

# Aerial Ignition Operations



**PROCEDURAL**

**GUIDELINE**

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## Review period

This guideline should be reviewed in 2025 by the doctrine owner.

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# About AFAC and AFAC Doctrine

## AFAC

The Australasian Fire and Emergency Service Authorities Council (AFAC) is the Australian and New Zealand National Council for fire, emergency services and land management. It is a collaborative network of fire, emergency services and land management agencies that supports the sector to make communities safer and more resilient.

## AFAC Doctrine

AFAC develops doctrine to support the practice of emergency management. The information in doctrine publications is evidence based and drawn from academic research and the collective expert knowledge of member agencies. Doctrine is regularly reviewed and represents the official AFAC view on a range of topics.

Doctrine does not mandate action; rather, it sets aspirational measures. Publishing nationally agreed views, shared approaches and common terminology enhances cooperation and collaboration within and between agencies and jurisdictions.

## Types of AFAC Doctrine

AFAC Doctrine is classified as follows:

**Capstone doctrine** – includes publications, such as 'strategic intents', that are high-level accounts of the concepts of emergency management operations and service delivery. They describe the principles of what is practical, realistic and possible in terms of protecting life, property and the environment.

**Fundamental doctrine** – includes 'positions', which AFAC members are expected to support, as well as 'approaches' and some 'frameworks'. Fundamental doctrine may become agency or jurisdictional policy on a matter if adopted by individual services or jurisdictions.

**Procedural doctrine** – includes 'guidelines', some 'frameworks', and 'specifications'. AFAC members are expected to be aware of procedural doctrine. A guideline is an advisable course of action; a framework provides a linking of elements to create a supporting structure to a system, and specifications are a detailed description of a precise requirement to do something or build something.

**Technical doctrine** – includes 'technical notes', 'training material' and the *Australasian Inter-Service Incident Management System* (AIIMS). Technical doctrine provides guidance of a technical nature: the how to do something, or the technical meaning relative to a situation.

## Acknowledgements

The 2012 AFAC *Aerial Ignition Operations Guideline* was developed by the Rural and Land Management Group, based on a pre-existing code of practice. This updated 2020 guideline was developed by the Aerial Ignition Project Team on behalf of the Rural and Land Management Group.

# 1 Source of authority

This guideline was endorsed by AFAC Council on 29 April 2020.

# 2 Purpose

Aerial ignition operations are conducted in Australia and New Zealand for a range of bushfire management and land management objectives. This guideline has been designed to assist fire and land management agencies in the development of policy and procedures for aerial ignition operations. It provides guidance on safety, regulatory requirements, operational planning, conduct of aerial ignition operations and communications.

# 3 Scope

The methods of aerial ignition within scope of this guideline are:

- aerial incendiary devices, dispensed from piloted aircraft from a specialised machine
- aerial incendiary devices, dispensed from remotely piloted aircraft
- aerial drip torches, a device underslung beneath a helicopter, designed to dispense ignited gelled petroleum in large droplet form.

This guideline provides guidance on safety, operational planning, conducting aerial ignition operations and communications during both day and night.

At the time of publication of this document, the Fire and Emergency Aviation Training and Assessment Framework (FEATAF) is currently under review. To avoid inconsistencies with the updated FEATAF, training and assessment requirements are not discussed in this guideline.

# 4 Statement of Engagement

The 2012 AFAC *Aerial Ignition Operations Guideline* was developed by the Rural and Land Management Group, based on a pre-existing code of practice. This 2020 updated guideline was developed by the Aerial Ignition Project Team on behalf of the Rural and Land Management Group with input from the National Aerial Firefighting Centre and the Fire Emergency Aviation Technical Group.

# 5 Audience

This guideline is intended to provide guidance for the development of agency doctrine relating to air operations personnel, incident control personnel and prescribed burn managers and planners in fire and land management agencies, as well as contractors involved in aerial ignition operations.

# 6 Definitions, acronyms and key terms

**ADT:** Aerial drip torch (helitorch)

**AD:** Airworthiness directive

**AIM:** Aerial incendiary machine

**AIMO:** Aerial incendiary machine operator

**AOC:** Air operator's certificate

**ARENA:** the national information system for supporting the use of aircraft for fire and emergency response managed by the National Aerial Firefighting Centre (NAFC)

**BVLOS:** Beyond visual line of sight

**CAA:** Civil Aviation Authority (New Zealand)

**CAO:** Civil Aviation Order

**CAR:** *Civil Aviation Regulations 1988*

**CASA:** Civil Aviation Safety Authority

**CASR:** Civil Aviation Safety Regulations

**CRM:** Crew resource management

**EVLOS:** Extended visual line of sight

**FATAF:** Fire and Emergency Aviation Training and Assessment Framework

**ICAO:** International Civil Aviation Organisation

**IOS:** Incendiary operations supervisor

**IDD:** Incendiary dispensing device (CASA term)

**NAFC:** National Aerial Firefighting Centre

**NVIS:** Night vision imaging system

**NVG:** Night vision goggles

**PoP:** Panel of providers

**RPA:** Remotely piloted aircraft

**RPAS:** Remotely piloted aircraft system

**VLOS:** Visual line of sight

# 7 Introduction

Aerial ignition operations are conducted in Australia and New Zealand for a range of bushfire management and land management objectives. The main methods of aerial ignition are:

1. Aerial incendiary devices/capsules dispensed from aircraft by a specialised machine.
2. Aerial drip torches, a device underslung beneath a helicopter, designed to dispense ignited gelled unleaded petrol in droplet form.
3. Aerial incendiary devices/capsules dispensed from remotely piloted aircraft.

This guideline provides advice on safety requirements and general principles to be addressed by agencies and aircraft operators that are engaged by fire and/or land management agencies in all states and territories of Australia and in New Zealand, for the conduct of aerial ignition operations.

This guideline is intended to assist agencies in the development of more detailed policies or procedures. The planning and operational guidance provided is intended to assist agencies to ensure:

- compliance with relevant legal and statutory requirements
- safe working practices
- high standards of operational management
- efficient use of resources
- adoption of best practice for aerial ignition operations.

## 8 AFAC's guideline

### 8.1 Legal

All fire suppression and fuel management burning operations conducted in Australia and New Zealand are required to comply with the provisions of various Acts, Regulations and Ordinances applying in the state in which operations are being conducted. Where aerial ignition is used for fire management in Australia, operators are additionally required to comply with relevant aviation legislation, including the *Civil Aviation Act (1988)*, Civil Aviation Regulations (CAR), Civil Aviation Safety Regulations (CASR), Civil Aviation Orders (CAO) and relevant airworthiness directives (AD). These are administered by the Civil Aviation Safety Authority (CASA). Similar legislation applies in New Zealand, administered by the Civil Aviation Authority (CAA).

#### 8.1.1 Aerial ignition equipment

In both Australia and New Zealand there is legislation requiring approval for:

- any incendiary dispensing device (aerial incendiary machine) that is fitted to the aircraft (note: underslung driptorches, being an external sling load, are normally not regarded as fitted to the aircraft, but are covered by other aviation legislation which requires sling load operations to be conducted safely)
- the method of fitment to the aircraft
- any modifications to the aircraft that may be required.

Under current legislation, the required approvals may be in the form of a supplemental type certificate (STC), or an engineering order issued by a competent authority approved by CASA.

*Airworthiness Bulletin (AWB) 25-022 Edition 2 Incendiary Dispensing Device (CASA 2013)* provides guidance on design considerations for incendiary dispensing devices carried in aircraft. Note: At the time of writing, *AWB 25-022* is available from CASA and provides useful guidance on design features for incendiary dispensing devices (aerial incendiary machines), however many of the specific references to legislation in the AWB are no longer current.

The installation and operational use of aerial incendiary equipment must be described in the aircraft operator's CASA approved operations manual and in the CASA approved flight manual supplement for each specific aircraft.

Where pressurised containers are used, these may be covered by state or territory legislation relating to pressure vessels.

#### 8.1.2 Qualifications and certifications

The agency conducting an aerial ignition operation should ensure that all personnel are accredited or endorsed and meet skills currency requirements for the respective roles they are performing.

Specific qualifications required by pilots engaged in aerial ignition operations will depend on the nature of the operation. They may include:

- qualification and experience requirements as detailed in the operator's CASA approved operations manual
- qualification and experience requirements as detailed in the respective contract with the operator
- low flying approval, where the operation requires sling loading or the dispensing of incendiaries below 500 feet above ground level
- maintenance authority, where required to oversee fitment of the aerial incendiary machine (AIM) to the aircraft

- sling load endorsement, for helicopter drip torch operations
- night flying qualifications, including night vision imaging systems (NVIS) approvals where relevant.

All pilots involved in aerial ignition operations should be required to complete an agency approved Basic Wildfire Awareness course.

All personnel involved in an airborne role in aerial ignition operations, including pilots, RPA pilots and RPA observers should be required to complete an agency approved course in crew resource management (CRM) or team resource management (TRM).

The operator of the aircraft must hold a current air operator's certificate (AOC) endorsed to carry out aerial ignition operations using the specific aircraft type. Where relevant, the operator's AOC must also authorise the conduct of sling load operations.

The AOC holder must maintain the appropriate aircraft flight manual supplements.

### 8.1.3 Operational aspects

Note: much of the civil aviation legislation in Australia is currently undergoing reform. During this process, applicable legislation is often transitioning between legacy provisions (eg CARs, CAOs) and the new framework (mainly CASRs). More significant changes are expected to occur with the introduction of CASR Part 138, planned for 2020.

When preparing agency doctrine, it is recommended that advice be sought on the current status of relevant legislation. Advice is available from aircraft operator's chief pilots/head of flying operations, industry associations, CASA and NAFC.

As well as extensive general provisions regarding operational safety, civil aviation legislation in Australia and New Zealand does include specific requirements for:

- dropping of articles
- low flying
- carriage of dangerous goods in aircraft, including incendiary devices
- helicopter external sling load operations
- night flight, including use of NVIS
- operation of RPA.

Aviation legislation requires that aircraft undertaking aerial work, including all aerial ignition operations and sling load operations, only carry persons who perform an essential function in connection with the operation.

Legislation covering sling load operations will normally restrict areas over which the aircraft may fly (e.g. flight over populous areas and major roads is precluded).

It is recommended that aircraft conducting aerial ignition

operations be fitted with an approved wire strike protection system, where these are commercially available.

Agencies planning and conducting aerial ignition operations should also consider any state, territory or local legislation covering:

- handling and carriage of dangerous goods
- firearm handling and licensing (some states require firearms licenses to dispense incendiaries)
- requirements to obtain permission from landholders or occupiers prior to dropping articles
- land tenure and landing or take off of an aircraft (including RPA)
- operation of RPA.

## 8.2 Standards – aerial ignition equipment

### 8.2.1 Aerial incendiary machines – piloted aircraft

In addition to any legislative requirements, it is recommended that for aerial incendiary machines used in piloted aircraft:

- Machine design should allow for the manual ejection of any primed incendiary capsule, or the design should ensure a fire cannot escalate within the machine.
- The electrical installation of the machine, or the machine itself, should incorporate an easily accessible 'master switch' to isolate any external power to the machine.
- The machine should incorporate a water extinguisher system, not dependant on aircraft power, that is capable of flooding the injection chamber.
- All electrical components should be protected by circuit breakers.
- The hopper should be fitted with a clear fire-resistant window or removable lid to enable viewing of the hopper contents.
- The unprimed incendiaries should be able to be manually isolated from the injection chamber.
- The water and mono-ethylene glycol tanks should be clearly marked.
- The mono-ethylene glycol tank should be of sufficient capacity to allow for operation of the machine for the longest possible mission. The mono-ethylene glycol tank should only be refilled when it is external to the aircraft.
- Incendiaries are to be carried in the aircraft in a flame-resistant container approved for aircraft use.
- A water fire extinguisher, fire blanket, and approved fire extinguisher must always be carried in the aircraft and in reach of the aerial incendiary machine operator.

### 8.2.3 Aerial drip torch

Aerial drip torches use high-energy, low-flashpoint unleaded petrol. There is potential for an accidental fire as a result of careless or improper practice in handling such fuel.

The following are minimum safety standard requirements for aerial drip torches:

- The tank may be an open vented tank as approved by the agency. Some aerial drip torches are fitted with a spark arrester.
- The pump delivery line should be of a high-pressure standard and able to withstand high temperatures.
- The ignition system and gel delivery pump should have separate activation switches.
- The operating handpiece should incorporate a fail-safe master switch.
- The electrical power cable must incorporate a breakaway, which will part readily in the event the aerial drip torch is released from the aircraft in an emergency.
- The cargo hook mechanism must have a pilot activated electrical and manual release, as well as an external manual release.

## 8.3 Planning aerial ignition operations

Thorough preparation and planning are the key to success for all aerial ignition operations.

The application of aerial ignition techniques for prescribed fire should only be carried out where a current and approved prescribed burn plan or incident action plan are in place.

Agencies should consider developing an operations plan for aerial ignition operations in addition to the prescribed burn plan or incident action plan.

The following should be considered in the development of planning documentation for aerial ignition operations:

- a description of the area to be treated and the fuel characteristics
- operational objectives, burn prescriptions and strategies
- resource requirements (equipment and personnel)
- notifications and signage requirements
- reporting protocols
- communications plan
- ground safety
- weather information both current and forecast
- a map showing:
  - areas to be burnt and areas to remain unburnt

- proposed aerial ignition runs, flight line directions, variable weather options, number of runs, adjoining or otherwise affected landholders, controls required to contain the burn, contingency containment control lines (fall back) the location of water points, aircraft landing and supply sites, safe refuge areas and escape routes.

The operational plan should be approved by the incident controller, prescribed burn operations officer or other authorised agency officer before operations commence.

## 8.4 Operational control management structure

The Incident Control System (ICS), a sub-system of AIIMS, provides a clear chain of command over all resources. The incendiary operations supervisor (IOS) is in charge of the aerial ignition mission and is responsible to the burn manager/prescribed burn operations officer and prescribed burn incident controller through the air operations manager, if in place. These titles may differ between agencies.

## 8.5 Conducting aerial ignition operations

### 8.5.1 Aerial incendiary machine operations – piloted aircraft

Procedures for the conduct of aerial incendiary machine operations should be specified in agency doctrine such as standard operating procedures (SOPs) or an aerial ignition operations manual. Relevant procedures will also be included in the aircraft operator's operations manual and the aircraft's flight manual supplement. All procedures should be consistent with the following operational principles:

- The pilot in command is responsible for the safe operation of the aircraft at all times and has the final say in the conduct of the mission.
- The IOS is responsible for managing the mission overall and for delivery of effective outcomes.
- In consultation with the incident controller or authorised officer, the IOS monitors the ignition spacing and fire rate of spread and will direct the aerial incendiary machine operator (AIMO) to alter the ignition spacing as required. The IOS may request the pilot to alter the aircraft airspeed to provide the required ignition spacing, in accordance with the burn prescription and operational approvals. The pilot will decide if requested speeds are practical, considering aircraft performance and flight safety.
- Ignition spacing should be determined by the burn objectives, rate of spread of the ignition spots,



desired intensity, and coverage. This should be monitored throughout the burn and modified through appropriate speed and height changes as appropriate to allow for changes in weather and fuel conditions. Any alteration to the planned activity should be in consultation with the responsible officer.

- Lighting must be conducted in a pattern which permits a safe escape route for the aircraft at all times.

Aircraft suitability considerations:

- Helicopters provide an excellent platform for dispensing aerial incendiary devices. They provide excellent visibility, a high degree of control over incendiary placement, manoeuvrability, and the ability to operate safely at slower speeds and a lower altitude above the target. They are best suited for burn areas where fuel variation and irregular terrain demand careful control over fire behaviour. Helicopters are also most suitable for undertaking fuel reduction burns close to urban and rural developments where precision and control are essential.
- Various types of fixed-wing aircraft are suitable for aerial incendiary machine operations. Relative to helicopters, they are generally less costly and can quickly cover broad areas. They are best suited for areas where accuracy of incendiary placement is not as critical, often being used in flat country, for lighting along ridge tops and rangeland operations.
- Agency policy and procedures will determine aircraft type and whether operations should be conducted in single or twin-engine aircraft. Considerations include engine type, height above ground, elevation above sea level, the dissection of terrain and suitability of terrain for forced landings.

### 8.5.2 Aerial incendiary machine operations – remotely piloted aircraft (RPA)

Procedures for the conduct of RPA aerial incendiary machine operations should be specified in agency doctrine such as SOPs or an aerial ignition operations manual. Relevant procedures will also be included in the RPA operator's operations manual. All procedures should be consistent with the following:

- Only RPA sourced through an appropriate procurement arrangement that establishes that the RPA operator and RPA meet and maintain appropriate standards should be used for aerial ignition operations.
- The RPA operator must hold an appropriate Remote Operator's Certificate that covers the provision of aerial ignition services.
- The RPA pilot must hold an appropriate Remote Pilot Licence and must have completed the training requirements prescribed in the operator's operations manual.

- Remotely piloted aircraft system (RPAS) operations shall be conducted in accordance with procedures and regulations laid down in:
  - respective agency RPA and AIM procedures
  - the RPA operator operations manual
  - aviation legislation governing RPA operation (in Australia, currently *CASR Part 101*).
- The RPA pilot and RPA observer must wear required fireground PPE during any RPA AIM operation.
- Agencies should consider whether to require geofencing of the burn area and/or the ignition area for RPAS AIM operations.
- Agency personnel requirements for an RPA AIM operation should include an authorised agency person with current officer in charge qualifications to be co-located with the RPA pilot during the entire ignition operation. This person shall have communications with all on-ground agency burn personnel and the prescribed burn operations officer.
- Effective communications must always be maintained between the RPA pilot and officer in charge of the prescribed burn during the AIM ignition operation and the AIM shall only be activated upon direction from the officer in charge.
- At the completion of the aerial ignition operation the prescribed burn operations officer is advised accordingly and confirms the RPA has departed the burn area.
- Agency procedures will dictate whether the RPA will operate:
  - visual line of sight (VLOS)
  - extended visual line of sight (EVLOS)
  - beyond visual line of sight (BVLOS), the RPA operator must have specific CASA approval to conduct BVLOS operations.

### 8.5.3 Aerial drip torch operations

Procedures for the conduct of aerial drip torch operations should be specified in agency doctrine such as SOPs or an aerial ignition operations manual. Relevant procedures will also be included in the aircraft operator's operations manual and the aircraft flight manual supplement for the aircraft conducting the operation. The procedures detailed should be consistent with the following operational principles:

- The pilot in command is responsible for the safe operation of the aircraft at all times and has the final say in the conduct of the mission.
- The drip torch operator is responsible for managing the mission overall and for delivery of effective outcomes.

Aircraft suitability considerations:

- The choice of helicopter will largely be determined by its external load carrying capacity (sufficient to safely carry crew and a fully loaded aerial drip torch), endurance and the nature of the terrain.
- Pilot-only operations are not recommended.

Height and speed considerations:

- Aerial ignition using aerial drip torches is commonly practiced for back burning, post-harvest burning (also known as slash burning), broad area fuel reduction burning, plantation establishment burning, rangeland, and weed control burning. Lighting is normally conducted from heights of 100 to 300 feet above obstructions at airspeeds. Agency operating procedures should provide guidance on appropriate airspeeds for any low altitude lighting.
- The lighting pattern will be determined by the objective of the operation, fuel moisture, the terrain, bushfire fuel type and wind direction as detailed in the burn plan or incident action plan.

Other considerations:

- The aircrew for aerial drip torch operations usually involve a pilot and agency aerial drip torch operator. There may be a requirement for a third crew member for training or assessment purposes; however, crew should be limited to those essential to the operation.
- Gel mixing and transfer should be conducted as per agency procedures.
- Marshalling of helicopters for hook up of aerial drip torches must be set out in the aircraft operator's operations manual.
- Prior to any flight the pilot is responsible for ensuring the slung load is correctly rigged and that all lifting gear is in suitable condition and within the manufacturer's life date.
- A full functional check of all the jettison modes of the aerial drip torch shall be conducted.
- The aerial drip torch should be ground tested for correct operation.

#### **8.5.4 All aerial ignition operations**

The following considerations should be made before conducting any aerial ignition operation:

- Prior to any operation, the officer in charge must fully brief the pilot and all crew on all matters associated with the conduct of the operation, including emergency and contingency procedures.
- Prior to any operation, the pilot must fully brief aircraft crew and passengers (and RPA observers in the case of RPA operations).
- Prior to any flight, the IOS or ADT operator, or RPA

operator, should ensure that a full functional check of all equipment is conducted.

- The officer in charge must ensure the area to be burnt is clear of personnel, stock and equipment before lighting commences. The pilot should conduct a reconnaissance flight over the burn area before commencement of burns over large areas. Agencies will provide instructions on specific precautions.
- Agency approved protective clothing and flight helmets (for helicopter operations) shall be worn by the pilot and agency personnel according to agency procedures during all aerial ignition operations.
- The IOS or ADT operator, or RPA operator, is responsible for ensuring ignitions only occur within the burn area.
- A debrief should be conducted at the end of each mission to evaluate all components of the operation and to remedy any procedural issues.

#### **8.5.5 Conducting night aerial ignition operations**

The following options are potentially available for conducting aerial ignition operations at night:

- NVFR: High level dropping under the night visual flight rules using fixed-wing aircraft or helicopters
- NVIS: Using night vision imaging systems, such as night vision goggles (NVG)
- RPA: Using remotely piloted aircraft.

Night aerial ignition operations require careful planning and are subject to additional regulatory considerations. Specific procedures for the conduct of night operations should be specified in agency doctrine such as SOPs or an operations manual. Relevant procedures will also be included in the aircraft operator's operations manual and the aircraft's flight manual supplement.

Night time aerial operations can attract additional concern from local communities. Planning of night aerial ignition missions should carefully consider how communities will be properly informed.

#### **Night visual flight rules**

NVFR operations require that the aircraft only fly above a specified minimum safe altitude and require favourable weather conditions. Normally this will limit NVFR aerial ignition operations to relatively flat terrain. Careful consideration needs to be given to:

- pilot qualifications and night flying recency
- suitable weather conditions for NVFR flight (e.g. forecast and actual visibility greater than 5000m)
- selection of type of aircraft best suited to the situation. Agency policy will determine whether twin or single engine aircraft are utilised.

## Night vision imaging systems

NVIS normally allows aircraft to be flown at lower altitude than NVFR operations.

At the time of writing, only helicopters using an AIM were approved by CASA for NVIS aerial ignition operations.

NIVS aircraft operations are highly regulated. Note: at the time of writing, legal requirements for helicopter NVIS are provided in *CAO 82.6*.

In addition to the requirements enabling daytime AIM operations, the helicopter operator must hold a current AOC authorising NVIS operations.

For NVIS operations, the IOS will normally be classified as aircraft flight crew, unless a specific exemption is granted by CASA. Agency personnel conducting NVIS operations must therefore:

- meet the pre-requisite and training requirements for NVIS flight crew members
- maintain CASA NVIS currency requirements.

Agency policy and procedures will determine whether NVG AIM operations will be conducted in single or twin-engine helicopters.

Agency personnel conducting NVIS AIM operations shall have completed an approved crew resource management (CRM) course.

Where agency aerial incendiary operations are conducted with on-board personnel using NVG, a reconnaissance flight will be conducted over the entire burn area during daylight hours and the entire boundary of the burn area must be clearly identified by the pilot and incendiary operations supervisor before aerial ignition commences.

Additional on-board, non-NVIS qualified personnel necessary for the conduct of the operation. For example, the aerial incendiary machine operator, must receive a pre-flight brief addressing night operation requirements, emergency procedures and the use of light sources in the cabin.

## Remotely piloted aircraft

Dispensing of incendiaries from an RPA at night will require that the operator (ReOC holder) is approved for BVLOS operations.

Any operation of RPA's is to comply with all relevant, applicable regulations and agency operating procedures.

## 8.6 Communications

As with all aircraft operations, adequate and reliable communications are essential.

Aerial ignition operations communications planning should be detailed in the communications plan as a sub-set of the burn plan or incident action plan. The following communications principles should be considered in the development of a communications plan:

- Sterile cockpit protocols should be adopted for all aerial ignition flight operations.
- Ground-to-air communication schedules should be pre-planned.
- During any aerial ignition operation, the aircraft conducting the operation shall have radio communications with the agency officer coordinating the operation at each site for the entirety of the ignition operation.
- Radio communications between the sector commander, division commander, operations officer, prescribed burn operations officer or incident controller and aircraft must be established before the aerial ignition commences.
- Where the operation requires agency personnel on-board, the aircraft conducting aerial ignition operations must have an operating aeronautical VHF and respective agency radios accessed via fully independently controlled audio switching facilities serving the pilot and on-board agency personnel and which provide transmit and receive access to agency transceivers.
- Helicopters should be equipped with a siren to warn people on the ground of pending danger and these should be capable of being operated by the pilot and IOS/ADT operator co-pilot by the single action of a button or switch. Power for the siren should be from a protected power supply separate from that supplying power to aerial ignition equipment.
- Communications between ground crew and pilot, designated fuelling, mixing and loading areas, and marked escape routes are essential to the conduct of all aerial ignition operations.

## Glossary

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<b>Aerial drip torch (helitorch)</b>	A device slung underneath a helicopter that dispenses ignited, gelled petroleum to ignite fuel reduction burns (sometimes referred to as a 'helitorch').
<b>Aerial drip torch operator</b>	Person responsible for the safe operation of the aerial drip torch during the burning operation and providing navigation and operational direction to the helicopter pilot and ground crews to ensure burn objectives are achieved.
<b>Aerial incendiary capsule</b>	A plastic ball, phial shaped vessel or capsule belt containing potassium permanganate which when injected with mono-ethylene glycol undergoes an exothermic reaction resulting in ignition.
<b>Aerial incendiary machine</b>	An electrically or manually powered machine designed for the purpose of priming and dispensing aerial incendiary capsules from aircraft. Normally they comprise a hopper, injection bay, dispatch mechanism and chute.
<b>Aerial incendiary machine operator</b>	An authorised agency person responsible for the operation, servicing, handling and storage of the aerial incendiary machine and associated consumables for a prescribed burn (NBP 2017).
<b>Back burn</b>	<ol style="list-style-type: none"><li>1. A fire started intentionally along the inner edge of a fireline during indirect attack operations to consume fuel in the path of a bushfire (Australia).</li><li>2. A counterfire commenced from within continuous fuel for the purpose of fighting a fire (New Zealand). (AFAC 2012).</li></ol>
<b>Burn manager/ prescribed burn operations officer</b>	A person responsible for the management of all operational aspects and resources allocated to a burn (AFAC 2018).
<b>Division commander</b>	Division commanders are under the direction of the operations officer and are responsible for the portion of the incident action plan that relates to their division. Divisions may be geographical or functional, and will consist of a number of sectors to which specific tasks are allocated (AFAC 2017).
<b>Fire management</b>	All activities associated with the management of fire-prone land, including the use of fire to meet land management goals and objectives (AFAC 2012).
<b>Fuel reduction burning</b>	The planned application of fire to reduce hazardous fuel quantities, undertaken in prescribed environmental conditions within defined boundaries (AFAC 2012).
<b>Helipad marshal/ Aerial drip torch support crew</b>	The helipad marshal is the leader of the aerial drip torch support crew responsible for the safe preparation and maintenance of the aerial drip torch and the safety of all personnel working in the helipad area.
<b>Ignition pattern</b>	The manner in which a prescribed burn, backfire, or burnout is set, determined by weather, fuel, ignition system, topographic and other factors having an influence on fire behaviour and the objective of the burn.

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<b>Incident controller</b>	The person responsible for the management of all incident control activities across a whole incident. This person will also have overall responsibility for the conduct and control of an aerial incendiary operation for either a prescribed fire or fire suppression operation.
<b>Incident controller (prescribed burn)</b>	An authorised agency person responsible for leading all resources delivering the prescribed burns operations program within a defined geographic area. The program may include a number of prescribed burns being conducted concurrently and the coordination of a large number of resources (AFAC 2018).
<b>Manned aircraft</b>	See piloted aircraft. Retitled in line with AFAC’s commitment to equity and diversity by addressing communications, language, and status symbols within our sector that act as barriers to inclusion for women and other diverse groups.
<b>Mono-ethylene glycol</b>	A liquid compound, commonly found in automotive anti-freeze, which when injected into an incendiary capsule starts an exothermic reaction resulting in capsule ignition.
<b>Operations officer</b>	See burn manager/prescribed burn operations officer.
<b>Pilot</b>	The person in command of the aircraft, responsible for ensuring operations are conducted in compliance with all relevant aviation legislation and regulations.
<b>Piloted aircraft</b>	An aircraft with a pilot on board in command of the aircraft.
<b>Prescribed burning</b>	The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives.
<b>Remotely piloted aircraft</b>	An aircraft without any persons aboard which is piloted from a remote pilot station (also referred to as UAVs or drones).
<b>Remotely piloted aircraft system</b>	A remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design (ICAO 2018).
<b>Sector commander</b>	Sector commanders are under the direction of the operations officer, (or division commander if appointed) and are responsible for the portion of the incident action plan that relates to their sector. A sector is an organisational level having responsibility for operations within a defined area of a division or having a specific functional responsibility (AFAC 2017).
<b>Unmanned aircraft</b>	See remotely piloted aircraft. Retitled in line with AFAC’s commitment to equity and diversity by addressing communications, language, and status symbols within our sector that act as barriers to inclusion for women and other diverse groups.

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