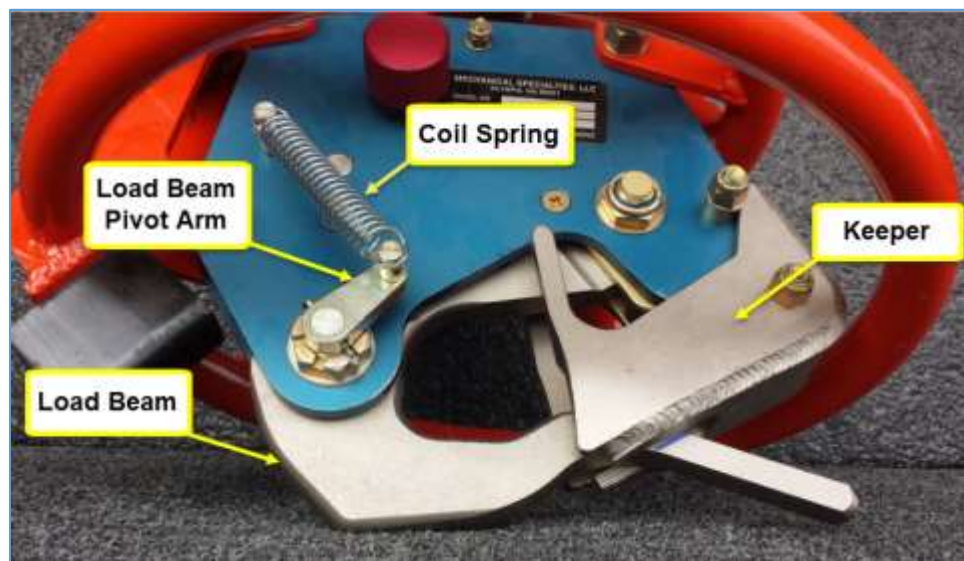


Figure 19: Self-cocking Remote Electric Hook

Helicopter Operations Field Manual

Appendix 11, Helicopter Pole Rigging Guidelines

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- Keeperless (new non-self-cocking)** – At the vendors option, the keeper (or gate) is modified and rendered inoperable by drilling a hole through both sides of the keeper and installing a bolt not allowing the keeper to swing in an upward motion. The load beam return coil spring is also removed when this modification is incorporated, therefore requiring manual re-cocking (latched closed position) of the load beam. The vendor per Federal Aviation Regulations carries out this modification. See Figure 20 and Figure 21.

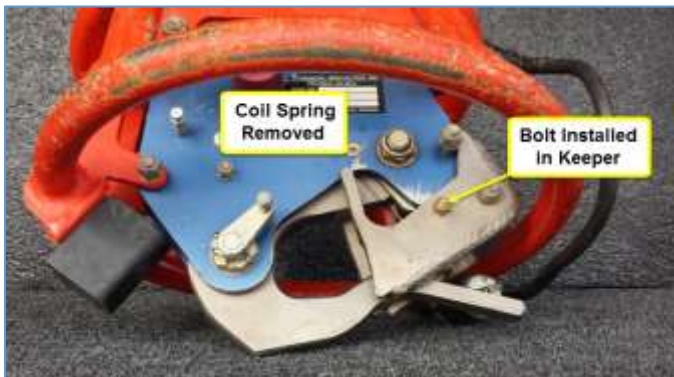


Figure 20: Non-Self-cocking Remote Electric Hook



Figure 21: Keeperless Remote Hook – Open Load Beam

A shackle must always be used when connecting a sling to the load beam of a remote release hook, (see Figure 22). Shackle screw pins must be hand tightened. At the remote hook location, the shackle size **must be** ¾-inch or larger (refer to Table 9 on page 180 for selecting shackles, when using wire rope ¾" or larger). For multiple lifts, when shackles will not be disconnected (unscrewed), screw pins must be "moused" with a light wire or zip-tie. Never attach the eye of a sling directly to the load beam (see Figure 23).



Figure 22: Correct – Shackle in Place



Figure 23: Incorrect – No Shackle

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Appendix 11, Helicopter Pole Rigging Guidelines

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Rigging Poles

Inspect all under hook rigging equipment prior to use, per SAFE-1016S, “Rigging Safety Standard”, TD-2327P-01, “Selecting and Caring for Ropes, Knots, Splices, and Slings”, and AVI-3001M, “Helicopter Operations Field Manual”.

Inspect the rigging attachment location on the pole for conditions that may damage rigging or interfere with the safe use of the rigging equipment.

Refer to Table 9 on page 180 for safe wire rope/shackle combinations. Shackle and cable saver screw pins must be hand tightened. For multiple lifts, when shackles will not be disconnected (unscrewed), screw pins must be “moused” with a light wire or zip-tie. With extended use, periodically check the screw pin to ensure that it has not worked loose.

If a cross arm is installed on a pole, the cross arm must be facing down before the pole is lifted. This ensures that the pole will not excessively roll, or shift, when lifted, due to any weight imbalance. Figure 24 shows correct shackle installation. Figure 25 shows an incorrect shackle installation—the shackle is upside down with the running end of the line on the screw pin. Figure 26 also shows an incorrect shackle installation—the screw pin is being forced into the pole. This condition may result in the screw pin working loose.



Figure 24: Correct Shackle Use



Figure 25: Incorrect, Shackle Upside Down



Figure 26: Incorrect, Screw-Pin Eye into Pole

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Appendix 11, Helicopter Pole Rigging Guidelines

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The cable saver is the preferred tool for pole rigging, up to and including 7/8-inch wire rope. Figure 27 shows the correct cable saver installation. Figure 28 shows an incorrect cable saver installation—the cable saver is upside down with the running end of the line exiting the cable saver in the wrong direction. Figure 29 also shows an incorrect cable saver installation—the screw pin is being forced into the pole.



Figure 27: Correct Cable Saver Installation



Figure 28: Incorrect, Cable Saver Upside Down



Figure 29: Incorrect, Screw-Pin Eye Against Pole

Wire Rope/Shackle Combinations

Table 9 lists the **pole choker** wire rope/shackle combinations. Always upsize shackles when possible.

Table 9: Minimum Wire Rope/Shackle Combinations for Pole Rigging

Wire Rope (dia. Inches)	1/2	9/16	5/8	3/4	7/8	1
Min. Shackle size (inches)	5/8	5/8	3/4	7/8	1	1-1/8

Helicopter Operations Field Manual

Appendix 11, Helicopter Pole Rigging Guidelines

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WARNING

Do not use staples to secure or pre-position rigging against the pole. Staples can become dangerous flying objects.

If it is necessary to prevent rigging from falling to the ground (after the pole has been set and released from the helicopter) the rigging can be tied off to the pole with one of the following materials:

- Specification 1-I rope, white with black tracer, 3-strand twisted
- Specification 1-II rope, white with black tracer, 12-strand braided
- Specification 2 rope, black, 3-strand twisted
- “

For this application, refer to the section on approved knots.

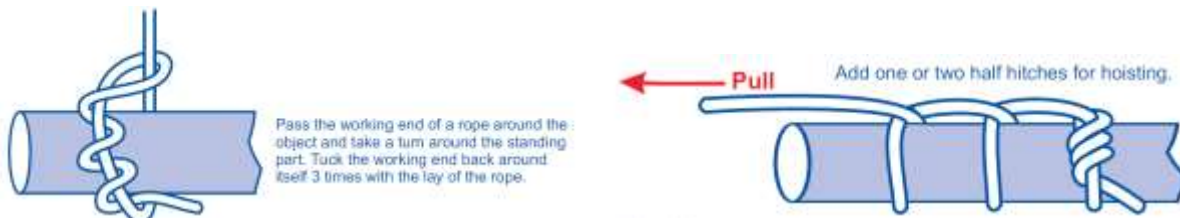
Once the rigging is properly installed to both helicopter and pole, maintain positive control of the sling until the slack has been removed, as the helicopter begins to lift.

When confirmed that rigging is correct and nothing is hung-up, step away, clear of the fall radius, and signal the helicopter to continue lifting.

Approved Knots

Timber Hitch

The timber hitch is used to attach a single length of rope to a cylindrical object. This knot remains secure while tension is applied but is easily untied even after heavy loading. As the name suggests, this knot is often used for attaching rope to tree trunks, branches, logs, and other cylindrical objects.



Bowline

The bowline is used to form a fixed loop at the end of a rope. It is easy to tie and untie, even after a heavy load is applied.



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Appendix 11, Helicopter Pole Rigging Guidelines

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Bowline

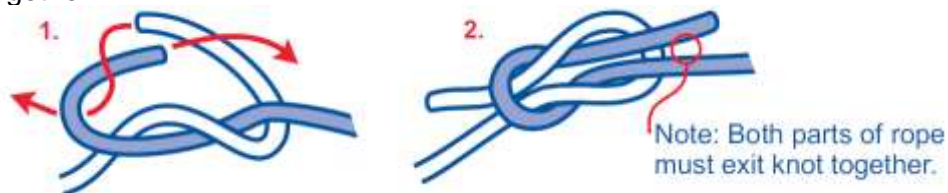
Half Hitch

The half hitch has many uses. Use two half hitches to tie a rope to any object, shown here tied to a ring. Company recommends three half hitches for safety.



Square Knot

Quick and easy to tie, a good knot for securing non-critical items. Not to be trusted to join two ropes together.



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APPENDIX 12, DCPD

Page 1 of 1

NOTE

DCPD prefers 48-hour notice, but that is not always possible.

When operations (e.g., helicopter, gas patrol, UAS) are scheduled within 2 miles of DCPD (located at N35°12.672' W120°51.200'), contact the Helicopter Operations Dispatcher; the Helicopter Operations Dispatcher must notify the Diablo Canyon Watch Commander (DCWC) at (805) 545-3330 (or e-mail, DCWC, DCPDSECURITYDCWC@pge.com; Security Shift Supervisor, DCPDSecurityShiftSupervision@pge.com) and provide the following:

- Name and contact phone number of person coordinating the flight
- Purpose of flight
- Date, time, and expected duration of flight
- Flight plan
- Description of aircraft (i.e., type, color, "N" numbers)

Advise the flight operator that flights are not permitted above or within the ISFSI protected area boundary (Figure 30).



Figure 30: ISFSI Restricted Area

Request that the aircraft operator contact, if possible, "Diablo Security 2" on UHF radio frequency (Tx451.675/Rx456.675) and provide direction of approach when approximately 2 miles from DCPD.



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Helicopter Operations Field Manual**APPENDIX 13, EDWARDS AFB PILOT BRIEFING**

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Edwards AFB PPR Briefing

(Transient Pilot Brief)



R-2515

R-2508 COMPLEX



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APPENDIX 13, Edwards AFB Pilot Briefing

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Edwards AFB PPR Briefing

☐ Edwards AFB and Edwards Class D Surface Area lie within Restricted Area 2515:

- ☐ R-2515 and Edwards Class D Surface Area contain many flight hazards for aircrews unfamiliar with "Flight Test/Restricted Area" operations.
- ☐ Transient aircrews are strongly discouraged from flying into or out of Edwards AFB unless such flight is absolutely mission essential.
- ☐ During times when R-2515 is active, aircrews can expect multiple simultaneous hazardous activities to be occurring in addition to aircraft arrivals and departures.

These hazardous activities include but are not limited to:

- ☐ RPA/UAS operations
 - ☐ Spin Area operations
 - ☐ Supersonic Flight Test Activity
 - ☐ Air to Ground Weapons Deliveries/Bombing operations
 - ☐ Lasing/Target Acquisition
 - ☐ Non-Standard Tower Patterns
 - ☐ Rapidly maneuvering aircraft with chase, and other operations of this nature.
- ☐ Please see "R-2515 Special Activity Area Map" (Slide 9) for the locations of special activity areas that may be in use during your arrival or departure phase at Edwards AFB.



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APPENDIX 13, Edwards AFB Pilot Briefing

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Edwards AFB PPR Briefing

☐ Participating and Non-Participating Aircraft Operations:

- ☐ Participating Aircraft: operate within R-2515 and R-2508 under the concept of VFR – See and Avoid – Non-Exclusive Use – Regardless of Altitude.

- ☐ IFR Services and separation cease at the Special Use Airspace (SUA) boundary inbound for arrivals and begin at SUA boundary outbound for departures.
- ☐ Participating aircraft will receive minimal or no delays when arriving or departing Edwards AFB or transiting R-2508 shared use airspace.

- ☐ Non-Participating Aircraft: are those aircraft that are unable to operate under VFR – See and Avoid and require IFR services and separation within R-2515.

- ☐ Application of IFR Arrival/Departure procedures with R-2515 requires SPORT Military Radar Unit to return the Palmdale Corridor airspace (see slide 10) to the FAA so IFR separation services can be provided. This has a significant negative impact to other user's of R-2515.
- ☐ Non-Participating aircraft may encounter significant arrival/departure delays.
- ☐ Non-Participating aircraft will be denied entry into R-2508 Complex ATCAA and Restricted area airspace.



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Edwards AFB PPR Briefing

- ❑ **Services by SPORT Military Radar Unit and Edwards Tower:** SPORT MRU will normally provide **C2 services** when R-2515 is active during normal 412 TW flying. When **SPORT** is closed, the FAA (Joshua Approach) will provide limited services such as traffic calls and boundary information.
 - ❑ Prior to entering R-2515 contact **SPORT MRU** on 132.75 or 343.7. SPORT MRU controllers are not FAA certified and cannot provide standard air traffic control separation services. However, they can provide you with C2 services such as radar monitoring, traffic advisories, airspace boundary calls and can issue instructions (Headings & altitudes) for airspace de-confliction.
 - ❑ **Edwards Tower** controllers are FAA certified and will provide standard ATC services and separation within Edwards Class D airspace.
 - ❑ **All clearances** will state "Maintain VFR" within R-2515/R-2508 complex airspace. This phrase is to remind you that all portions of flight in the active Restricted Area/MOA/ATCAA are VFR, unless arriving/departing EDW IFR via the Palmdale Corridor. If at any time you are unable to maintain VMC conditions within R-2515 or R-2508 advise SPORT, Tower, or Joshua Approach, as appropriate.

**Helicopter Operations Field Manual****APPENDIX 13, Edwards AFB Pilot Briefing**

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R-2515 PPR Briefing

- ☐ **TRAFFIC PATTERNS:** Edwards has several traffic patterns with non-standard features BE ALERT FOR TOWER instructions:
 - ☐ South base runway 6/24 is located one mile south of 4/22. **Use caution on final to RWY 22 to preclude inadvertent landing on south base RWY 24.**
- ☐ **DEPARTURES, MISSED APPROACHES, LOW APPROACHES AND TOUCH AND GO LANDINGS WILL NOT CLIMB ABOVE 3,300' UNTIL DEPARTURE END OF THE RUNWAY.**
- ☐ **OVERFLIGHT RESTRICTIONS:**
 - ☐ **AVOID LEUHMANN RIDGE 5NM EAST-NORTHEAST OF RWY 22 BELOW 5,300' MSL**
 - ☐ **AVOID HOUSING/HOSPITAL AREAS LOCATED 2 MILES WEST OF RWY 22**

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R-2515 PPR Briefing

- ☐ **Runways** There are 3 main operating surfaces within the Edwards Class D Surface Area. North Base, Main Base and South Base. You'll be landing on Main Base, most likely runway 22L. There are also 18 Lakebed runways on Rodgers Dry Lakebed and Rosamond Dry Lakebed. If lakebed runway use is needed for an emergency situation, request instructions and runway status from the tower. Be cognizant of low level civil traffic and UAS ops in and out of the Class D to North and South Base areas.
- ☐ **R-2508 Transitions** Participating aircraft transiting R-2508 enroute to or from Edwards AFB are required to receive an "R-2508 Airspace Briefing" and schedule with the R-2508 Central Coordinating Facility (CCF) DSN 527-2508/COM 661-277-2508. Participating aircraft must maintain VFR, see and avoid while operating within R2508 MOA/ATCAA/Restricted airspace.



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R-2515 PPR Briefing

- ☐ **PPR FLIGHT PLANS:** In order to fly as a participant within R-2515 you must receive and acknowledge this **Edwards AFB PPR Briefing** and comply with the instructions below.
 - ☐ **INFORM BASE OPERATIONS Of Your Participant Status:** Insert this information as the first item in THE REMARKS SECTION OF THE FLIGHT PLAN (DD175) as either a "PARTICIPANT" or "NON-PARTICIPANT".
 - ☐ **Prior Permission Requested (PPR) for non-participating:** Expect arrival/departure delays when R-2515 is active due to ongoing operational flight tests/evaluations.
 - ☐ Ongoing tests may have to be suspended to allow for your IFR arrival/departure.
 - ☐ Airspace within R-2515 must be returned to the FAA so they can provide IFR separation services.
 - ☐ Pilots who elect to be **Non-Participants** or who have not received an **R-2508 Complex Airspace Briefing** must be routed to and from Edwards AFB via the Palmdale VORTAC. Aircrews must file Palmdale (PMD) direct Edwards (EDW) or EDW direct PMD. You will not be allowed entry into R-2508/R2515 to transition to/from Edwards (i.e. BFL direct EDW).

Phone Numbers:	DSN	Commercial
Base Operations:	527-2222	(661) 277-2222
SPORT MRU:	527-6184/3928	(661) 277-6184/3928
R-2515 Airspace Manager:	527-2515	(661) 277-2515

**Helicopter Operations Field Manual****APPENDIX 13, Edwards AFB Pilot Briefing**

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R-2515 PPR Briefing

- ☐ Aircrews landing at Edwards AFB are strongly encouraged to review the R-2508 Complex User's handbook @ www.edwards.af.mil/r-2508.asp and DOD FLIP Planning AP/1 (Edwards AFB and the Flight Hazards sections).
- ☐ The R-2508 Handbook is listed along the right side of the Edwards web site and may be downloaded in PDF format.
- ☐ If you do not have access to the DOD FLIP publications contact Airspace Management at 661-277-2515 or DSN 527-2515
- ☐ After reviewing this briefing contact Airfield Management Operations (AMOPS) at 661-277-2222 or DSN 527-2222 and let them know that you have received the R-2515 Airspace Briefing. They will provide your PPR number.

QUESTIONS?

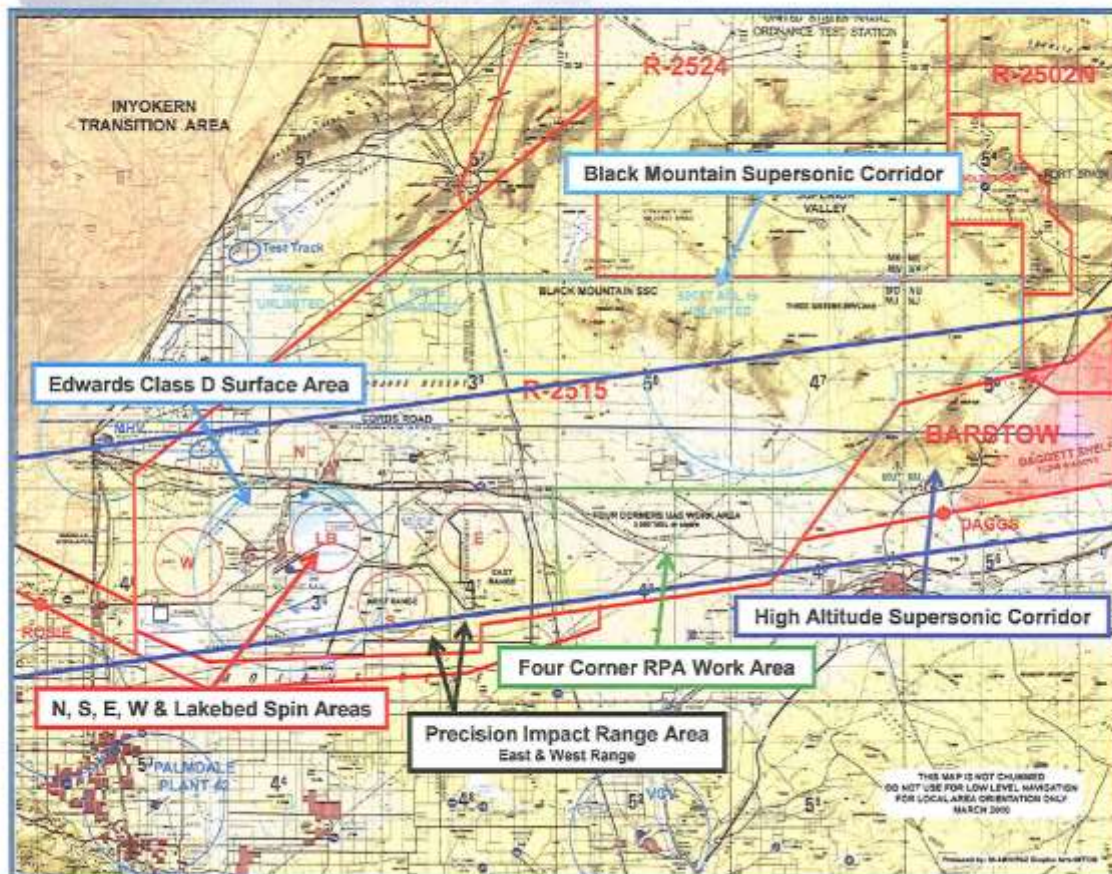
**Call R-2515 Airspace Management
At 661-277-2515 or DSN 527-2515**



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R-2515 Airspace for Special Use

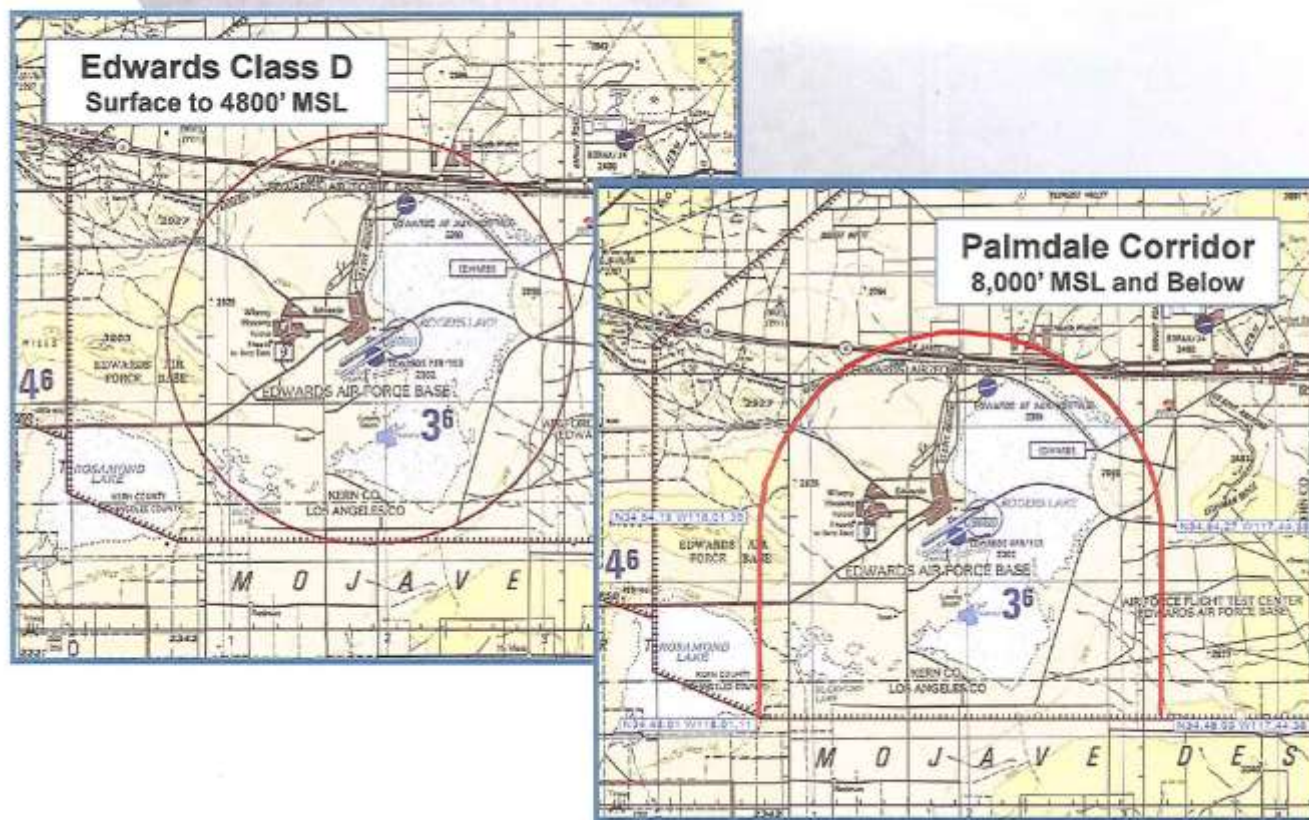




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Edwards Class D and Palmdale Corridor



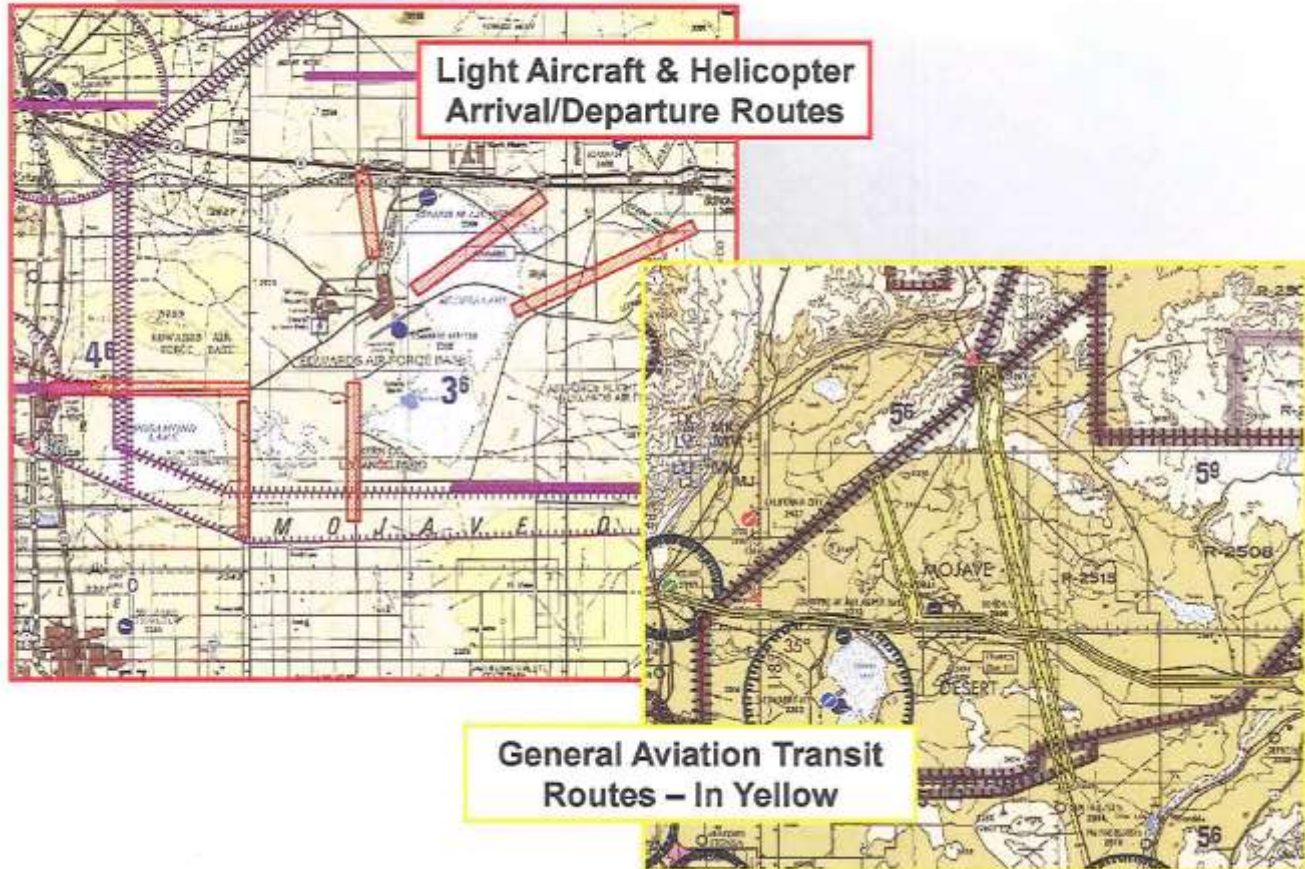


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Light Aircraft, Helicopter & General Aviation Transit Routes





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Phone Listing

	<u>Commercial</u>	<u>DSN</u>
• Billeting	661-277-3394	527-3394
• Enterprise Rental	661-258-1586	
• Command Post	661-277-3040	527-3040
• MOC	661-277-3143	527-3143
• Fuel	661-277-2272	527-2272
• Weather	661-277-4472	527-4472
• Transient Alert	661-277-2325	527-2325
• Transportation	661-277-2620	527-2620
*Transportation (Mon-Fri) only 0700L-1600L until further notice.		



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Restricted Airspace

Airspace above MCAGCC is classified as a Restricted Area (RA) which is one of several types of Special Use Airspace (SUA) in which authorities have determined that air traffic must be limited due to safety or security concerns. On aeronautical charts, RA is depicted with the letter 'R' followed by a serial number.

Before flying through RA, civilian pilots must confirm that the RA has been returned to the National Airspace for general use and management by Air Traffic Control or secure permission when MCAGCC retains use of the RA for military training.

Entering an RA without authorization and during military training will put you in danger from munitions fired by ground and airborne weapon systems. It also requires all live-fire training to come to a halt, causing the loss of critical military training opportunities.

"Restricted Area denotes existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants"

**- Federal Aviation
Administration (FAA)**

REMEMBER!

Pilots should ensure they do the following every time they fly near MCAGCC.

Always fly with an activated transponder when you fly near MCAGCC SUA. If you don't fly with an activated transponder, Range Control and other aircraft cannot see you. You could be putting yourself and others in serious danger.

Monitor the Guard frequency when near MCAGCC SUA. If you don't monitor the Guard frequency, Range Control will not be able to contact you in the event of imminent danger or an emergency.

Plan your trip before you leave. Give yourself time to become familiar with the SUA near your flight plan, local terrain, and weather conditions before you leave. Federal Aviation Regulations require all pilots to keep a chart with them while flying; however, the more you plan the less likely you will fly into SUA without authorization.



This brochure was printed on 100% Recycled paper.



**MCAGCC
Special Use
Airspace**

To ensure the safety of commercial and civilian aviation during military training activities, the FAA has established special use airspace above and in the vicinity of the Marine Corps Air Ground Combat Center (MCAGCC). Non-military aircraft must use this airspace consistent with FAA rules and regulations.



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Special Use Airspace (SUA)

The nation's airspace, seemingly unlimited, is actually a very finite resource that is defined in vertical, horizontal, and time dimensions.

Airspace is a public asset that is used for military, commercial, and recreational purposes. The Federal Aviation Administration (FAA) is charged with managing U.S. airspace, ensuring its safe and efficient use. With this mandate, the FAA must balance airspace utilization to best optimize meeting the nation's requirements to support all three elements of the aviation sector.

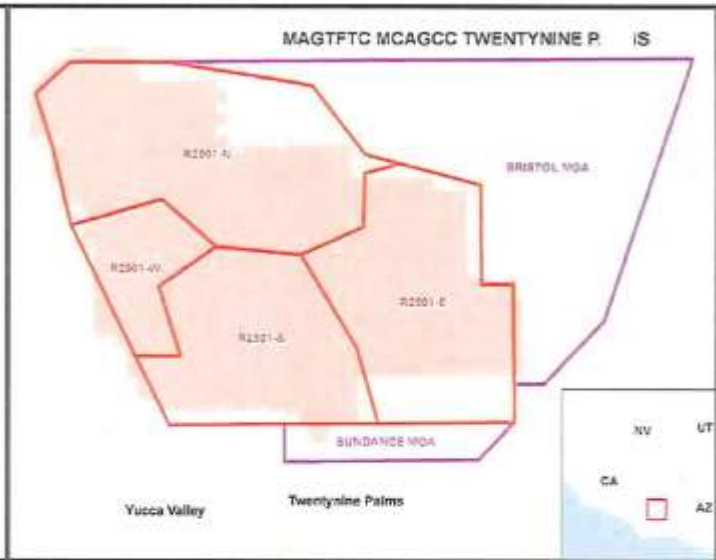
Recognizing the special requirements of the DoD, the FAA has set aside various blocks of airspace to support those needs. These pieces of airspace are designated as Special Use Airspace (SUA), which is designed to support military training.

Of the six categories of SUA, the two at MCAGCC are Restricted Areas (RA) and Military Operations Areas (MOA), and above the MOA are Air Traffic Control Assigned Airspace (ATCAA). Due to the nature of the activities taking place within SUA, varying restrictions are imposed on non-military aircraft. These limitations allow the DoD to conduct its often hazardous activities, while preserving public safety.



LEGEND

- Restricted Area
- Military Operations Area
- U.S. Marine Corps Land
- Government Owned Land, Non-DoD



MCAGCC SUA

The above chart displays the Restricted Area R-2501 above MCAGCC and the two MOAs adjacent to that RA. The altitude of the RA is from the ground to unlimited elevation; of the Bristol MOA from 5,000 to 18,000 ft. above Mean Sea Level (MSL); and of the Sundance MOA from 500 ft. above Ground Level (AGL) to 10,000 MSL.

R-2501 consists of four different quadrants (outlined in red), R-2501 North, R-2501 South, R-2501 West and R-2501 East. Note that R-2501 boundaries do not mirror the installation's boundaries in all areas. At some locations it is possible to be operating within R-2501 and not be over the installation property.

MCAGCC Range Control manages its SUA for release and use by all aircraft in the National

Airspace System when not needed for military training. This can include capping the elevation of the RA (for example at 28,000 MSL). This reduces disruptions to the National Airspace. Authority to fly into R-2501 must come from the Los Angeles Air Traffic Control Center.

The Bristol MOA abuts the Eastern boundary of R-2501 (outlined in purple). Aircraft planning to operate within the Bristol MOA must first file a DD Form 175 Flight Plan. Authorization to fly into the Bristol MOA must come from the Los Angeles Air Traffic Control Center.

The Sundance MOA abuts a portion of the Southern boundary of R-2501 (outlined in purple). Authorization to fly into the Sundance MOA must come from MCAGCC Range Control.

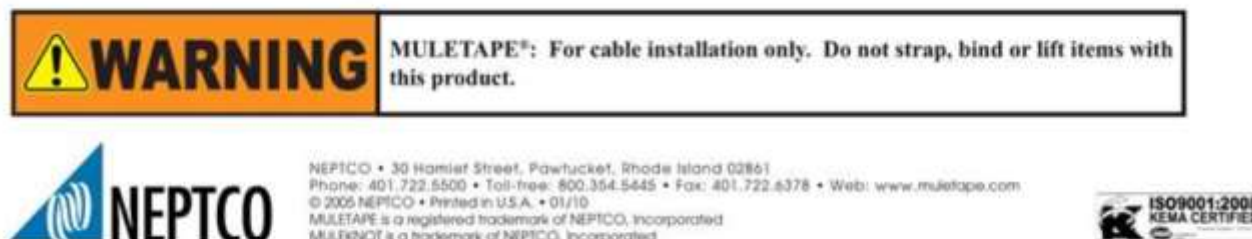
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APPENDIX 14, MULETAPE® RESTRICTION AND WARNING

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Do not use MULETAPE® during any helicopter operations at PG&E. This product is intended for underground cable installation only—not for rigging.

Manufacturer's Warning



Always use PG&E approved rigging, such as fiber or steel slings, when rigging loads hauled via helicopter.

PG&E References:

- SAFE-1016S "Rigging Safety Standard"
- TD-2327P-01 "Selecting and Caring for Ropes, Knots, Splices, and Slings"



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APPENDIX 15, ARS AIR REACH SEAT MANUAL

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1.0 GENERAL INFORMATION

1.1 INTRODUCTION-

Much more than just a Bosun's chair, the ARS Air Reach Seat sets new standards in lineman safety, comfort, and efficiency. Designed based on customer inputs, the Air Reach Seat was manufactured to meet the specific needs of lineman performing helicopter-based operations. With unparalleled positioning capabilities, the Air Reach Seat improves work performance by increasing comfort and safety and decreasing fatigue. The Air Reach Seat allows the lineman to work all day without the frustration of limited reach, restricted movement or lack of circulation from extended exposure in a harness.

Rated software gear loops and forged D-rings for flying tools and equipment. Easily integrates with ARS Traveller Hooks or Traveller Lanyard Set. Whether standing, leaning, or sitting, this innovative new platform reinvents how power utility helicopter operations are done – for both the lineman and the pilot.

1.2 AIR REACH SEAT FEATURES-

- Dual lanyard retention system
- ANSI Z359 Rated Fall Protection Lanyard
- Single or double seat configuration
- Fully adjustable, one-size-fits-all
- Improves work performance through decreased fatigue and increased safety and mobility
- Extra wide spreader bar system for dual seat option

1.3 AIR REACH SEAT OPERATIONAL USE-

- Human External Cargo (HEC) operations
- Power Utility

1.4 AIR REACH SEAT SPECIFICATIONS-

- Safe working load for the Air Reach Seat is **375 lbs** per chair (Lineman and equipment) and is based off of the system's 10:1 safety margin. It is not aircraft specific
- Minimum Rated Breaking Strength (MBS) 3750 lbs

1.5 CONSTRUCTION AND MATERIALS-

- **SEAT CONSTRUCTION**
 - One piece, "uni-body" construction for improved strength to weight ratio
 - All seat components are 316 Stainless Steel
 - TIG Welded
 - Industrial powder coat finish in "safety" orange for hi-visibility
 - All stainless steel fasteners
- **THREE POINT SPREADER BAR**
 - 6061 T-6 3/8" aircraft grade aluminum plate
 - TIG Welded
 - Destructive tested to 4000 lbs
 - Industrial powder coat finish in "safety" orange for hi-visibility
- **LOAD BEARING SOFTWARE COMPONENTS**
 - All rated structural stitching on 1-3/4" MIL Spec webbing
 - Forged rescue rated stainless steel hardware
 - ANSI Z359 rated fall protection lanyards
- **LARGE "TWO-SEAT" CONFIGURATION SPREADER BAR**
 - 6061 T-6 1/2" aircraft grade aluminum plate
 - Destructive Tested to 8000 lbs
 - Industrial powder coat finish in "safety" orange for hi-visibility
 - Forged rescue rated stainless steel hardware



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Appendix 15, ARS Air Reach Seat Manual

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2.0 INSTRUCTIONS / LIMITATIONS FOR AIRWORTHINESS

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS -

This product manual serves as the Instructions for Continued Airworthiness (ICAs) for the Air Reach Seat.

- This document lists user operating instructions, operational capability and equipment limitations for the Air Reach Seat.
- This document includes instructions on how and when to conduct inspections as well as product maintenance and storage procedures.
- As approved changes to any ICA's are implemented they will be disseminated to all users recorded in Air Rescue System's sales records.
- This manual does not contain any troubleshooting information. Any alterations or repairs to the Air Reach Seat not conducted by Air Rescue Systems may damage structural integrity, are prohibited, and void the product warranty.
- Contact ARS for trouble shooting or technical support questions.

AIRWORTHINESS LIMITATIONS -

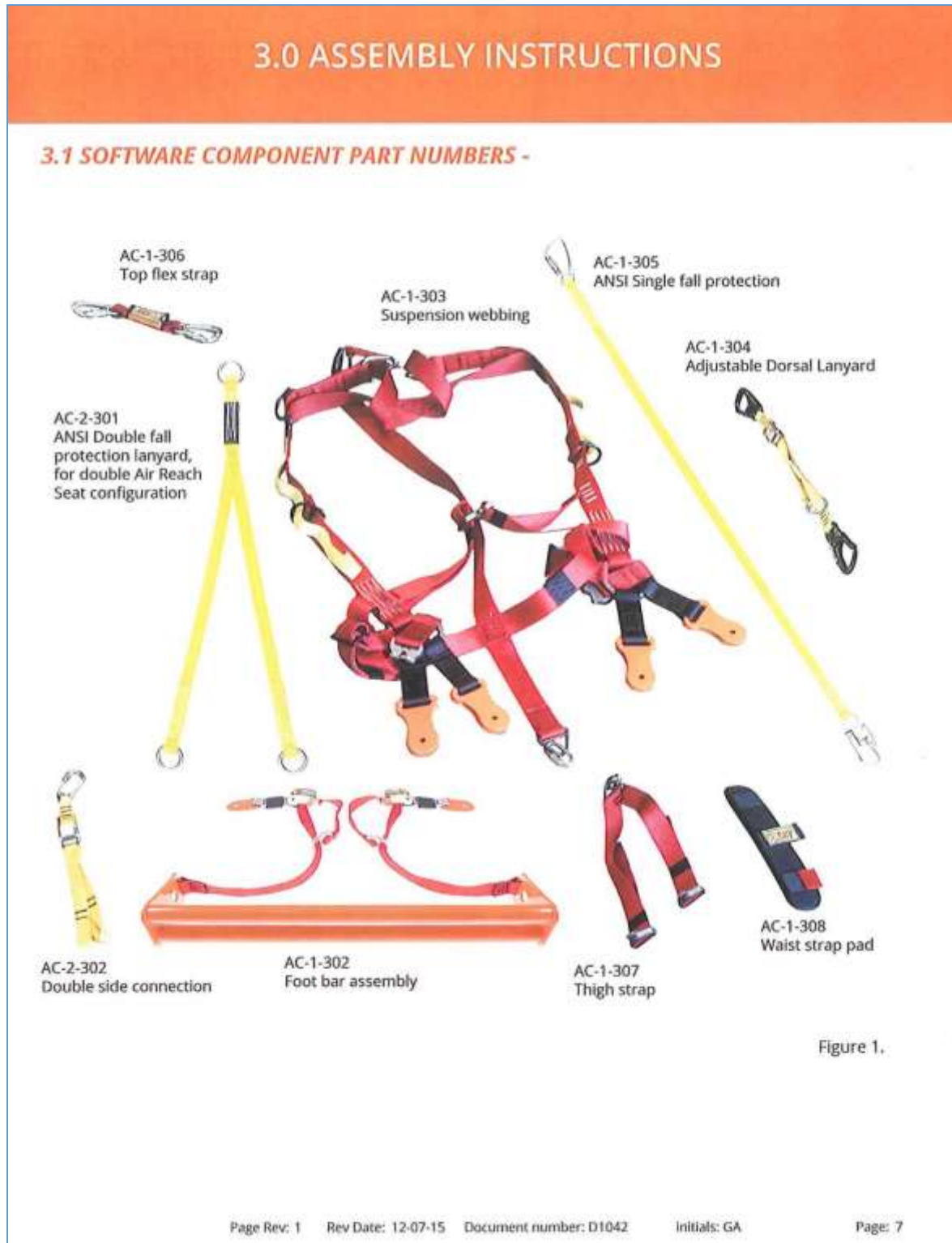
- A pre-flight safety check must be performed by the operator every time the device is used.
- A post-flight inspection must be performed every time the device is stowed.
- A routine inspection must be performed every time the device has been stored for a period of greater than 30 days.
- An in-depth quarterly inspection must be performed every three months and logged in the label packet secured to the back of suspension webbing.
- With routine inspections, a five-year life span is the maximum authorized use for all continuous use webbing products once put into service.
- A detailed data inspection sheet is provided for maintenance record keeping purposes in the back of this manual, Appendix II, page 16.



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3.2 HARDWARE COMPONENTS -



Figure 2.



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3.3 AIR REACH SEAT CONFIGURATIONS -

3.3.1 SINGLE SEAT CONFIGURATION AND ASSEMBLY -

Step 1) On the Air Reach Seat, weave the end of the yellow ANSI Z359.1 fall protection lanyard (AC-1-305) through the Tri-link located on the rear suspension webbing.

Step 2) Attach the ANSI Z359.1 fall protection lanyard (AC-1-305) carabiner into the Bull Ring of the Short Haul line.

Step 3) Attach Adjustable Dorsal Lanyard (AC-1-304) buckle up to the V-Ring, located on the rear suspension webbing. The other end of the Adjustable Dorsal Lanyard attaches to the dorsal ring of the harness.

Step 4) Inspect the Air Reach Seat system to ensure (refer to inspection instructions pg 12):

- All webbing is in good condition.
- All stitching is intact.
- All Screw-Links are closed and tightened (1/4 turn past hand-tight).
- All carabiners are closed, and
- All buckles are in good working order.

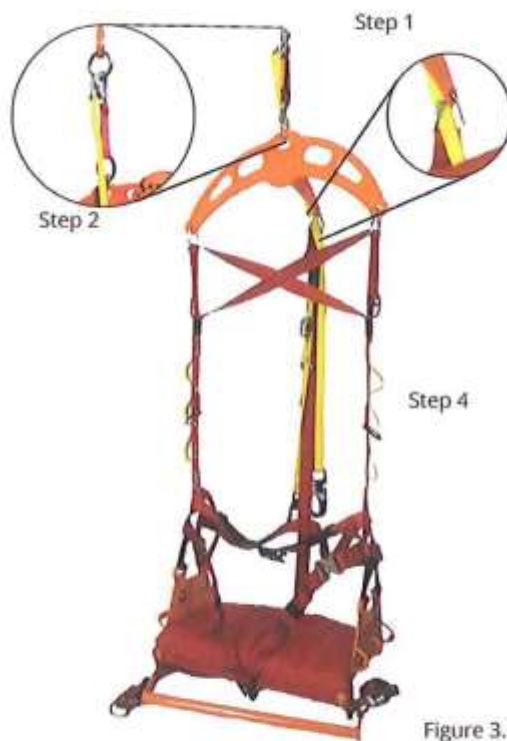


Figure 3.



Figure 4.



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3.3.2 DOUBLE SEAT CONFIGURATION AND ASSEMBLY -

Step 1) On the Air Reach Seat attach the Screw-Link end of the yellow ANSI Z359.1 single fall protection lanyard into the Screw-Link on the double yellow fall protection lanyard leg (AC-2-301) that is woven through the large orange double spreader bar.

Step 2) Once connected, attach the fall protection lanyard Screw-Link into the upper 2-Stage Captive Eye carabiner on the red main support spreader, at the top of the Air Reach Seat system. Ensuring the Screw-Link is resting on the spine of the carabiner, attach the carabiner into the hole at the bottom of the large orange double spreader bar as depicted.

Step 3) Repeat steps 1 and 2 for the second Air Reach Seat so they are both attached to the large orange double spreader bar as depicted.

Step 4) Attach one small adjustable yellow stabilizing strap via a girth hitch to the black D-Ring located on the vertical support webbing. Clip the opposing carabiner end of that same strap to the same D-Ring on the opposing Air Reach Seat.

Step 5) Attach the other small adjustable yellow stabilizing strap to the steel orange gear rack on the side of the seat pan via a girth hitch. Attach the carabiner end of the same strap into the same location on the other Air Reach Seat.

Step 6) Inspect the Air Reach Seat system to ensure (refer to inspection instructions pg 12):

- All webbing is in good condition.
- All stitching is intact.
- All Screw-Links are closed and tightened (1/4 turn past hand tight).
- All carabiners are closed, and
- All buckles are in good working order.

Step 7) Ensure the forged ring of the double yellow fall protection lanyard (AC-2-301) woven through the large orange double spreader bar is resting on the spine of the 72kN carabiner, and that the 72kN carabiner is correctly attached to the forged ring on the end of the of your Short Haul line for flight.



Both the yellow ANSI Z359.1 fall protection lanyard and the yellow adjustable work positioning lanyard hanging from the back of the chair, attach to the line-man's dorsal D-Ring on their certified class III full body harness. Each person must be wearing and properly fitted certified class III full body harness and correctly connected to the short haul line using only the ANSI rated lanyards provided. (The Air Reach Seat suspension webbing is NOT a certified fall protection).

Each user should be connected to the ANSI single fall protection lanyard (AC-1-305) using the waist D-ring on the certified class III full body harness. The Adjustable Dorsal Lanyard (AC-1-304) is only for user position control.



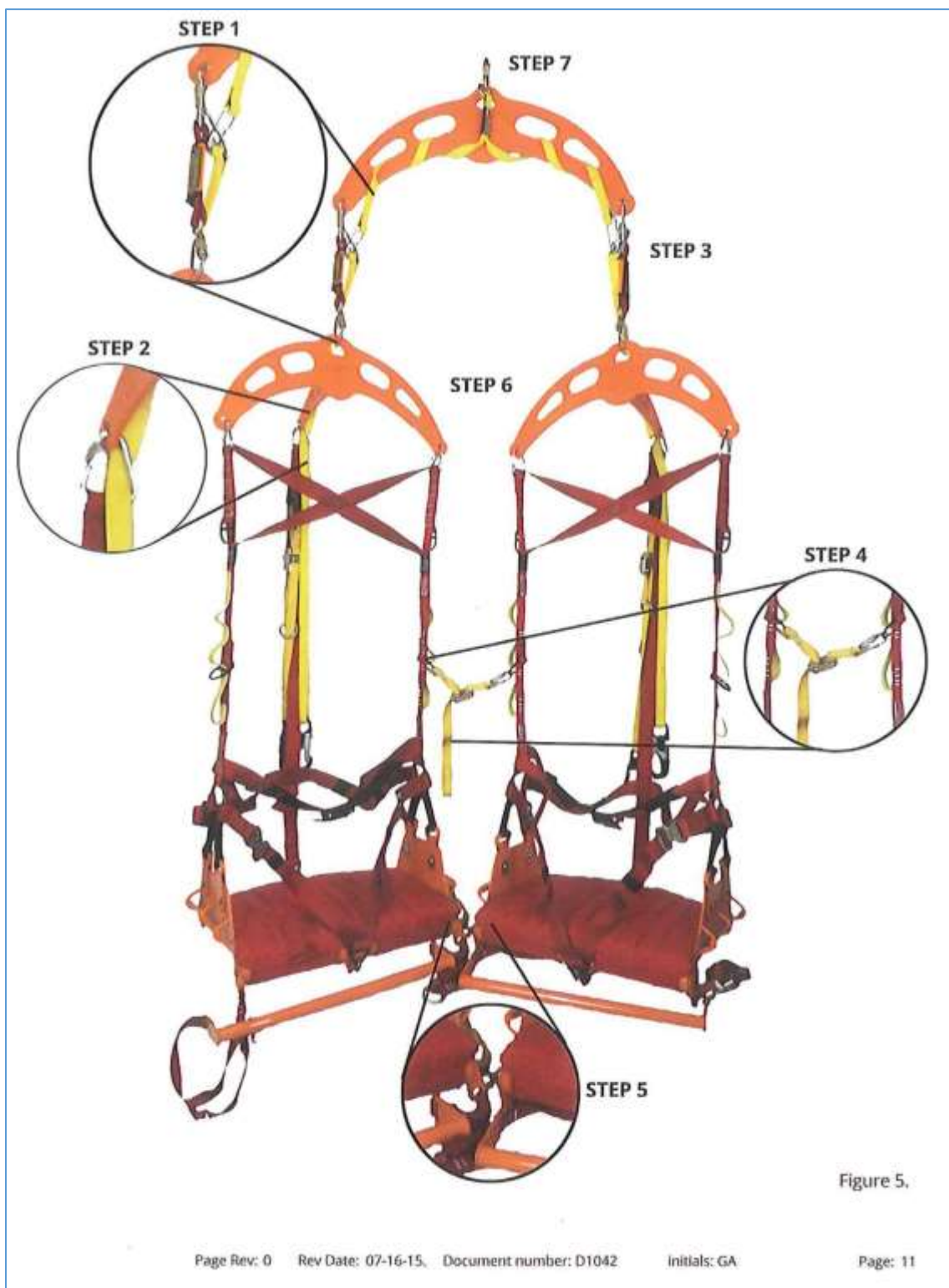
The Maximum capacity of an individual Air Reach Seat is 375 lbs to include both the operator and equipment. Using this system outside its maximum capacity can result in serious injury or death.



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3.4 INSPECTION, MAINTENANCE, AND STORAGE OF THE AIR REACH SEAT -

Maintenance and Inspection -

- Before and after each use, inspect the Air Reach Seat to ensure that it is in a serviceable condition.
- Check for worn or damaged parts.
- Ensure all hardware (D-Rings, buckles, etc.) are present.
- Inspect all hardware to ensure they do not have any sharp edges, burrs, cracks, or corrosion.
- Inspect webbing for wear, cuts, burns, frayed edges, or any other damage.
- Inspect all stitching for abrasion, discolouration, and wear to ensure integrity.
- Thoroughly inspect Air Reach Seat after any period of storage greater than 30 days.
- Check for proper functionality of all components.

Discontinue use of this Air Reach Seat system and remove from service if inspection reveals any doubt about the safety or serviceability.

Advanced Inspection -

- For advanced inspections contact: Air Rescue Systems at info@airrescuesystems.com
Phone: 541-488-0941 Fax: 1-800-944-4135

Cleaning Instructions -

- Discontinue use of product, and contact ARS, for advanced inspection if it has come into contact with any suspect chemical agents.
- Clean product with warm water in a mild detergent solution.
- Wipe off hardware with a clean dry cloth and hang product to air dry.
- Dry in ventilated, cool, and shaded area. Do not force dry with heat.



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4.0 OPERATIONAL INSTRUCTIONS

OPERATIONS SHOULD BE COMPLETED IN ACCORDANCE WITH AIRCRAFT MANUFACTURER'S ESTABLISHED PERFORMANCE GUIDELINES, AS WELL AS IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL GOVERNING AGENCIES, INCLUDING THE FEDERAL AVIATION ADMINISTRATION.

When first using the Air Reach Seat, it is best to have the operator seated on a platform or bed of a vehicle to start.

Once the operator is securely connected into the Air Reach Seat, and all attachment points and safety lanyards have been verified, the helicopter can be call in to connect with the Air Reach Seat.

It is important to use clear head and hand signals to effectively communicate to the helicopter pilot.

Be sure to keep all body parts clear of webbing and metal attachment points when lifting the Air Reach Seat into operational use via helicopter.



Figure 6.





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APPENDIX 16, SEGMENTED PATROL

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A “segment” is part of a circuit. A “segmented patrol” involves clearing the segment of significant hazards on a high reconnaissance, defining a start point and end point with no significant hazards in between. The end point is a “safe area” easily identified at patrol altitude before the next identified hazard on the circuit. As with any patrol, it requires SAFE-0256 training.

After reaching the end point (X), do a high reconnaissance to the next identified hazard and proceed with a segmented patrol from that hazard back to the end point X.

A “segmented patrol” is a method for mitigating patrol hazards within a specified area. The key element of the segmented patrol is once a hazard has been identified, patrol away from the hazard to an end point that is easy to identify while patrolling. There should be no significant hazards in between the start and end points.

The patrol crew will determine if a “segmented patrol” is the appropriate method; the best method may vary depending on the situation. As a best practice, PG&E patrols may use the “Line Segment Method” (or segmented patrol) when hazards:

- Are difficult to see at patrol altitude.
- Can be identified by high reconnaissance.
- Can be defined by two points, start and end. The start point is usually a hazard such as an overhead crossing, other utility lines not marked on PG&E maps, etc.
- Can patrol away from the hazard to a safe end point. The end point must be easy to identify at patrol altitude.
- No significant hazards between the start and end points.

END of Manual

