# HELICOPTER OPERATIONS 8344

(Revised September 2001)

## GENERAL 8344.1

(Revised September 2001)

TO BE WRITTEN

## HELICOPTER/HELITACK CREW CAPIBILITIES 8344.2

(Revised September 2001)

TO BE WRITTEN

## OPERATIONAL GUIDELINES FOR HELICOPTER SAFETY 8344.3

(Revised September 2001)

## SAFETY PROCEDURES 8344.3.1

(Revised September 2001)

**Safety Procedures For Working Around Helicopters**

All personnel will comply with any directions or instructions given by the pilot, crew person or other person assigned to the helicopter of its operation (helibases manager, helicopter coordinator etc.).

**Ground Safety**

- Personnel and vehicles will remain 100 feet away from operating helicopters, unless under the direction of helitack personnel or pilot.
- Do not face a landing or departing helicopter without eye protection.
- Smoking is prohibited within 50 feet of helicopters and fuel storage areas, including helitenders and other fueling vehicles.
- Remain clear of the helicopter's approach and departure path, and at no time stand beneath a hovering helicopter unless specifically authorized to do so in policy.
- Hearing and eye protection is required when working around operating helicopters.

**Approaching a Helicopter**

- Approach the helicopter only after a positive indication from the pilot or front seat captain, and remain in his full view.
- Never approach (or depart) a helicopter from ground that is higher than the aircraft, and never approach from the rear.
- Remove or secure headgear. If carrying a tool, do so with the length of the tool parallel to the ground.
- Obtain pilot's permission and instruction on the storage and security of cargo. Cargo loading will only be done by members of the flight crew.
- Assist the pilot in the completion of the passenger manifest, and leave one copy at the point of departure.

**Mission Briefing**

- Fully explain the intended mission to the pilot and secure his approval. Do not encourage a pilot to overextend himself or the aircraft.
- Inform pilot of known hazards in the mission area.
- Obtain a briefing from the pilot covering in-flight procedures, crash procedures and radio use, as required.

Note location of emergency equipment, i.e., fire extinguishers, first-PSD kits, emergency door releases, emergency locator transmitter, etc. should be included in this briefing.

**In-Flight Procedures**

- Prior to flight, fasten and adjust seatbelt and do not unfasten until instructed to do so by the pilot or a member of the flight crew.
- Secure doors; do not slam.
- Secure loose materials in lap.
- Remain clear of controls and do not engage the pilot in conversation unless required to do so.
- Remain alert for hazards and inform the pilot of their position.

- Keep arms and legs inside the helicopter and allow nothing to blow outside.

- Smoking is prohibited in all aircraft.

## OPERATIONAL PROCEDURES 8344.3.2

(Revised September 2001)

To Be Written

## INCIDENT HELIBASE & HELISPOT STANDARDS AND SAFETY AREAS 8344.4

(Revised September 2001)

The minimum area necessary for helicopter operations will include the safety circle and landing pad. The helibase should be flagged as necessary and utilize topographic barriers when available to control the movement of personnel and equipment. The incident helibase perimeter is not required for helispots unless the activity warrants, as determined by the helispot manager.

## HELICOPTER APPROACH AND DEPARTURE PATHS 8344.4.1

(Revised September 2001)

Preferably, the approach and departure paths should not be the same. Several approach and departure paths should be developed, if possible, to allow pilots to adjust to changing wind conditions.

The minimum width for approach and departure paths should be the same as the diameter of the corresponding safety circle. The width will increase by 10° on either side as you proceed away from the circle (20° total).

Curved approach and departure paths are permissible in order to avoid obstacles.

The path should have as a maximum, a 20 percent slope, measured from the edge of the safety circle and including the 20° spread for a distance of:

- Approach path - 150 feet (48 meters)

- Departure path - 300 feet (96 meters)

Areas suitable for landing the helicopter in the event of an emergency would be desirable along the paths. The path should generally be aligned with the prevailing wind when possible. Variables such as wind velocity, turbulence, updrafts, and downdrafts must be considered when selecting an approach or departure route. Having several paths available is a real advantage for pilots.

Approach and departure routes should avoid areas where people are concentrated, such as eating and rest areas. Under no circumstances shall helicopters carrying external loads overfly these areas.

## SAFETY EQUIPMENT MINIMUM REQUIREMENT CHECKLIST 8344.4.2

(Revised September 2001)

Minimum required safety equipment checklist is located in the exhibit Helibase Safety Equipment Minimum Requirement Checklist.

## DUST ABATEMENT 8344.4.3

(Revised September 2001)

Dust abatement procedures will be followed as necessary at all helispots and helibases to mitigate the hazards that are present.

## MINIMUM STAFFING REQUIREMENTS 8344.4.4

(Revised September 2001)

Safety can best be maintained if helicopter operations at helibases and helispots are managed by trained personnel. Minimum staffing requirements are outlined in the exhibit Minimum Helibase/Helispot Staffing Requirements.

## INCIDENT OPERATIONS 8344.5

(Revised September 2001)

## GENERAL 8344.5.1

(Revised September 2001)

TO BE WRITTEN

## WATER DROPPING OPERATIONS 8344.5.2

(No. 8 May 2003)

Water Sources - Pilots will determine the suitability of dip or snorkel sites. Consideration will be given for proximity to fire, rotor clearance, quantity and quality of water source. Water sources are often located in close proximity to people, structures or livestock. The number one priority is a safe operation with minimum impact on the dip site.

Use of Contaminated Water: In extreme emergencies contaminated water (including effluent from sewage treatment facilities) may be the only water source immediately available. Contaminated water should only be used when there is an immediate threat to life or property that can be only mitigated by short-term use of water from these sources.

Although CDF routinely uses livestock ponds and rock quarry ponds as water sources, caution should be taken as they have the potential to be contaminated. Pilots who are unsure of the quality of the water source should land and investigate, or ask ground personnel to make an assessment of the water quality prior to use.

The following procedure will be followed when using contaminated water:

- Attempt to notify the ATGS and Incident Commander.
- Notify ground personnel to clear the drop area.
- Verify that there are no personnel in the area of the drop.
- If contaminated water is dropped on ground personnel, advise the ATGS and/or Incident Commander and recommend that they be decontaminated as soon as possible.
- Upon return to base, file an FC-119 and an exposure report.
- After the threat to life or property has passed pilots will discontinue the use of the contaminated or wastewater.
- Personnel assigned to work in areas that have been dropped on with contaminated water will be notified of potential health risks.

## FIXED TANK OPERATIONS 8344.5.2.1

(Revised September 2001)

CDF helicopters may dispense water with or without foam or retardant solution by utilizing a fixed tank attached to the underside of the helicopter. The tank may be filled from a ground-based water source such as a hydrant or water tender vehicle or by using the snorkel/pump system.

A major advantage to a fixed tank system is that it does not fall under FAR 133, flight over populated areas. It does not present a hazard due to inadvertent release. A helicopter with a fixed tank has more maneuverability and is able to split drops from a single load. The snorkel is capable of drawing water from a source as little as 18 inches deep. Disadvantages include somewhat slower fill time than a bucket and 400 pounds of added tank weight. The tank release doors are vulnerable to damage from landing on rocks or stumps.

## BUCKET OPERATIONS 8344.5.2.2

(Revised September 2001)

CDF helicopters may dispense water with foam injection from buckets. A collapsible bucket is normally transported internally until deployed. The bucket is attached to the cargo hook so that it is suspended directly beneath the helicopter. The pilot flies to a suitable water source, then maneuvers the helicopter in a manner which allows the bucket to fill with water then flies away with it. The capacity of the bucket can be limited by use of a cinch strap to accommodate helicopter performance or other weight considerations.

The bucket is an underslung load that demands the same safety considerations as other sling loads with the added element of having the ability to release its contents (water). Pilots shall attempt to avoid flying over or near any person, vehicle or structure in such a way that an inadvertent release of the bucket or water could be a threat. The advantages of a bucket include speed of operation, lightweight, and it is a mechanically simple operation.

The helicopter cargo hook shall be armed during bucket operations. For all bucket operations an emergency release check must be performed with a manual lever and electrical release check.

## HELITORCH OPERATIONS 8344.5.3

(Revised September 2001)

## GENERAL 8344.5.3.1

(Revised September 2001)

TO BE WRITTEN

## HELITORCH PLANNING AND COORDINATION 8344.5.3.2

(Revised September 2001)

The helitorch is a safe, efficient tool for use in wildland fire situations and prescribed burns. The decision to use the helitorch necessitates additional planning to provide personnel and support equipment to operate this specialized tool. The initial planning must be coordinated between the Incident Commander, helibase manager, the appropriate incident staff, and the pilot.

For helitorch operations, the following procedures should be considered:

Helitorch operations should be treated separately from other helicopter support operations.

Locate the mixing operation and helitorch activities away from the base helibase/helispot, if possible. This area must be large enough to provide a safety margin for mixing, loading and air traffic.

The Incident Commander, or Firing Group Supervisor is responsible for directing overall helitorch operations and will coordinate closely with the helibase manager.

Refer to the exhibit Helitorch Training Requirements.

## HELITORCH PROCEDURES 8344.5.3.2.1

(Revised September 2001)

**Safety**

It is critical to the safety of the crews and the success of the helitorch program that we recognize the risk as well as be prepared to follow the appropriate plan of action to minimize the consequences of any mistake.

**THE RISK**: Handling large quantities of raw gasoline in close proximity to ignition sources. A helicopter with external load, ground crews and equipment, all often working in confined areas.

We will not be able to eliminate the risk, but if we keep to the plan and remain alert, we may greatly reduce the damage of any mistake by adhering to the rules of this handbook.

The following situations are potentially the most hazardous:

- Ignition of raw gasoline from static spark.
- Spillage of raw gasoline or gelled fuel on helibase personnel or over the helibase landing area and ground equipment and its potential ignition sources.
- Spillage of flaming gelled fuel on ground personnel or equipment on or near the fire line.
- Helicopter with hang fire on torch departing the burn area.
- External load in confined area.

**Safety requirements:**

- Qualified Incident Commander assigned and kept informed.
- Helitorch base meets standards
- Crew assignments made and crewmembers informed.
- Organizational chart posted.

- Communication frequencies assigned and posted.
- Helitorch base fire protection requirements met.
- Crash/rescue plan posted and appropriate personnel informed.
- Pilots, crew, and helitorch manager consulted and briefed.
- Separation of aircraft at helibase( if more than one used ).
- Personal protective equipment on hand and utilized by crewmembers.
- Cotton or static resistant Nomex III overalls are to be worn by the mixing crew and all other personnel within 25 feet of the designated mixing area.
- No wildland Nomex or nylon will be worn under overalls.
- Ensure bonding and grounding of tanks and barrels during transfer of raw gasoline.
- Water bucket and known water source available in the event of escaped fire.

**Safety checklist:**

The Incident Commander and the Helitorch Manager will sign a copy of the FC-76.

## IN-FLIGHT EMERGENCIES 8344.5.3.2.2

(Revised September 2001)

- If a chip light occurs the pilot should land the aircraft as soon as is practical. Notification of helibase should be made.
- If there is a hydraulic failure or loss of tail rotor authority the torch should be jettisoned, ideally over the burn area. Notification should be made to helibase with the problem and landing requirements.
- If engine failure occurs, jettison torch, execute appropriate emergency procedures and make emergency notification if time permits.

## CRASH RESCUE 8344.5.3.2.3

(Revised September 2001)

**Crash/rescue plan:**

- Post at helitorch base.
- List location, route to, and communication frequencies to nearest medical facility.
- Identify medivac aircraft, medical personnel, and ambulances available.
- Rescue procedures:
- Wait until all parts have come to rest.
- Use equipment on helitender and/or fire protection engine.
- Shut off main fuel valve (switch on console).
- Shut off battery switch (switch overhead).
- Stabilize helicopter if necessary.
- Utilize AFFF and dry chemical extinguishers if fire occurs.

**Notification:**

Notify the Incident Commander and ECC, giving a brief description of incident, i.e., location, fire involvement, medical assistance needed.

## PERSONNEL AND ORGANIZATION 8344.5.3.2.4

(Revised September 2001)

**Minimum Positions**

The following positions are minimums for helitorch operations. One person can assume more than one position concurrently.

| | |
|---|---|
| Helitorch Manager | 1 |
| Firing Group Supervisor | 1 |
| Pilot | 1 |
| Parking tender | 1 |
| Mixmaster | 1 |
| Mix crew | 2 |
| Helibase fire protection (Type 3 engine or better) | 1 |
| Radio operator | 1 |
| Helitender operator | 1 |

## HELITORCH BASE PERSONNEL DUTIES 8344.5.3.2.5

(Revised September 2001)

### Helitorch Manager

During helitorch operations the Helitorch Manager is responsible to the Incident Commander. Coordination must be established between the Helitorch Manager and I.C. during operations. The Helitorch Manager must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Develops helibase organization.

2. Conducts briefings and assigns helibase personnel.

3. Procures all necessary equipment and assures all is on site.

4. Coordinates communication plan with ECC. Obtains discrete radio frequency to be used between helicopter pilot, I.C., and helitorch base.

5. Determines backup frequency.

6. Establishes helitorch base operating area.

7. Briefs and provides technical advice to the I.C..

8. Completes FC-76 operations checklist.

### Firing Group Supervisor (FGS)

The FGS is responsible to the I.C. for the firing patterns of the helitorch. On most burning operations, the FGS or designee can supervise personnel and burning operations from the ground. However, on more complex burns it may become necessary for the FGS to direct the firing from the air. When flying is necessary, the FGS shall fly in the LEFT FRONT SEAT ONLY. During helitorch operations the pilot and the FGS, or designee, are the only individuals permitted to fly in the helicopter. The FGS must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Will coordinate with I.C. on burn plan.

2. Will handle radio communications with the I.C..

**Pilot**

The pilot is responsible to the Helitorch Manager while operating in and around the helitorch base. During flight, while on burning operation, the pilot is responsible to the I.C., or the FGS if the position is utilized.

1. Pilot will maintain proficiency and be current in external loads, helitorch operations, and terrain flight.

2. The pilot must have one fire season flying as a CDF forestry pilot prior to being qualified in helitorch operations.

3. A pilot in training for helitorch operations may replace the FGS in the left front seat when appropriate.

4. The pilot-in-command is responsible for the safe operation of the aircraft and has final authority to determine whether a particular mission can be safely flown.

**Parking Tender**

The Parking Tender is responsible to the Helitorch Manager. This position can participate in handling the helitorch once the helicopter is on the ground. The Parking Tender must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Primary function is to direct takeoffs and landings. They will perform other duties as directed by Helitorch Manager.

2. Wears proper personal protective equipment, hard hat with chin strap, goggles, and hearing protection, as well as a high visibility orange vest to be discernible from other helibase personnel.

3. May have radio to monitor traffic and inform pilot of problems associated with the torch and rigging.

**Mixmaster**

The Mixmaster is responsible to the Helitorch Manager. The Mixmaster must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Plans the helitorch base mixing operations with the Helitorch Manager.

2. Determines size of job as it pertains to how much fuel, gelling agent, and other support equipment will be required and time frames between batch mixes.

3. Supervises assigned helpers.

4. Assures coordination exists between all personnel prior to actual operations.

5. Outfitted in cotton or anti-static Nomex III coveralls, rubber gloves, helmet, goggles, and approved respirator.

6. Maintains record of gasoline and gelling agent used.

**Mix Crew**

Mix crew personnel are responsible to the mixmaster. Mix crew must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Outfitted in cotton or anti static Nomex III coveralls, rubber gloves, helmet, goggles, and approved respirator.

2. Secure equipment requested by mixmaster.

3. Assure helitorch and related equipment are clean and in serviceable condition. Report any discrepancies to the mixmaster.

**Helibase Fire Protection**

The crash protection personnel are responsible to the Helitorch Manager. They must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Outfitted in full turnout gear with SCBA.

2. Minimum of one line, 1 ½” or better, charged and staffed during mixing operations and during helicopter takeoffs and landings.

**Radio Operator**

The Radio Operator is responsible to the Helibase Manager. Must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Will be positioned at the helitorch base.

2. Will initiate communications with I.C..

3. Will maintain communication with the pilot(s) to ensure traffic control.

4. Maintain a log of aircraft operations.

**Helitender Operator**

The Helitender Operator is responsible to the Helitorch Manager. Must receive training as outlined in the exhibit Helitorch Training Requirements.

1. Ensure proper equipment is on the helitender and torch trailer for torch operations.

2. Maintain an adequate aviation fuel supply and dispense that fuel to the helicopter.

3. Perform other duties as required by the Helitorch Manager.

4. Wear proper PPE.

## COMMUNICATIONS 8344.5.3.2.6

(Revised September 2001)

Radio communications will use a minimum of two frequencies depending on the complexity of the organization and layout of the project area. These channels will be utilized by the following units during the operation:

**HELICOPTER FIRING OPERATIONS CHANNELS**

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Frequency One (CDF discrete net) | Frequency Two (Aircraft VHF) | Emergency Freq. (CDF A/G, Guard 2) | Ground Unit Nets |
| Helicopter | Helicopter | Helicopter | Tactical |
| Incident Commander | Helitorch base | Incident Commander | Command |
| Helitorch Base | | Emergency Command Center | |

During burning operations, Frequency One MUST remain a discrete frequency. Frequencies will be assigned and radios checked before commencing burning operations.

Communications plan will be posted.

## BASE OPERATIONS 8344.5.3.2.7

(Revised September 2001)

The helitorch base must meet the requirements set forth for helibase standards in Section 8344.4. In addition the Helitorch Manager shall:

1. Establish a safety zone 200’ x 200’, which is the minimum area necessary for helitorch operations. The safety zone is an area cleared of obstructions for takeoff and landing and providing an operating area for assigned helitorch personnel and equipment.

2. Separate helitorch helicopters at least 100’ from other helicopters operating from helibase.

3. Assure the mixing area shall be a minimum of 50’ from the helicopter landing and parking areas. No open mixing will occur during takeoffs, landings or while the helicopter is running on the pad.

4. Predetermine a flight pattern at the helitorch base.

5. During helicopter operations, instruct the pilot to contact the radio operator before takeoff and landing to insure traffic control. It is the pilot’s ultimate responsibility to maintain aircraft separation.

## TRANSPORTATION, STORAGE OF GAS AND GELLING AGENTS 8344.5.3.2.8

(Revised September 2001)

1. The transportation of bulk gasoline will be in accordance with Department of Transportation regulations.

2. Shipping documents showing type and amount of gasoline carried will be within reach of the driver.

3. One B.C. type fire extinguisher will be carried.

4. All containers will be blocked and chained.

5. All containers will be labeled “FLAMMABLE”.

6. The vehicle will be appropriately placarded on all four sides.

7. Use private fuel vender when possible.

8. Gelling agent should be stored and transported in waterproof containers.

**Minimum Equipment Required**

| | |
|---|---|
| Helicopter | Vest – High visibility |
| Helitorch | Coveralls, cotton or anti-static Nomex |
| Mix equipment | Rubber gloves |
| Helitender w/jet fuel | Approved respirators (3) |
| Water bucket | Radios: VHF, UHF |
| Engine company | Windsock |
| AFFF – 10 gallons | Wildland PPE |
| Bulk fuel | Non sparking paddle |
| Gelling agent | Torch repair tools and parts |
| Dry chemical extinguishers 20# (2) | Grounding rods and cables |

# HELITORCH PREUSE CHECKLIST 8344.5.3.2.9

(Revised September 2001)

- ❑ Helitorch tanks.
- ❑ All welds OK.
- ❑ Handles secure.
- ❑ Latch and cover – good condition.
- ❑ Valves clean
- ❑ Frame – no cracks
- ❑ Motor and electrical housing
- ❑ Wiring – condition
- ❑ Motor – condition
- ❑ Pump – lubed/condition
- ❑ Screws, pins, bolts, secure
- ❑ Plumbing – clean, secure
- ❑ Ignitors – good condition
- ❑ Cover and latches secure
- ❑ Drive belt – good condition
- ❑ Air, electrical and lead lines
- ❑ Swedges secure
- ❑ Clevises secure and safetied
- ❑ All free of cuts or burns
- ❑ Plugs and connectors – condition
- ❑ Mix equipment
- ❑ Mix torch – clean, condition
- ❑ Pump – condition, fueled
- ❑ Hoses, fittings – condition
- ❑ Valves – clean, operable

## MIXING OPERATIONS 8344.5.3.2.10

(Revised September 2001)

### Fuel Transfer

The transfer of bulk gasoline into helitorch units will be conducted in the following manner:

1. Ground the fuel source and torch unit. Bond the nozzle to the helitorch.

2. Never use a plastic bucket or container that cannot be properly grounded and bonded.

3. Commit a minimum of personnel to the operation.

4. Staff the fire protection lines.

### Mixing of gelled gasoline

Correct mixing is essential. A poor gel-gas mix will have a serious impact on the success of the burn operation and can damage helitorch equipment.

1. The colder the gasoline the longer it will take for gelling to occur.

2. Any moisture in containers, fuel, or powder will cause gelling procedure to fail.

3. It is desirable to mix loads at least 20 minutes prior to burn time to ensure they gel.

4. When mixing, personnel will wear approved respirators and anti-static coveralls.

5. Mix gelling agent per manufacturer's recommendations.

6. Add gelling agent slowly, straining to avoid lumps.

7. Powder added after gasoline begins to thicken will not dissolve and may clog plumbing.

8. The gasoline will have a waxy appearance as it starts to gel. A properly mixed batch will "fold in" when the paddle is inserted onto the mix with little residue on the paddle when removed.

**Transfer of gelled gasoline**

The transfer of the gelled mix from the mix torch to the fly torch is for the most part a closed operation. This operation is critical to the safety of the aircraft and personnel.

1. Ground fly torch

2. Connect vent hose to vent port on fly torch. Ensure hose is fully extended downhill and downwind.

3. Slow mix pump to an idle.

4. Close dry break valve on mix tank inlet.

5. Remove hose and valve and connect them to inlet on fly torch.

6. Open dry break valve and throttle up mix pump.

7. When transfer is complete shut off pump.

8. Disconnect vent hose and cap port.

9. Close dry break valve and remove hose and valve from torch. Cap dry break inlet.

10. Safety all caps on fly torch.

**Load Calculations and Cargo Hook checks**

1. Confirm that load calculations are correct. Adhere to applicable aviation safety standards and appropriate aircraft flight manuals in preparing the helicopter for use in external load operations. Assure that adequate power is available for the operation.

2. Prior to external load operation, arm the cargo hook. Check electrical and manual cargo release to assure operation.

## HELITORCH OPERATION 8344.5.3.2.11

(Revised September 2001)

### Hook-Up and System Checks

1. To hook up the 200 gallon helitorch to the helicopter it must be placed in front of the aircraft with the tip to the pilot's side. The spreader bar is placed under the aircraft with one end attached to the cargo hook and the shoe placed on the skid adjacent to the ground handling lug.

2. The shoe should be taped to the skid prior to the first flight, with the aircraft in a low hover.

3. All windows and doors shall be closed and pilots visor down to provide maximum protection from flash fire.

### System Checklist

- Helitorch connected to aircraft
- Switches on helitorch are off.
- Aircraft RPM brought to 80%.
- Electrical switch on helitorch ON – check for spark
- Electrical switch OFF.
- Pump switch on helitorch ON, metal bucket under tip to catch gel - check pump.
- Pump switch OFF.
- Pilot activates bleed air – check air line with finger for pressure.
- All switches placed in ON position.

### Takeoff To A Hover

1. Parking tender provides guidance to pilot in hovering over and in centering the helitorch.

2. Mixmaster manages the torch during takeoff and landing. Mixmaster may need to make adjustments to cables and wiring during liftoff.

3. Mixmaster should move out from under the aircraft as soon as they are confident that the rigging will not foul. They should move to the position of the Parking Tender.

**In Flight Procedures**

1. The pilot or FGS, as designated, will monitor communication frequencies and respond as necessary.

2. Will notify the I.C. when the aircraft enters or leaves the burn area.

3. Pilot will complete pre-landing checklist prior to commencing burning and visually inspect cables and lines for proper position.

4. Drop heights and airspeed affects gel dispersal and burn time.

5. Prior to leaving the burn area the pilot should get confirmation that there is not “hang fire” on the torch tip.

**Landing Procedures**

1. Parking tender directs helicopter to intended landing spot and signals to hold hover once the torch touches the ground.

2. Mixmaster moves to helitorch, straightens it and assures that cables will not foul or lay under skids.

3. Parking tender directs pilot to land helicopter.

4. Mixmaster turns all switches on helitorch OFF.

## HELITORCH TROUBLESHOOTING 8344.5.3.2.12

(Revised September 2001)

- No fuel when pilot activates switch.
- Wiring harness to aircraft not properly connected.
- Pump switch off.
- Circuit breaker open.
- One way valve on tip not opening.
- Fuel valve off.
- Obstruction in pump.

- Pump not primed.
- Leads reversed to pump. Running in wrong direction.
- Fuel too thick.
- Lumps in suction line
- Fuel, but no ignition.
- Wiring harness to helicopter not properly connected.
- Igniter switch off.
- Wiring loose or damaged.
- Igniter not properly gapped.
- Igniter dirty.
- Coil or exciter bad.
- Airspeed too high.
- No air pressure at tip.
- Bleed air not working properly.
- Restriction in air line.
- Discharge plugged at tip.

## MAINTENANCE AND STORAGE 8344.5.3.2.13

(Revised September 2001)

To keep helitorches operating properly and to minimize cleanup mess the following procedures should be followed.

1. Flush the empty helitorch with jet fuel at the conclusion of the burn.
2. Pump the cleanup waste onto the burn from the torch.
3. Clean tips, dry break valves and other fittings.

4. Inspect torch unit for any damage or wear.

5. Inspect cables, hoses and electrical lines.

6. Inspect pump, drive belt and ignition components.

7. Store helitorches in a dry location.

## PLASTIC SPHERICAL DISPENSER (PSD) 8344.5.3.3

(Revised September 2001)

The PSD used by CDF is an effective tool for prescribed burning and as a firing tool on large fires. Its advantages are minimum logistical support, mobility, rapid mobilization and relatively low cost when compared to the helitorch. It must be remembered however, that it does require a fine fuel bed to effect ignition.

The PSD system consists of the dispenser, a supply of aerial ignition devices, a supply of automotive antifreeze (ethylene glycol), and water. The dispenser is a 24 volt mechanism weighing approximately 98 pounds. The aerial ignition device is a 1.25 inch polystyrene ball filled with 3 grams of potassium permanganate.

The potassium permanganate reacts with the ethylene glycol to produce ignition. The department uses “grade C” balls which produce ignition in 30 – 45 seconds using a 100% glycol solution.

**Safety**

The I.C. is responsible for directing overall aerial ignition device operation and will promote safety. Personnel involved in the operation are responsible for safety within the scope of their duties.

## INFLIGHT EMERGENCIES 8344.5.3.3.1

(Revised September 2001)

1. PSD dispenser must be able to be quickly jettisoned in the event of a flight emergency.

2. PSD dispenser must be able to be quickly jettisoned if fire occurs in it that cannot be extinguished.

## CRASH /RESCUE 8344.5.3.3.2

(Revised September 2001)

1. Post crash/rescue plan a helibase.

2. Brief all personnel on crash/rescue plan.

3. Provide one Type 3 or better fire engine with AFFF capability.

## HANDLING CHEMICALS 8344.5.3.3.3

(Revised September 2001)

1. PSD balls should be handled carefully to avoid breakage and release of potassium permanganate.

2. PSD balls must be stored away from glycol.

3. Personnel handling potassium permanganate during cleaning of the dispenser should wear rubber gloves and approved respirator.

4. Potassium permanganate is a strong oxidizer and should be stored in a cool, dry place away from other chemicals.

## PERSONNEL AND ORGANIZATION 8344.5.3.3.4

(Revised September 2001)

TO BE WRITTEN

## MINIMUM POSITIONS 8344.5.3.3.5

(Revised September 2001)

The following positions are minimums for PSD system operations. One person can assume more than one position concurrently.

Helibase Manager
Firing Group Supervisor
Pilot
PSD System Operator
Assistant PSD Operator

## AERIAL IGNITION PERSONNEL DUTIES 8344.5.3.3.6

(Revised September 2001)

**Helibase Manager**

The Helibase Manager is responsible to the Incident Commander. Must coordinate helibase operations with I.C. during PSD operations.

**Firing Group Supervisor**

The FGS is responsible to the I.C. and is responsible for the lighters and firing patterns. The FGS can supervise most burn operations from the ground, however, on complex burns they may have to direct firing patterns from the air.

**Pilot**

The pilot is responsible to the Helibase Manager when operating in or around the helibase. They are responsible to the I.C. or FGS when flying aerial ignition missions. The pilot is responsible for the safe operation of the aircraft and has ultimate authority to determine if the mission is safe to fly. The pilot must be familiar with the operation of the PSD system and with its application in the fire environment.

**Plastic Spherical Dispenser Operator**

The PSD Operator is directly responsible to the pilot. The operator's function is to safely operate the dispenser and maintain communications with the pilot.

1. Must be familiar with PSD operation and maintenance.

2. Perform pre-flight and installation procedures.

3. Be familiar with common malfunctions and corrective actions.

**Assistant PSD Operator**

The Assistant PSD Operator is responsible to the PSD Operator. Their duty is to assist the PSD Operator as needed.

1. Must be familiar with PSD operation and maintenance.

2. Perform pre-flight and installation procedures.

## COMMUNICATIONS 8344.5.3.3.7

(Revised September 2001)

Radio communications will use a minimum of two frequencies depending on the complexity of the organization and layout of the project area. These channels will be utilized by the following units during the operation:

HELICOPTER FIRING OPERATIONS CHANNELS

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Frequency One (CDF discrete net) | Frequency Two (Aircraft VHF) | Emergency Freq. (CDF A/G,Guard 2) | Ground Unit Nets |
| Helicopter | Helicopter | Helicopter | Tactical |
| Incident Commander | Helitorch base | Incident Commander | Command |
| Helitorch Base | | Emergency Command Center | |

During burning operations, Frequency One MUST remain a discrete frequency. Frequencies will be assigned and radios checked before commencing burning operations.

Communications plan will be posted

## PLASTIC SPHERICAL DISPENSER SYSTEM OPERATIONS 8344.5.3.3.8

(Revised September 2001)

1. Secure PSD in aircraft in a manner that will hold it securely yet allow it to be readily jettisoned if need arises.

2. Secure PSD boxes within easy reach of Operator or Assistant.

3. Connect electrical plug to outlet located in ceiling at front of transmission bulkhead.

4. Circuit breaker is marked either “Blanket Warmer” or “PSD ” or both.

5. Perform pre-flight check on PSD as per Premo Operational Manual.

6. In-flight operation:

7. When aircraft is within burn perimeter pilot will advise “Circuit breakers in”.

8. Pilot will advise PSD Operator when they are on final for a burn run.

9. Operator will, with the chutes closed, turn on the glycol pump and the motor.

10. Pilot will advise when to commence firing.

11. Operator will open the appropriate number of chutes and advise the pilot “Chutes open, commencing firing”.

12. When pilot advises to stop firing, the Operator will close the chutes and state, ”Chutes closed”.

13. Operator will then lift hopper to assure that all balls have cleared the slippers. If the slippers are clear the Operator will replace the hopper, turn the switches off and state, “Slippers clear, switches off”.

14. If aircraft is leaving the burn area the pilot will pull breaker and reply “Breaker pulled”.

## TROUBLESHOOTING 8344.5.3.3.9

(Revised September 2001)

Refer to the comprehensive troubleshooting guide in the Premo Operations Manual.

## MAINTENANCE AND STORAGE 8344.5.3.3.10

(Revised September 2001)

1. Clean dispenser with water.

2. Dry completely prior to storage.

3. Lubricate with “Triflon” or “Never-Seize”. Avoid WD 40 because it causes dirt and gum buildup.

4. Completely flush glycol system before storage .

5. Store with glycol and water tanks empty.

Refer to the exhibit Plastic Spherical Dispenser (PSD) System Training.

## 25MM FLARE GUN (VERY PISTOL) PROCEDURES 8344.5.3.4

(No. 19 July 2005)

The 25mm flare gun used by CDF is an effective tool for small, large, or isolated sections of fireline. Many times ground resources cannot be brought in quickly enough because of accessibility problems due to terrain features. The advantages of the hand-held flare gun are its rapid mobilization, pinpoint accuracy, and relatively low cost when compared to the helitorch. It must be remembered however, that it does require fine fuels to effect ignition.

## FIRING GROUP SUPERVISOR (FGS) 8344.5.3.4.1

(No. 19 July 2005)

The FGS is responsible to the Incident Commander for the firing patterns of the pistol. It is recommended that the FGS have completed I-234 Firing Operations and must be familiar with the use and operation of the pistol.

1. The FGS will ride forward facing in the passenger area of the helicopter with the appropriate cargo door opened and pinned. Aircraft speed restrictions will be observed during flight.

2. The FGS will insure that the flare pistol is pointed out and down, and away from the helicopter anytime during loading, while the pistol is loaded, or during shooting.

3. The FGS will utilize the appropriate verbal commands. The FGS will announce “firing” via the intercom prior to dispersal of each individual round so as not to startle the pilot. Will announce “ceasefire” when the operation is over or moving to a new area.

4. The FGS will coordinate forward airspeed and altitude with pilot. It is important for the aircraft to maintain appropriate altitude to allow the downward firing of rounds and to avoid any rounds going through the rotor disk.

## FIRING ASSISTANT (FA) 8344.5.3.4.2

(No. 19 July 2005)

The FA is responsible to the FGS. No formal training for this position is required, as an in-depth briefing will suffice. It is recommended that the FA ride aft facing, opposite the FGS and have two plastic containers with handles which can be seat belted in next to the FA. One container will hold live rounds and the other will hold spent rounds.

1. The FA will hand live rounds to FGS and will retrieve spent rounds from FGS, placing them in the spent container.

2. The FA will in the event of an emergency jettison live rounds over-board at the direction of the FGS or pilot.

## PILOT 8344.5.3.4.3

(No. 19 July 2005)

The pilot is responsible to the FGS.

1. The pilot coordinate forward airspeed and altitude the FGS.

2. The pilot-in-command is responsible for the safe operation of the aircraft and has final authority to determine whether a particular mission can be safely flown.

## FRONT SEAT CAPTAIN (FSC) 8344.5.3.4.4

(No. 19 July 2005)

The FSC can be utilized to handle radio traffic between the aircraft and the ground. The FSC will also observe the overall safety of the operation.

## STORAGE AND TRANSPORTATION 8344.5.3.4.5

(No. 19 July 2005)

Flare pistol rounds should be stored in their original shipping containers and in a compartment on the helitender free of other hazardous materials. The factory containers have the appropriate placarding.

Refer to the exhibit Plastic Spherical Dispenser (PSD) System Training.

## SUPPORT OPERATIONS 8344.5.4

(Revised September 2001)

## GENERAL 8344.5.4.1

(Revised September 2001)

TO BE WRITTEN

## INTERNAL CARGO LOAD OPERATIONS 8344.5.4.2

(Revised September 2001)

TO BE WRITTEN

Refer to the exhibit Training and Procedures for Internal Load Operations *(coming soon).*

## EXTERNAL/SLING CARGO LOAD OPERATIONS 8344.5.4.3

(Revised September 2001)

TO BE WRITTEN

Refer to the exhibit Training and Procedures for External/Sling Load Operations *(coming soon).*

## PERSONNEL TRANSPORT OPERATIONS 8344.5.5

(Revised September 2001)

## GENERAL 8344.5.5.1

(Revised September 2001)

TO BE WRITTEN

## PERSONNEL TRANSPORTATION 8344.5.5.2

(Revised September 2001)

Refer to the exhibit Engine Crew Loading Procedures.

Refer to the exhibit Training and Procedures for Hand Crew Loading (coming soon).

## HELICOPTER SHORT HAUL RESCUE OPERATIONS 8344.5.6

(No. 5 January 2003)

The CDF Air Short Haul Rescue program was established for the purpose of rescuing fire entrapped or injured personnel when no other timely method can reasonably be employed, and when further delay would significantly reduce the chances of extraction and survival. Severity or potential severity of injury to the victim or ground based rescuers will be the primary determining factor for deciding whether Short Haul should be used. CDF Short Haul Rescue is available to other agencies upon request.

Upon certification, CDF helitack units will have the capability to lower a trained rescuer from the helicopter hovering overhead. The rescuer can then assess the victim's condition and when the situation warrants, both the rescuer and the victim can then be transported on the end of a rescue line suspended under the helicopter to a safe landing site.

To ensure standardization and to maximize safety constraints, a comprehensive helicopter rescue training curriculum has been developed for CDF. The training curriculum, standards and proficiency testing set forth in the CDF Helicopter Short Haul Rescue Manual shall be adhered to. An annual training calendar will be prepared and coordinated between the Units to maintain flight crew proficiency.

## POLICY 8344.5.6.1

(Revised September 2001)

Short haul rescues will be performed during daylight hours under visual flight conditions

All personnel must be trained and current for the position they will be performing. Refer to CDF Helicopter Short Haul Rescue Manual for specifics on requirements.

The following minimum crew positions must be staffed prior to each short haul mission:

- Pilot
- Crew Chief
- Rescue Supervisor
- Rescuer

Only equipment items approved by the department and procured through the department's Aviation Life Support Equipment program shall be used.

All equipment must be thoroughly inspected prior to and following each use. The Aviation Safety officer will annually review and inspect equipment and records for each helitack base.

The crew shall complete a helicopter short haul risk analysis prior to each mission.

Pilots conduct GO-NO-GO power checks.

Crews shall submit short haul after action reports to the Unit and Region Operations Chief and the Aviation Safety Officer. Perform necessary after-action debriefings.

Following any safety of flight condition that is encountered completes and forwards the automated Aircraft Accident/Incident Report.

Pilots and crews will be issued qualification cards stating the maximum altitude that they can perform a Short Haul rescue.

The Pilot will always have the final authority for overall flight safety.

Refer to CDF Helicopter Short Haul Rescue Manual for procedures and training standards.

**RESCUE EQUIPMENT**

The following is a list of technical rescue equipment specifications for Helicopter Short Haul Program.

1. Tubular Webbing, Flat, 1”, 4000 lbs. Rating CMC Catalog:

2. Color: Red Item #200103, Orange Item #200101, Yellow Item # 200107

3. Rope, Kernmantle, Static, ½”, 10,000 lbs, NFPA 1993-1995 Edition, Federal Test Spec 191-A, Method 6016, Two Person. CMC Catalog: Item #K0516 Color: Orange with Blue Stripe

4. Harness, Full Body, Pro Series, LACO Emergency Service type, black webbing with orange safety vest, padded waist & leg straps, “D” ring tie in point, pre-manufactures, NFPA 1983-1998 Edition, CMC Catalog, Item #202244. Size: Large

5. Carabiner, Steell, Locking “D”, 9225 lbs., NFPA 1983-1995 Edition, 1.00” in gate opening, bright finish, CMC Catalog, Item #300110

6. Carabiner, X-Large Steel, Locking “D”, 10,450 lbs., NFPA 1983-1995 Edition, 1.45” in gate opening, bright finish, CMC Catalog, Item #320001

7. Carabiner, Heat treated steel, large locking “D”, 16,450 lbs, NFPA 1983-1995 Edition, 1.20” gate opening, bright finish, CMC Catalog, Item #321002

8. Carabiner, Alloy Steel, Lite “D” Locking, 10,500 lbs., NFPA 1983-1995 Edition, .94” gate opening, bright finish, CMC Catalog, Item #310001

9. Harness, Stokes (pre-rig), 4 point adjustable, NFPA 1983-1995 Edition, 5000 lbs, Color: Black 1 ¾” flat webbing, “O” ring tie in rated at 25,000 lbs, pre-manufactured, CMC Catalog, Item #724121

10. Eight Plate, Rescue with ears, Steel, 45,000 lbs., 20 ox, CMC Catalog, Item #300800

11. Brake Bar Rack MFG: SMC 6 Bar, Stainless Steel, NFPA 1983-1995 Edition, 8000 lbs., CMC Catalog, Item #313522

12. Collar rescue, 5 inch type, nylon with “D” ring tie off, Color: yellow. Life Safety Products, Pro Medix Catalog, Item #593

13. Screwlink, triangular, 9,900 lbs. Steel, U.L. rated. CMC Catalog, Item #34511

14. Bag, Rope, Nylon, Color: Orange, with carry straps, pull string on one end. For 200'-1/2", rope-linght 30" X 9", MFC, CMC, Item #431021

15. Strap, pick-off, adjustable, extends to 42" lenthg, sewn in"D" ring, color: Yellow 4,500 lbs. MFC – CMC Catalog Item #201107

16. Back Pack, MFC – Technical Rescue, 17" long X 21" high, 3 compartments each with zippers, shoulder straps, Color: Red, Material Cordura, Item #9712

17. Strap, Exterior Stokes, BDM Spider, X-Strap BDM 2" Strap with Velcro® Fastener, Color: Blue-Orange, CMC Catalog Item #750190

18. Harness, Victim, Lifesave, Pro Series, Black webbing with color coded connections, 3 Item #202403

19. Strap, Chect, Lifesaver, Pro Series, Webbing sewn in "D" rings with quick connect feature, Color: Yellow, CMC Catalog, Item #202406

20. Swivel, Sealed Bearing, Rock Exotica, 8,000 lb. 4 oz, CMC Catalog Item #345090

21. Dry Suit, Surface Water Search & Rescue, 210 Denier Urethane Coated, Butt pad, Thigh pad protection, Front Entry, Nylon with Diagonal zipper with fabric cover for protection, Color: Orange & Black, Manufactured by USIA, Catalog Item # USIASYS8896SRT

22. Shackle, Snap, Tripper-Latch Release, Stainless Steel Construction, 9000 lbs. Strength 4 ¾ Length, Emergency Pull Pin, Manufactured by Lewmar, Marcon Catalog Item #19522001

23. Stretcher, Military Type, Stainless Steel Heavy Duty Bridge Truss Design Wire Mesh Replaceable, Length 83" Widths Chect 24" Abdomen 23" Calf 21", Weight 30 lbs., Height 11", Dimensions, 80.5" X 22" X 8"

24. Rescue, Floatation Device Personal (PFD), Fury, Type V, USCG Approved, "Quick Release" Cam Buckle Harness, Stainless Steel 3 Bar and O-ring, Heavy Duty 1000D Cordura, 200 Denier Nylon, YKK Plastic Zipper, Reflective Tape, Color: Red-Black, Manufacture: Swiftwater Inc., Rescue Source Catalog Item # PF7660

25. Whistle, Mini 40, Fox. Water Rescue, Plastic Construction, Color: Yellow. Rescue Source Catalog Item #WH7605 Mini

26. Knife, Rescue, Stainless Steel Blade, Scrade S.T.C. with assembly harness, Rescue Source Catalog Item #KN8020

27. Helmet, Water Rescue, Gath, Shatterproof Plastic, Super Lightweight lbs, 2.5 oz., Color: White, CMC Catalog Item #347804

28. Ring, Steel “O”, Connection Point, Diameter 3”, 40,000 lbs. Strength, Weight 11 oz., CMC Catalog Item #33005012

29. SNAP, Double Locking, Two Stage, Forged Steel, Locking Mechanism Stamped Steel, 5000 lb. Rating. Rescue Technology Catalog Item #959890

This equipment list contains the only approved items which may be utilized in the CDF short haul program. **The wear-out period for software (ropes, webbing, etc) is 2 years and the wear-out period for hardware (carabiners, brake bar racks, etc.) is 5 years.** Annual inspection and inspection after each use shall determine if items need to be replaced prior to the wear our period. Consult manufacture specifications and the NFPA 1983 (1995 Edition) for assistance.

Refer to the exhibit Training and Procedures for Short Haul Operations.

## SPECIAL OPERATIONS 8344.5.7

(Revised September 2001)

## VEGETATION MANAGEMENT OPERATIONS 8344.5.7.1

(Revised September 2001)

## GENERAL 8344.5.7.2

(Revised September 2001)

The success of any vegetation management burn involving the helitorch depends upon close coordination between the Pre-Fire Manager or vegetation management coordinator and helitack base personnel. The vegetation management coordinator should contact the helitack base well in advance of the burn to discuss logistics and operational procedures. If at all possible, the Helibase manager and prescribed burn manager should meet for an on-site inspection of the burn area. A copy of the burn plan should be forwarded to the helitack base prior to the project.

## NOTIFICATION 8344.5.7.3

(Revised September 2001)

During the IRA period the responsible helitack base shall be notified a **MINIMUM** of 48 hours prior to the burn through normal dispatch procedures. During winter staffing periods (NIRA) a minimum of 72 hours of advanced notice shall be given prior to the burn.

## PROCEDURES FOR VEGETATION MANAGEMENT OPERATIONS 8344.5.7.4

(Revised September 2001)

Information needed by the base personnel should include, but not be limited to, the following:

- Order number
- Heading and distance
- Geographic description
- Legal description
- Report time
- Radio contact
- Radio frequency
- Equipment requested
    - Helicopter
    - Torch
    - Chemical ignition system
    - Number of crew persons

## LOGISTICAL SUPPORT 8344.5.7.5

(Revised September 2001)

An adequate supply of fresh gasoline shall be supplied at the site of the mixing operation by the receiving agency, unit or as specified in the contract.

Arrangements shall be made by the incident commander with the responsible helitack base regarding Alumagel supplies.
Receiving agency or unit is responsible for feeding and lodging of the helitack crew.

Refer to the exhibit Training and Procedures for Vegetation Management Operations.
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## AERIAL SEEDING OPERATIONS 8344.5.8

(Revised September 2001)

TO BE WRITTEN

Refer to the exhibit Training and Procedures for Aerial Seeding Operations (coming soon).

## HELICOPTER HOIST RESCUE OPERATIONS 8344.5.9

(No. 21 May 2006)

The CDF Hoist Rescue program was established along the same guidelines as the CDF Short Haul Rescue Program and is intended to supplement and enhance the capabilities of the helicopter and crews.

Certain CDF helitack units will have the capability to lower trained rescuer(s) from the helicopter. The rescuer can then assess the victim's condition and when the situation warrants, both the rescuer and the victim can then be recovered and transported internally to the most appropriate site.

It is the intent of the California Department of Forestry to provide the highest level of service to the citizens of this State. This will be accomplished through high standards, training and continuous evaluation.

For a safe, effective and efficient conclusion to any response, personnel must act decisively, without hesitation, and most importantly – as a team. This can only be achieved through standards, preparation, training, and constant evaluation.

Each member has a clear role, and responsibilities to perform in chronological order. Every action shall be anticipated an shall trigger an appropriate reaction; dependant upon each member, the evolution can only be executed as a team.

To ensure standardization and to maximize safety constraints, a comprehensive Hoist Rescue training curriculum has been developed by CDF. The training curriculum, standards and proficiency testing set forth in the CDF Hoist Rescue Manual shall be strictly adhered to. An annual training calendar will be prepared and coordinated between the Units to maintain flight crew proficiency.

CDF Hoist Rescue is available to local agencies upon request.

Hoist Rescues will be performed during daylight hours under visual flight conditions. All personnel must be trained and current for the position they will be performing. Refer to the CDF Hoist Rescue Manual for specific requirements.

The following minimum crew positions must be staffed prior to each Hoist Rescue mission:

- Pilot
- Crew Chief
- Rescuer

Only equipment items approved by the Department's Aviation Life Support Equipment program shall be used. All equipment must be thoroughly inspected prior to and following each use. The Aviation Safety officer will annually review and inspect equipment and records for each affected helitack base.

Prior to accepting a mission the crew shall perform a risk analysis. This process is continual and shall be constantly reevaluated. The crew shall complete and adhere to all checklist according to the CDF Hoist Rescue Manual.

Crews shall perform after-action debriefings and forward the appropriate information to the Unit and Region Operations Chief and the Aviation Safety Officer.

Pilots and crews will be issued qualification cards stating the maximum altitude that they can perform a Hoist Rescue.

The Pilot shall have the final authority for overall flight safety.

**RESCUE EQUIPMENT**

Refer to the CDF Hoist Rescue Manual, Section V - Hoist Rescue Mission Equipment, for a list of the approved technical equipment, specifications, implementation, care and service life.

**TRAINING STANDARDS**

Refer to the CDF Hoist Rescue Manual, Section II – Hoist Training Requirements for outlines of minimum qualifications, standards and proficiency requirements for the positions of:

Pilot
Crew Chief
Rescuer
Hoist Senior Instructor

Hoist Instructor
Instructor Trainee

Refer to the CDF Hoist Rescue Manual, Section I – Safety and Section IX – Hoist Standard Operating Procedures for a brief outline of expected performance standards.

(see next section)

(see HB Table of Contents)

(see Forms or Forms Samples)