

**Employment Development Group (EDPG) Training
Package 2**

F18.1 Wildfire B (V.01)

Wildfire Tactics & Incident Command

Training pre-requisites

- 1.1 Before using this training package, learners should have completed initial and any developmental training commensurate with their role, such as Initial Trainee course, Equality and Diversity, Health & Safety, Manual Handling, First Aid, Incident Command etc.
- 1.2 To use this package for acquisition training, to support claiming competency in role, appropriate development plans must be in place to identify and assess learning outcomes. This could include delivery of this package by a competent trainer / assessor.
- 1.3 To use this package as part of maintenance of competence or a refresher training programme, all learners must be competent in role. This training package can be undertaken in either a team or individual environment.

SECTION 1

Wildfire tactics & Incident Command

SECTION 2 Introduction and Aims Introduction

Wildfire is the generic term used to describe large uncontrolled fires occurring in the open in natural vegetation.

Wildfires are a growing issue in the south east and across the whole of the UK. They differ greatly to structural fires with a larger number of environmental factors influencing how they develop. Due to this and the vast variations in fuel types, urban/rural interface, land topography, remote access, poor water supplies and rapid fire development it makes tactical planning difficult & operational fire fighting arguably one of the greater fire risks to crews who attend them.

Key to the success of wildfire control is an understanding of the fires behaviour in relation to the land, vegetation and weather and with this applying the right fire fighting tactics at the right time and in the right location.

For this to work the incident command structure must have the ability to function efficiently in a dynamic environment. The UK Incident Command

System (ICS) relies on the provision of trained, experienced and confident officers. These must be able to apply systems that support the ICS by addressing issues that are specific to wildfire.

Aim

To provide crews with an understanding of the risks associated with the application of specific tactics at wildfire incidents.

To provide crews with the understanding of how and when to apply wildfire tactics.

To provide crews with the understanding of the application of the Incident command structure at wildfires

To highlight key factors in the incident command process to maintain operational safety

By the end of this session learners will be able to recognise when and how to implement the Standard operating procedure/s when attending incidents involving **Wildfire**.

It is suggested that **45 minutes** are allocated to completing this training package together with the summative assessment.

Following a training frequency analysis it is recommended that this package is repeated every **24** months.

This training package has been created to support the SOP/s that deals with **Wildfire**

SECTION 3

Learning outcomes:

By the end of this session delegates will be able to recognise and describe the:

- Significant Hazards
- Control measures and actions
- Incident command considerations

When attending incidents involving **Wildfire, but also:**

- Have an understanding of the tactics to adopt at wildfire incidents

Template V.6.0a

- Have a basic understanding of the associated hazards when applying operational tactics
- Have an awareness of incident command and key factors that will influence safety and outcome on the fire ground.
- Be able to apply this knowledge to safely implement SOPs relating to wildfire **Notes:**

The training notes in relation to this subject matter form a large amount of learning material and have been to be broken into three training packages: A. Wildfires: An introduction to wildfire operations.

B. Fire fighting tactics & ICS.

C. Communications and Navigation on the fire ground.

SECTION 4

Slide 1 How much do we know?

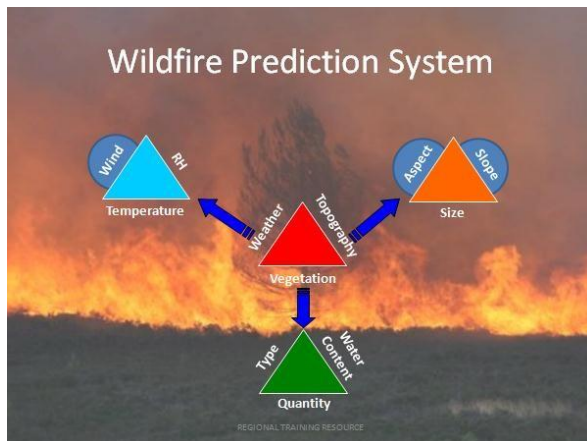


Notes:

The two pictures are fundamentally the same, current practise in many circumstances is putting fire-fighters in dangerous avoidable conditions.

Slide 2 Significant Hazards

Wildfire Tactics



Notes:

As discussed in Wildfire package 'A' the Wildfire Prediction System (WPS) can be used to identify the main significant hazards at any wildfire incident, predict fire behaviour and to identify potential locations and times where fire suppression activity would be most effective, these are known as 'windows of opportunity'.

WPS uses the principle that fire behaviour within a given fuel is influenced predominately by its alignment with three major forces

Wind
Slope
Aspect

This along with other key topographical and environmental factors can be used by crews and incident commanders to apply the right **operational tactics and incident command procedures**.

Slide 3 Wildland Urban Interface

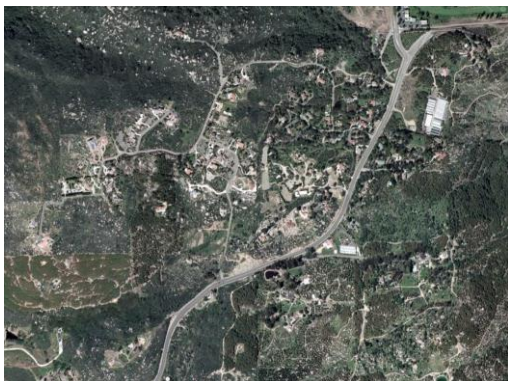


Fig 1.1 Complicated Wildland rural intermix

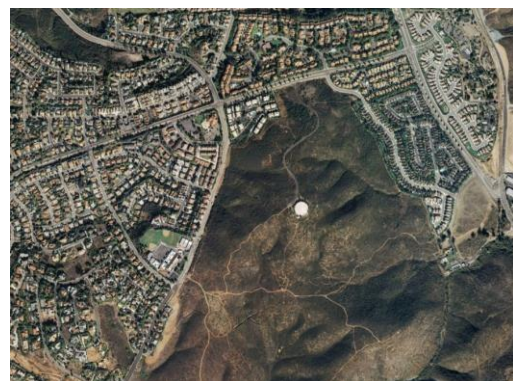


Fig 1.0 Distinct Wildland rural interface

Notes

One of the main tactical hazards presented at wildfire incidents in the South of England where urban environments, villages, towns & cities are in close proximity to high risk wildfire areas.

They can be viewed into two types:

Interface: Where a distinct boundary line exists between the wildfire risk and the urban habitats (fig 1.0)

Intermix: Where structures are scattered throughout the risk area with no clear demarcation (fig 1.1)

Fire fighting operations prioritises fire fighting:

Save Life

Save Property

Save Environment

This can pose a significant hazard to fire fighters in WUI areas as shifts in resources from wildfire fighting to life and property protection can lead miss communication on the fire ground in rapidly changing environments

Slide 3 Pre-determined attendance (PDA)



Notes

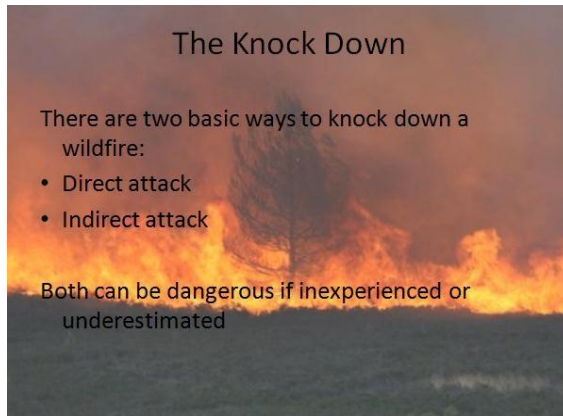
One of the significant hazards created tactically in the early stages of Wildfire incidents is the PDA. Standard mobilisation is focused on structural fire fighting response and fire development is often contained to the building of origin due to the restriction of fuel and vehicle access within close proximity to the fire.

With wildfires however main fire appliances offer little ability to control wildfire due to their size & restrictions to road use. Wildfire is often able to develop from small controllable fires to high intensity wildfires due to:

1. Delays in fire fighting whilst waiting for specialist off road capacity
2. Incorrect weight of attack
3. Incorrect fire fighting appliances in the initial PDA
4. Unrestricted fuel source allows rapid increase in intensity
5. Adoption of the wrong fire fighting strategy

Slide 4 **Methods of attack**

There are two main methods used to suppress wildfire, these are;



Notes:

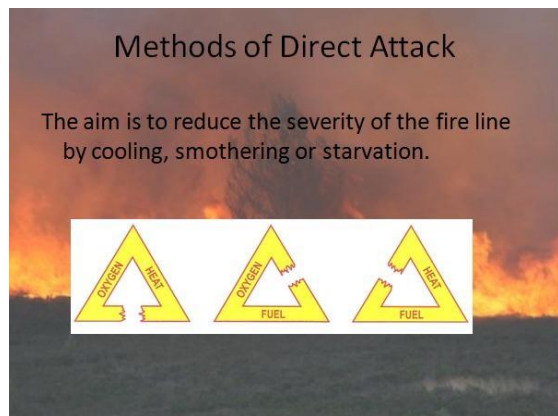
Direct Attack

Where personnel and resources work at, or very close to, the burning edge of the fire. Fire fighting crews aggressively attack the fire either by applying water or extinguishing the fire using '*hand tools*' and '*beaters*'

Indirect Attack

This method involves applying suppression tactics that take place away from the burning edge of the fire. Either by using control lines to contain fire spread, or the proactive use of fire as a suppression tool.

Slide 5 **Direct Attack Hazards**



Notes

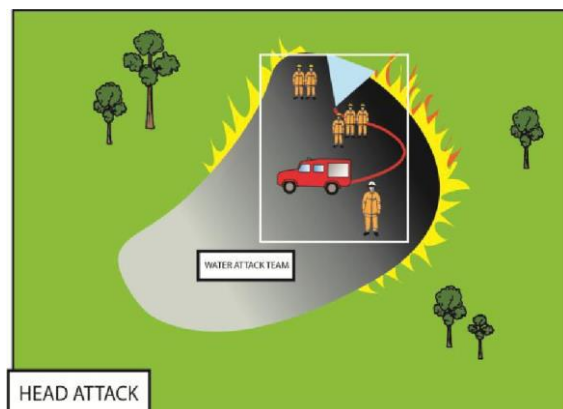
Direct attack is an effective method of suppression, and one that can be used with great success, but it is a technique that has limitations and is more successful when used on fires with an intensity producing a flame length of below 1.5m.

Its purpose as with all fire is to break the triangle of fire by reducing the severity of the fire line by cooling, smothering, or starving the fire.

Direct Attack methods can be extremely successful when deployed against fires of low (flame length up to 0.5m) and low/medium intensity (flame length up to a maximum of 1.5m). Fires that produce flame lengths above 1.5m become progressively more difficult and dangerous to control due to the rapidly rising intensity of the fire. Having ground crews working close to the fire is incredibly dangerous.

The application of water via pressurised systems may still have some success on fires above this threshold; personnel working with hand tools such as beaters should be withdrawn until flame length is reduced.

Slide 6 Head attack hazards

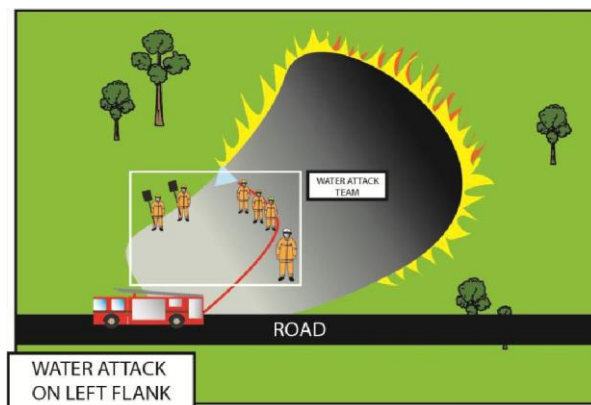


Notes

Unless a fire is of low intensity, the head part of a fire should normally only be attacked once the flanks have been extinguished. This is partly because the head fire gains some support from the flank fires, and once these have been extinguished, fire intensity at the head will normally reduce. Direct attack against a head fire is normally only successful on lower intensity fires. It may be dangerous to attack a head fire from the front, particularly when personnel are placed in un-burnt vegetation.

It is a significant hazard to have fire crews operating in un-burnt vegetation due to the intensity of fire at the head. Adopting this method should only be considered under strict control measures.

Slide 7 Flank attack hazards



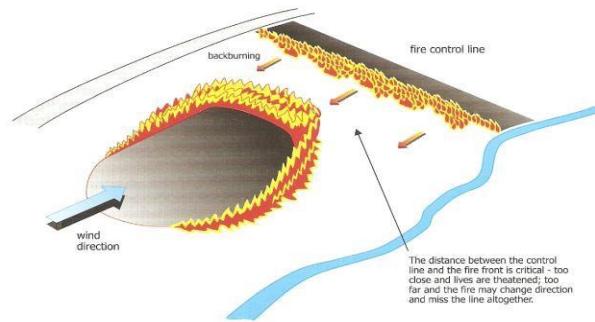
Notes

The significant hazard associated with flanked attacks is that wind and topography can affect the fire development and the flank fire can develop into a head fire placing ground crews at significant risks.

Slide 8 Indirect Attack hazards

Template V.6.0a

Figure 2.9 Indirect attack – control line tied into existing break (secure perimeter)



Notes:

These tactics should be applied at higher intensity fires, where fire fighting close to the fires edge may be more dangerous. As the name suggests, Indirect Attack is where fire fighting techniques are applied *'indirectly'* or away from the fires' edge. The purpose is normally to contain a fire within a chosen boundary. Due to the fact that these techniques are applied some distance from the fire front, they can often be a much safer way of fighting a fire.

We don't currently adopt prescribed burning as a method of control line creation due the abnormal level of risk, however similar results can be achieved by use of CAFS, hand tools, heavy machinery as well as use of existing fire breaks.

Risk is posed by the creation of a control line in the wrong location and creating the control line at the wrong time in relation to the fire line.

- Creating the control line too close to the fire line risks crews due to insufficient time to create an adequate fire line exposing crews to intense fire conditions.
- Creating the fire line too far in advance leaves risk of changing weather conditions causing the fire line to miss the control line completely
- Using offensive burning although effective poses a high level of risk if used incorrectly in
 - o Areas consisting of large numbers of wildland urban interfaces
 - o Complex infrastructure
 - o High unmanaged fuel loads
 - o Incorrect weather conditions
- Spotting: Fire fighting crews on the control line may be put at risk if spotting occurs beyond the control line causing further fire spread

Slide 9 Hazard considerations during wildfire tactics

When adopting direct or indirect fire fighting tactics the additional operational hazards must be taken into consideration.

Slide 10 Physical injury



Notes:

The nature of wildfire incidents and the speed of fire development require crews to carry out a large amount of manual work; risk of muscular-skeletal injuries arises from such activities as:

- Walking/Carrying equipment over rough terrain
- Beating
- Creating firebreak
- Making up large quantities of hose

Slide 11 Utilities



Notes:

Electricity

When a fire occurs under or near overhead power cables and is accompanied by dense smoke with a high carbon content, e.g. tyres, from forest or heath land, or when flames rise close to the conductors, there could be a danger of

a discharge to earth/ground or adjacent structures, trees, or fire service equipment. The maximum danger zone is considered to be a corridor about 10 metres either side of high voltage lines, i.e. those carrying up to 400 Kilovolts (KV).

Pipelines

Surface or underground pipelines are present throughout many of our rural areas with many of the pipelines carrying multi-fuel products gas, oil, and petroleum. The depth of these pipelines is 900mm in rural areas & present a limited hazard and should be considered prior to and during fire suppression operations.

- Pipelines heating from excessive downward heat travel
- Ruptured pipelines from excavation equipment
- The pressure of the fuel in the pipeline ranges from 40bar at source down to 4bar at its terminal location

Slide 12 Non-uniformed personnel & equipment



Notes

LAND MANAGERS FORM ONE OF THE ASSETS AT ANY WILDFIRE INCIDENT, PROVIDING LOCAL KNOWLEDGE OF TOPOGRAPHY AND FUELS & ACCESS TO RESOURCES. HOWEVER MEMBERS OF THE PUBLIC WISHING TO ASSIST IN AN ADHOC MANNER POSE SIGNIFICANT HAZARD AT WILDFIRE INCIDENTS

Non uniformed personnel

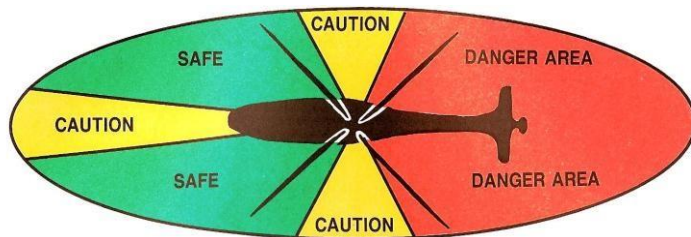
1. Non-service personnel lacking experience of emergency situations
2. Lack of appropriate PPE
3. Lack of effective command and control systems
4. Attempting to carry out their own fire fighting actions
5. Self deployment

Non service vehicles

It is recognised that privately owned heavy/specialist machinery can greatly assist wildfire incidents however all deployment must be controlled through the incident command system to minimise the risks:

- Suitability of the equipment for the task
- The lack of competence of the operators
- Self deployment on the fire ground

Slide 13 Helicopters



Notes:

Helicopters may be utilised at outdoor fires and provide an aerial perspective of incidents or in the future for fire fighting activities.

Hazards that may be associated with their use include:

- Accelerated fire growth
- Impact with moving rotors
- Flying Brands
- Risks to ground crews when landing from rotor movement

Slide 14 Explosion



Notes:

An explosion hazard may exist due to discarded cylinders and aerosols and unexploded ordnance on military ranges involved in fire

Incidents within these areas are normally confined to heathland, undergrowth and common fires. Very few buildings and vehicles are located in these areas.

The dangerous nature of their use means that special care should be adopted when attending incidents in these areas. All the relevant information must be utilised as well as liaising with the relevant wardens/rangers.



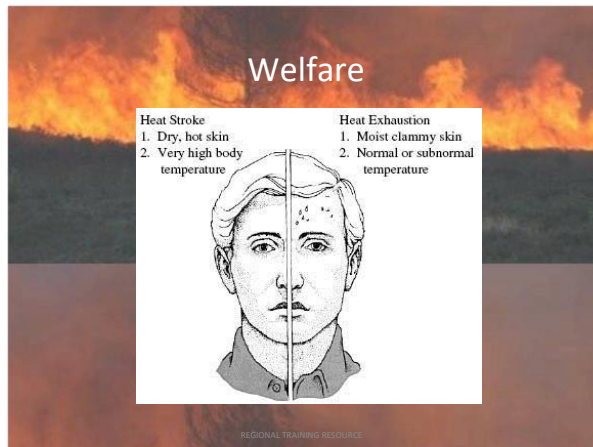
Notes:

Animals, either wild, livestock or domesticated, may present a hazard during wildfire operations. Animal behaviour during fire is unpredictable and all animals must be treated with extreme caution. Additional risks are presented from insect bites/stings/scratches and the potential transmission of zoonoses. Consideration must be given to utilising personnel or others who have animal handling skills.

Any extreme reactions to bites and stings (e.g. Adder bites) will require immediate medical attention.

Slide 16 Additional Tactical Hazards

Welfare



Wildfires predominantly occur during periods of elevated ambient temperature this presents a number of hazards that may be exacerbated due to the extended periods of working that may also occur.

Personnel working for long periods in high temperatures/humidity may be exposed to sunburn, dehydration, Hyperthermia which may range from heat stress to heat stroke.

Notes

Sunburn:

Depending on the time of year and the strength of the sun, all personnel, FRS and non FRS that are exposed will be affected. Exposure time may only be short if the UV is strong enough before personnel are adversely affected with any of the following:- ☐ Blistering

- Fever
- Dizziness
- Headaches
- Nausea

Hyperthermia

An elevated body temperature due to failed thermoregulation. Hyperthermia occurs when the body produces or absorbs more heat than it can dissipate.

Heat stroke

An acute condition of hyperthermia that is caused by prolonged exposure to excessive heat or heat and humidity. The heat-regulating mechanisms of the body eventually become overwhelmed and unable to effectively deal with the heat, causing the body temperature to climb uncontrollably.

SECTION 5

Control Measures & Actions

Slide 16 Wildland Urban Interface (WUI)

When there is threat to life or property at a wildfire incident, these areas should be identified in the early stages by the incident command and form part of the tactical plan based on the predicted fire spread.

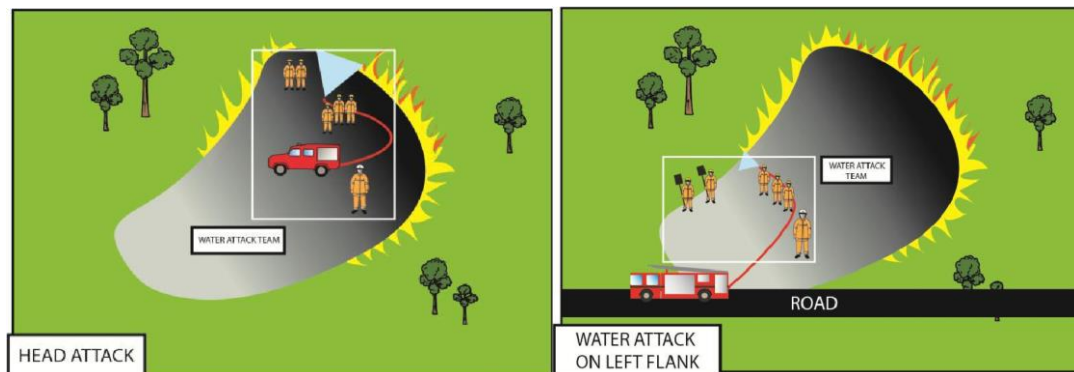
Should resources have to be redeployed to protect life/property due to unpredicted fire spread then the safety officer or lookout should maintain LACES protocol to ensure crew safety during any transitional phase.

Clear communication between sectors and incident command should occur prior to any movement of resources between sector so that an effective tactical plan can be maintained

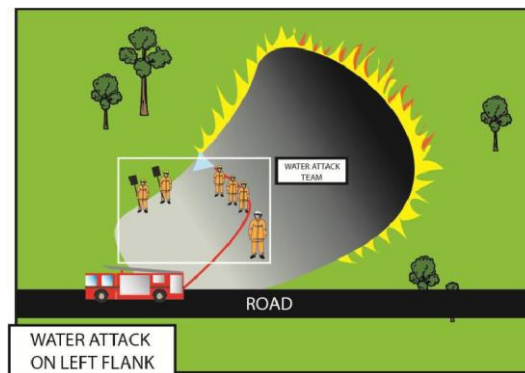
Tactical Control measures Slide 17 PDA

Where possible PDA should be adjusted during high wildfire season and during periods of high temperatures when the Fire Severity rating is high, to include specialist off-road capabilities in the initial attack. By increasing the weight of attack to include specialist off road equipment in the early stages we greatly reduce the risk of the fire gaining sufficient momentum in becoming an uncontrolled wildfire.

Slide 18 Direct Attack: Head & Flanked attacks



Slide 18a



- When attacking a fire it is important to start operations from what is known as an Anchor Point. This is a location that is free of fuel and which will prevent fire spread outside the containment area. Crews should normally work from an anchor point along the flank or flanks of the fire towards the head.

Slide 18b

- A wildfire, under normal circumstances should always be attacked from the rear and where possible from an area that has already been burnt. This prevents personnel from being placed in front of a fire in un-burnt fuel, which can be particularly dangerous.

Slide 18c

- Whenever possible, it is good practise to work from within the burnt area or what is termed '*the black*'. Working from '*the black*' can provide crews with some security as they are working from behind the fire in an area that has already been burnt. When doing so, it is still important to understand that the fuel in the black area may not be

completely burnt, and should the fire change its direction; the remaining fuel may support a second burn.

Slide 18d



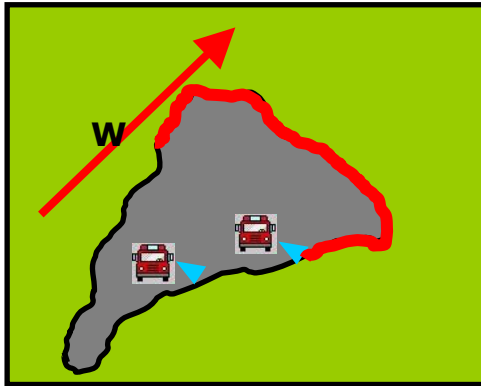
- The timing of an attack is also important, changes to alignment and fuels will result in different fire intensities. Attacks should be made at times and places where the fire is burning with lower intensities. For example, if a fire is burning upslope it might be prudent to delay any attack on the head part of a fire until it reaches the top of the slope, where its intensity will fall.

Slide 18e

- Direct attack methods can be extremely successful when deployed against fires of low (flame length up to 0.5m) and low/medium intensity (flame length up to a maximum of 1.5m). Fires that demonstrate flame lengths above 1.5m become progressively more difficult and dangerous to control, although the application of water via pressurised systems may still have some success on fires above this threshold; personnel working with hand tools such as beaters should be withdrawn until flame length is reduced.

By adopting LACES sector commanders will ensure that a lookout is in place not only for safety but as the wind changes the direction of fire spread, crews on the flanks can move accordingly to ensure fire fighting pressure is maintained on the flanks at all times.

Slide 19 Tandem attack



Notes

- Where possible the deployment of specialist vehicles should occur as a wildfire unit consisting of two vehicles to a unit.
- Two vehicles can be used effectively to knock down the fire and to prevent re-ignition. The first appliance moves along the fire front knocking down the fire and preventing it from spreading further. This may be an effective use of a fire fogging system. The second appliance follows behind ensuring that the knocked down areas are extinguished fully.
- The rear vehicle effectively governs the speed of the fire fighting unit looking to see the effectiveness of extinguishment and slowing or speeding up to balance effective fire fighting with rapid knock down.

Although it is effective and can minimise the need for ground crews, careful consideration should be given to the terrain as this method is only effective where areas of continuous vehicle access can be achieved.

Some FRS may have a policy of no fire fighting from moving vehicles; tandem crewing can still be adopted with crew's fire fighting on foot alongside the vehicles. Safety officers and sufficient measures to maintain crew safety should be implemented.



Notes

These are made up of personnel who are equipped to fight a fire using techniques which utilise hand tools and portable fire fighting equipment. Hand tool crews should be equipped with fire fighting equipment such as beaters and knapsack sprayers. They can also use mattocks, spades, saws and other equipment specific to **control line construction**.

This technique can be used effectively in direct attack on creeping fire fronts below 1.5m flame length, and also in construction of fire breaks for indirect **attack**

A crew made up of hand tool users performs most efficiently when crews of between 6-12 individuals are used in a coordinated fashion by the sector commander.

LACES protocol should be adopted at all times during direct attack and crews withdrawn, particularly ground crews on foot, if flame length and fire intensity increases.

Before commencing the construction of a control line, a plan should be made, and it is important to consider the following points;

- Always ensure that the control line is started from a strong anchor point. A control line that does not completely close in a fire may allow fire to spread around it.
- Plan to take the shortest route and keep the line as straight as possible. Sharp bends will create weak points where the fire may be able to penetrate the line. When a change of direction is made, ensure that bends are gradual. If bends have to be more severe consider broadening the width of the control line at these points.

- Take full advantage of existing features of terrain and natural or manmade features that will prevent fire spread.
- Plan the route to pass through fuel and vegetation that is easier to work in. For example, a longer route through grass may be significantly quicker to build than a shorter route through scrubland.
- Build the line as close to the fire as possible, but take into consideration the rate of fire spread. Ensure that there is enough time to complete the control line before the fire reaches it. By keeping close to the fire, crews may be able to use the black area as a safety zone.
- Constructing a control line on a slope above a fire is extremely hazardous and because of the likely increase in fire intensity is potentially ineffective. Consider routing lines along the base of slopes or on the reverse side.
- *Constructing a control line in front of the head fire is extremely hazardous.* Ensure that crews are positioned a safe distance from the fire front and that their escape routes and safety zones cannot be compromised if the fire changes its behaviour.
- When constructing a control line on a slope below a fire, it should be constructed in such a way that it prevents any rolling materials passing over it and into un-burned fuel on the outer side.
- Plan what threat there is to the line being penetrated. Flame length, wind strength, radiant heat, fuel type, ground fuels such as roots or buried branches, rolling fire debris etc. must all be considered
- Control lines can be strengthened by wetting the surrounding fuel, covering it with some form of fire retardant, or using fire to remove the fuel completely
- Due to the arduous nature of control line construction consideration should always be given to the welfare of personnel, particularly with regard to maintaining hydration and providing regular rest intervals / reliefs.



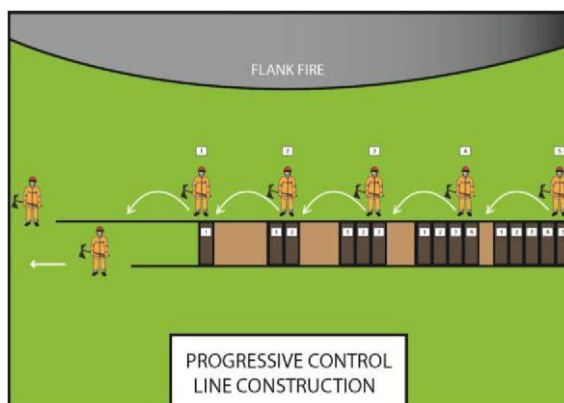
This can be considered the most effective way to use manual methods of fire line construction. It is a systematic technique where each member of the crew has a specific task which is repeated along the control line which is broken down in to blocks.

Each hand crew should consist of about ten people including a lookout to monitor fire behaviour in relation to crew location.

Team Roles

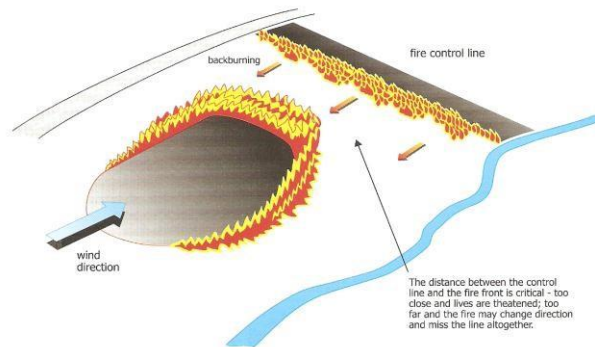
1. **Pathfinders:** Identify the best route through the vegetation, and begin to remove larger vegetation (when use of mechanical tools i.e. chainsaws consider land rangers to form part of the team)
2. **Edge cutters:** Two crew members begin cutting the width of the fire break to clear. One member cuts the edge nearest the fire and the other at the rear of the control line
3. **Diggers:** These crew work at least 3 metres apart for safety and remove by digging/raking out fuel between the edges that have been cut
4. **Tail Crew:** They clear the control line removing any missed fuel and ensuring all fuel is on the outside of the control line

Slide 22



Slide 23 Indirect Attack

Figure 2.9 Indirect attack – control line tied into existing break (secure perimeter)



As already suggested these tactics should be applied at higher intensity fires, where fire fighting close to the fires edge may be more dangerous. The purpose is when the fire intensity is too great for direct fire fighting that we use wildfire understanding to contain it in a location highly likely to succeed.

It must be understood however that from a view point of the incident commander Indirect Attack can be used as an offensive and defensive tool.

Notes

- Offensive: The indirect attack to create a fire break is based on the likely development of the fire and is based on your primary operational plan
- Defensive: The indirect attack is used in a precautionary way away from the fire in the eventuality that fire development changes and your primary operational plan becomes ineffective.
- Decisions on where to create the control line should be based on knowledge and understanding of the fires current and future behaviour through the "Wildfire Prediction System" and the wildfire officer who will be providing the incident commander with knowledge of the fire scene.
- Use of Class B foam at 3% can be used to form an effective fire break
- Use of Class B foam at 3% in conjunction with the creation of a fire break by removal of available fuel by hand or machinery.
- Ensure that crews observe beyond the fire line once the fire reaches the control line to extinguish spotting that may occur.
- Once the fire has reached the control line efforts should be focused on maintaining the effectiveness of the line while the fire intensity is reduced & importantly controlling any spotting beyond the control line.

Slide 24 Physical injury



Notes:

Control measures to prevent injury:

- Ensure correct PPE is worn
- Adhere to manual handling of equipment when moving or lifting equipment
- Ensure regular rotation of crew is maintained
- Work efficiently when creating manual fire breaks

Slide 25 UTILITIES



Notes:

Electricity

In the vicinity of overhead power lines, personnel should observe an exclusion corridor of ten metres on each side of the route.

The maximum danger zone is considered to be a corridor about 10 metres either side of high voltage lines, i.e. those carrying up to 400 Kilovolts (KV).

Pipelines

Surface or underground pipelines may present a hazard and should be considered prior to and during fire suppression operations.

- Where excessive downward heat travel has occurred near pipelines the flow of fuel through the pipeline is designed to maintain a safe temperature
- Risk assess the use of any heavy machinery on site close to pipelines when excavating fire breaks
- Pipeline operators are identified with contact details from the markers present
- Request pipeline operators and set up appropriate cordon
- Refer to Specific incident plan for pipelines
- Carry out full dynamic risk assessment to ascertain level of risk

Slide 26 Non uniformed personnel & equipment

LAND MANAGERS FORM ONE OF THE ASSETS AT ANY WILDFIRE INCIDENT, PROVIDING LOCAL KNOWLEDGE OF TOPOGRAPHY AND FUELS & ACCESS TO RESOURCES. HOWEVER MEMBERS OF THE PUBLIC WISHING TO ASSIST IN AN ADHOC MANNER POSE SIGNIFICANT HAZARD AT WILDFIRE INCIDENTS

Notes:

Non uniformed personnel

- Ensure land manager of risk area is requested and forms part of the incident command
- Incident command must ensure that public and land agency staff do not self deploy on the fire ground.
- All non uniformed assistance must first present to the Incident command unit
- Ensure all non uniformed personnel carrying out assistance on the fire ground operate under supervision of the FRS
- Non uniformed personnel should not be operating within the immediate risk area. Non uniformed personnel can be used effectively should the situation permit to assist FRS to create control line construction as it is away from the immediate fire risk
- When non uniformed personnel are operating on the fire ground all sectors should be informed and their location monitored and LACES adhered to.

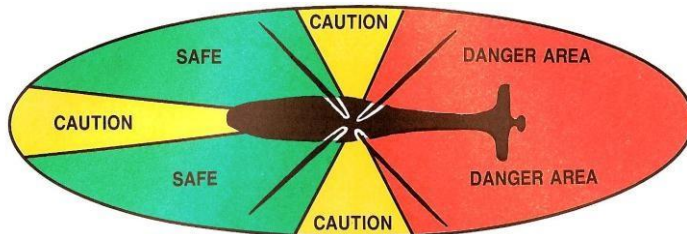
Non Service Vehicles

Use of privately owned specialist machinery can greatly improve the ability to contain a wildfire however control measures will help eliminate the hazards.

- An effective operational plan is created before deployment
- Private operators receive a full briefing including liability issues for use of vehicles

- Private vehicles and resources are deployed under the supervision of uniformed personnel and away from the immediate risk area and adhere to LACES protocol at all times

Slide 27 Helicopters

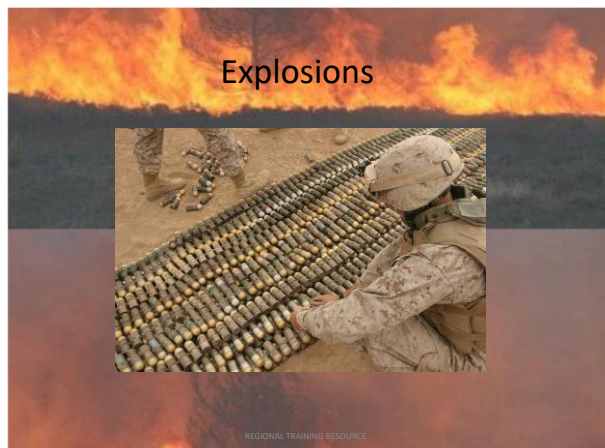


Notes:

Helicopters may be utilised at outdoor fires and provide an aerial perspective of incidents or in the future for fire fighting activities. There risk can be minimised by adopting strict control measures when operating near aircraft.

- Establish communications with any aircraft on scene
- Ensure safety protocols regarding approaching rotary aircraft are followed when on the ground.
- Any landing aircraft is away from the scene of operations

Slide 28 Explosion



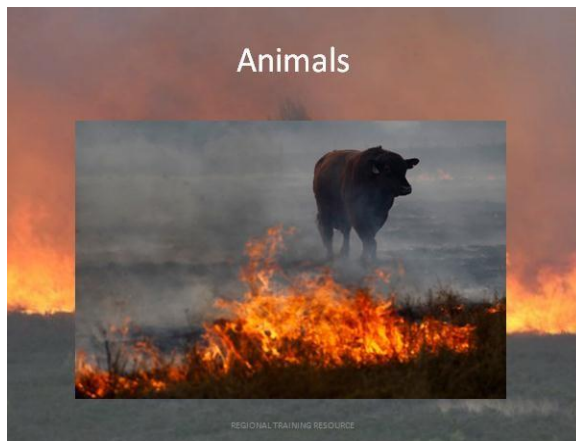
Notes:

The dangerous nature of their use means that special care should be adopted when attending incidents in these areas. All the relevant information must be utilised as well as liaising with the relevant wardens/rangers.

- Where possible have all risk sites pre mapped before an incident occurs
- Incident command should form a relevant operational plan based on the unknown risk and guidance from the land operator (military etc)

- Risk areas during fire should be clearly marked and communicate no go areas to all personnel upon incident brief or at the earliest opportunity
- Location of unknown explosives/ordnance at an incident should be given a grid reference and communicated back to command support adopting an indirect/defensive fire fighting position.

Slide 29 **Animals**

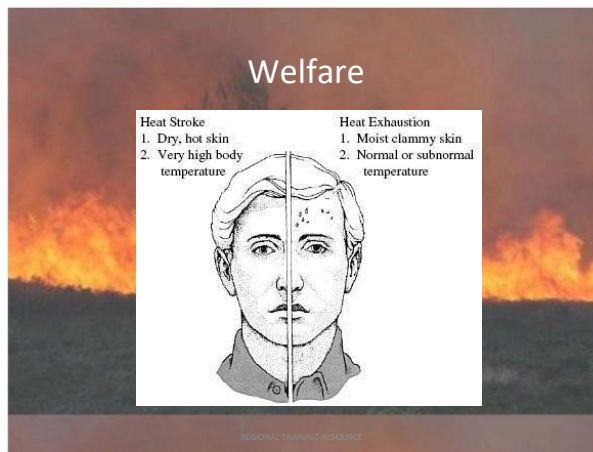


Notes:

Animal risk during wildfire is significant particularly livestock, equestrian animals.

- Crews should never enter penned areas with livestock
- Removal of animals from the fire scene should be ideally be managed by the landowner under strict supervision by FRS.
- To reduce risks of bites and stings personnel should keep skin covered where possible particularly in long grass and undergrowth
- FRS trained animal rescue units should be used where possible
- To minimise infection risks from bites or transmission of zoonoses
- Crews should adopt thorough hygiene procedures after contact and prior to consuming food or fluids.

Slide 30 **Welfare**



Personnel working for long periods in high temperatures/humidity may be exposed to sunburn, dehydration, Hyperthermia which may range from heat stress to heat stroke.

Notes

Sunburn:

To avoid the effects of sunburn ensure that:

- Sun cream is available for personnel on the fire ground
- Wear appropriate head protection
- Take regular shelter from direct sunlight during fire operations

Hyperthermia/Heat stroke

Effective control measures should be adopted to prevent this:

- At the operational/sector commanders discretion or when safe to do so PPE can be removed to allow dissipation of heat
- Drink fluids at regular intervals to maintain thermoregulation (avoid diuretics-Tea/Coffee)
- Ensure regular rotation of personnel on the fire ground
- All personnel to monitor themselves and others on the fire ground for signs of hyperthermia/heatstroke.

Slide 31 LACES

L	LOOKOUTS	All teams to have a dedicated lookout Monitor Fire Behaviour/Weather Assess tactics and liaise with relevant commander
A	AWARENESS	All personnel to understand role/task Safety measures/Dangers/Risks identified and briefed Regular radio checks
C	COMMUNICATIONS	Full safety briefs for all personnel Regular situation updates
E	ESCAPE ROUTES	Part of briefing Must be more than one Avoid steep slopes
S	SAFETY ZONE	Clearly identified in briefing Size (4 x flame height)/Avoid downwind/Avoid steep slopes

Notes

The wildfire behaviour within the UK wildfire environment can be equally as dangerous as the rest of the world perhaps not in relation to size but definitely in the complexity of the fires. It is imperative that FRS's appreciate that without proper training, appropriate understanding and effective systems of work, FRS personnel and those that work with them remain at significant risk

LACES is an uncomplicated and easily applied safety system that is ideally suited for UK FRS use. It is internationally recognised as good practise, and has been adopted in many countries to improve the safety of operational personnel at wildfire incidents. The UK version of LACES is similar to the US system but has been adapted to ensure its compatibility with UK FRS systems.

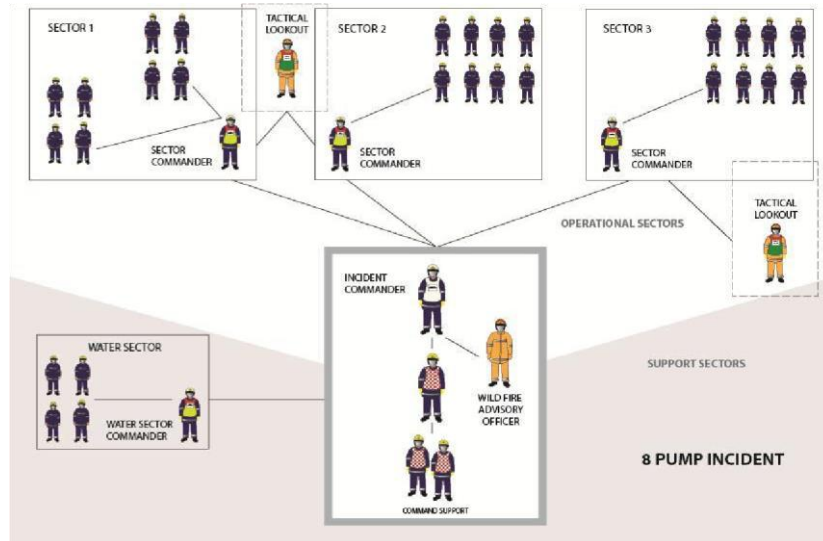
The principal advantage of LACES is that it can be applied to all wildfire situations and acts as a controlling process, which, if followed, ensures critical risks are considered and monitored and that others are significantly diminished.

The various elements contained within the LACES protocol, ensure that:

- Personnel are supervised and remain informed of the status and development of the wildfire.
- The situation is monitored and the risks that personnel are exposed to are continually assessed.
- It proactively identifies a response to any unexpected events, ensuring that an escape route exists to take personnel from a place of danger to one of complete safety.

SECTION 6

Slide 32 Incident command considerations



Wildfire Incident command should not deviate from the command doctrine outlined within the FRS Manual on Incident Command and recognises that the key principles of the UK ICS can be applied to wildfire incidents to ensure that they are effectively managed. What it does however is to reinforce key applications of the existing system to meet wildfire needs.

The effectiveness of the incident command system (ICS)¹ used within the UK is heavily dependent upon effective communications, the ability to gather incident related intelligence and to use this information to formulate a plan that will bring the situation to a safe conclusion. This plan is reliant on the use of supporting systems that are capable of monitoring the effectiveness of the operational tactics and strategy, and instigating suitable responses to any changes to the wildfire operational environment.

Slide 33 Briefings



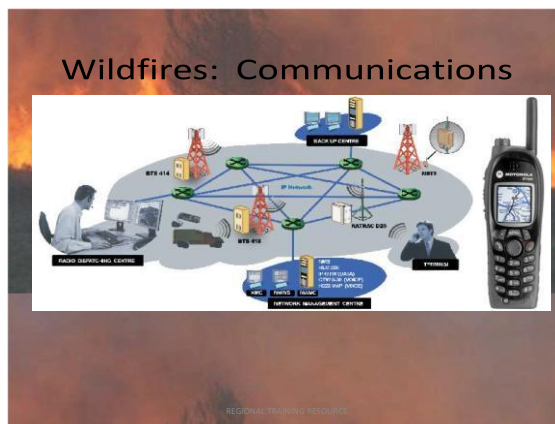
Notes

Due to the dynamic and spatial nature of wildfire incidents the need for comprehensive briefings is particularly relevant. Briefings are an integral part of the ICS communication process and, as advised in Fire Service Manual, on Incident Command.

It is never more critical to carry out briefings than prior to any operational deployment on the fire ground.

The primary responsibility of any Incident Commander is the safety of personnel working under their control. A briefing must be provided so that any hazards can be identified and that control over them can be established.

Slide 34 Communication



Notes

Critical to any wildfire incident is effective and robust communication channels on the fire ground. (This will be discussed in training package C). However as part of the incident command process a secondary method of fire ground communications (main scheme radio network) should be established prior to any crew deployment on the fire ground.

Slide 35 Navigation



Notes:

Wildfires usually occur in more rural or even remote areas; as a result the use of maps during these incidents is both necessary and unavoidable. All FRS's should provide personnel with training that is appropriate to identified risk, thus ensuring that these invaluable aids are used to their full potential. Some of the wildfire issues that UK FRS's are required to address are complex; others such as acquiring an appropriate standard of map reading and navigational expertise are simpler. One thing is certain however, without the basic skills to operate effectively within a spatial environment, operational capabilities will be limited.

Detailed information surrounding the importance of navigation at wildfire incidents will be discussed in training package C

Slide 36 Partnership work



Notes

- FRS incident commanders should be immediately considering incorporating land managers within the incident command structure when developing operation response.
- Planning inclusion on land managers should be taking place prior to the wildfire as part of the prevention strategy.
- Rural managers/rangers should also be considered to form strategic parts of wildfire officers' team to provide detailed strategic guidance to the Incident Commander.
- Partnership response to wildfires should occur only where all organisations have an understanding of fire service ICS and they understand where they sit within that structure, and the range of responsibilities they would be expected to perform.

Slide 37 Specialist skills

Wildfire advisors or Subject matter advisors should be utilised quickly as part of the Incident commander's operational plan. Officers with specialist knowledge of wildfire can carry out a number of functions to ensure that their FRS is better prepared to meet the wildfire risk in their local area. At an incident, they can act as subject matter advisors or take on more complex risk critical operational roles, and their expertise can prove to be invaluable to the Incident Commander.

Prior to any incident occurring, specialist officers can assist in the pre-planning required to determine a services local operational response to the wildfire risk within their area. They can also play an important part in ensuring that there is effective liaison with partner agencies, to underpin the preplanning and prevention strategies developed by their services.

Operationally, specialist officers or personnel performing an advisory role will operate at a tactical level, providing support to the incident command structure and assisting in the control and co-ordination of resources.

Notes

Personnel performing a wildfire advisory role should have the knowledge and understanding to provide information on issues including:

- Fire behaviour and its future development.
- The appropriate tactics to be employed.
- The suppression methods to be used.
- The deployment of resources on the fire ground.
- The associated risks and the control measures to be instigated during the incident.
- Provide advice or practical guidance in relation to map reading or navigational issues.
- To gather and analyse operational intelligence.

Wildfire officers may be deployed in each sector of the fire to provide tactical support and help coordinate:

Template V.6.0a

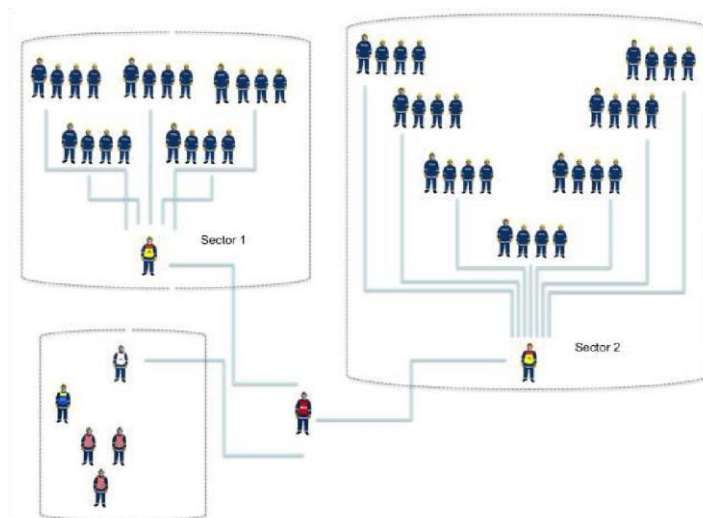
- Operating as Team, Sector or Incident lookouts.
 - Giving tactical support to operational commanders.
 - Form teams able to construct control lines.
- (All wildfire specialist officers should have a thorough understanding of map reading, navigation and orienteering)

Crew and Vehicle Deployment

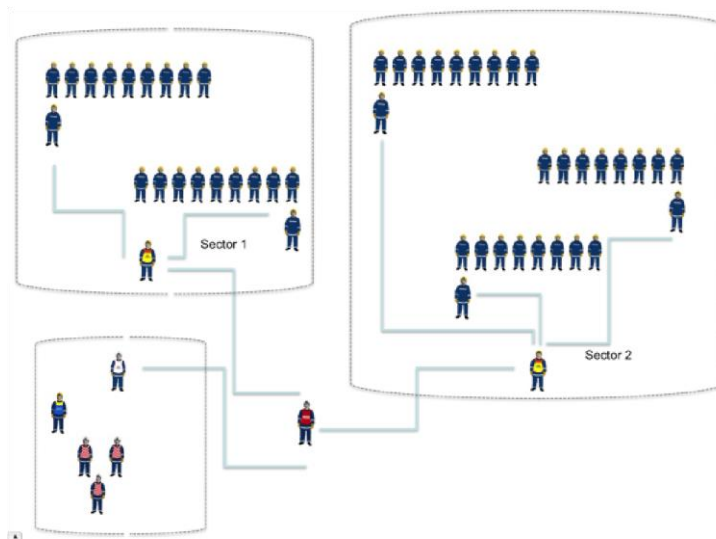
It has been mentioned that adjustments to pre-determined attendance for wildfires can greatly reduce the impact of them by correct weight of response with the right vehicles however further IC consideration should be made to crew sizes and configuration of working vehicles

Crew sizes At an incident that has large numbers of personnel in attendance, it may be appropriate, and more efficient and effective to place these personnel within larger groupings, typically of 10 – 12 persons. There can be significant benefits to this approach, not only to the ICS but also to the individuals making up the teams.

Slide 38 Standard Crew deployment



Slide 39 Deployment of crews in larger groups



Notes:

Crews

- Fewer crews - raising the number of people in each team can significantly reduce the total number of crews committed onto the fire ground.
- A crew supervisor is more able to concentrate on the Lookout role within the LACES protocol. They are then able to monitor fire behaviour and issues related to team safety.
- A small team is unlikely to have the capacity to meet the minimum requirements of LACES. If each team requires a supervisory officer then up to 25% of the total work force may be required to perform this management role. It will be difficult to maintain control over so many teams, or even establish effective communications.
- Due to the lower numbers of crews the communication process is simplified and commanders are better able establish and maintain contact with all crews throughout the incident.
- Tactical lookouts will be responsible for fewer teams and will have to communicate with fewer crew lookouts.
- Less radio traffic and a less complex communication system facilitating a more efficient transfer of information within the ICS.
- Fewer briefings required allowing for a better information exchange.
- Crews have the capacity to be more resilient.

- Crews are more effective, a larger team can employ a more effective system of work utilising a number of tactics at once that benefits all team members.
- Crews can remain active for longer and address many of their own welfare issues.

Vehicles

- Specialist off road vehicles should be deployed where possible in pairs to allow effective fire suppression (tandem attack)
- ICS should ensure that early make up for specialist vehicles occurs, specialist wildfire officers will be able to predict fire spread and likely resources required.

Slide 40 Sectorisation

With the dynamic nature of wildfires, and the large geographical areas they cover, sectorisation of the wildfire can be difficult to achieve.

Setting fixed sector boundaries to a fire with a continuous outward spread is difficult so where possible incident command should focus on sectorising via the landscape not the fire.

By sectorising according to landscape means if set wide enough the sector boundaries can remain fixed for the duration of the incident.

It is widely suggested that an effective way to achieve this is by via OS map draw a circle around the incident, far enough away to include future fire development. This circle is then divided into sectors according to:

- Sections of the fire
- Features of the landscape
- Fire spread

Slide 41



Image 1: Original development of the fire placed onto a map taking into account its shape due to WPS and land topography

Slide 42

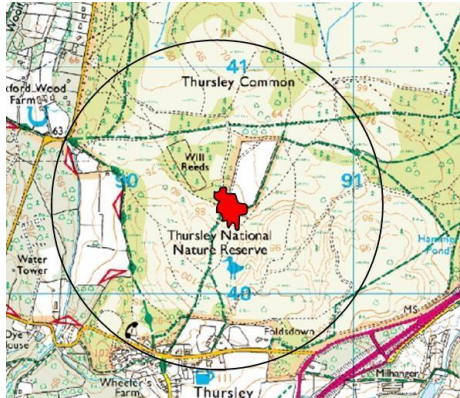


Image 2: Likely fire spread is predicted and a circle placed around the fire (The diameter can measure in Km to account for spread). With this, sectorisation within the landscape can now occur

Slide 43

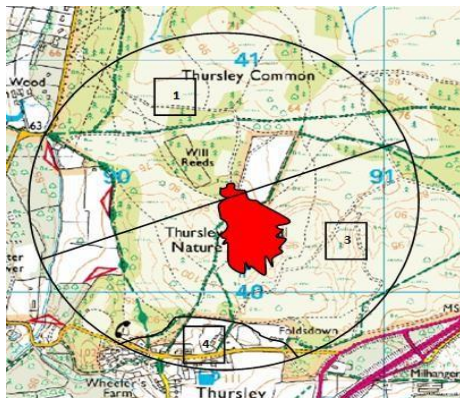


Image 3: Sectors can now be created either by separating the fire into segments via straight lines or in this instance use the landmarks to create key sectors.

Slide 44

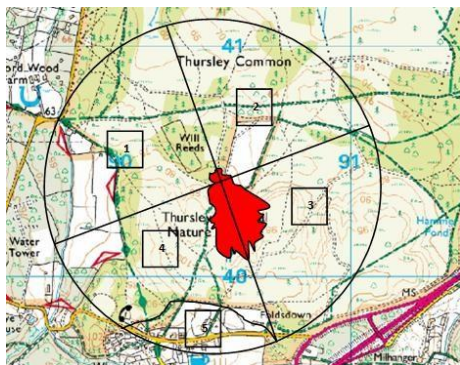
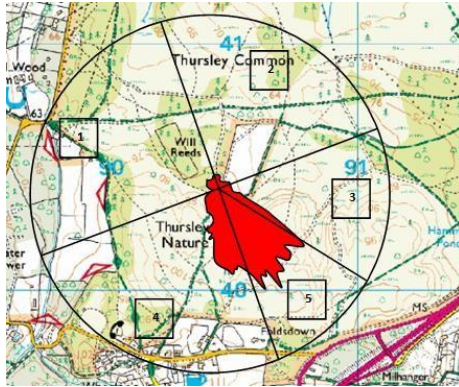


Image 4: Here is an example of how effective this method is in sectorising. The incident is in five sectors and although the fire is developing the sectorisation can remain intact

Slide 45 Image 5: Should the level of resources allocated or risk increase due to fire spread then the sector can be sub divided further for better incident management



Notes:

The above method forms a basis for simple sectorisation however should the situation demand it, sectorisation can occur further according to specific risks on the fire ground

If the outer boundary of the fire is reached by unexpected fire spread then the radius of the sectors can be expanded.

Key Incident Command considerations

- What is the fire's behaviour and its future development?
- Have effective Communications been established?
- Have we established communication with the land owner?
- Do I have the appropriate equipment and appliances to carryout fire suppression?
- What are the appropriate tactics to be employed?
- What suppression methods to be used?
- The deployment of resources on the fire ground.
- The associated risks and the control measures to be instigated during the incident.
- Provide advice or practical guidance in relation to map reading or navigational issues.
- To gather and analyse operational intelligence.

Key elements of the leadership role are :

- The maintenance of shared situational awareness by effective communications
- Clear planning and setting of operational priorities
- Direction and focusing of activity in pursuit of objectives
- Ensuring operational crews have freedom and resources to carry out their role safely within the plan.

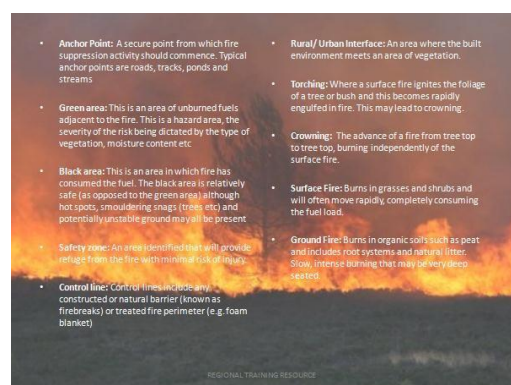
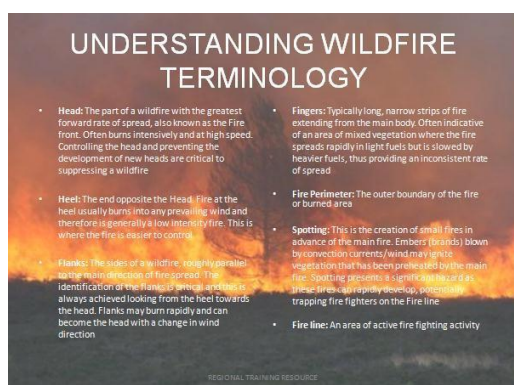
SECTION 7

Supporting information

- Wildfire Manual (awaiting publication)
- F18.1 WLD 01 SOP Wildfire V0.2
- Wild land Fire fighting for structural Firefighters 4th Edition IFSTA 2003
- Fire and Rescue Manual Volume 2 – Fire Service Operations– Incident Command

Slide 46 Wildfire terminology Understanding wildfire terminology

To understand the significant hazards associated with Wildfires it is important to first understand the terminology associated with these fire types as they vary greatly from most other types of fire.



Slide 47

Notes:

(Slide 47)

Head: The part of a wildfire with the greatest forward rate of spread, also known as the Fire front. Often burns intensively and at high speed. Controlling the head and preventing the development of new heads are critical to suppressing a wildfire.

Slide 48

Heel: The end opposite the Head. Fire at the heel usually burns into any prevailing wind and therefore is generally a low intensity fire. This is where the fire is easier to control.

Flanks: The sides of a wildfire, roughly parallel to the main direction of fire spread. The identification of the flanks is critical and this is always achieved looking from the heel towards the head. Flanks may burn rapidly and can become the head with a change in wind direction.

Fingers: Typically long, narrow strips of fire extending from the main body. Often indicative of an area of mixed vegetation where the fire spreads rapidly in light fuels but is slowed by heavier fuels, thus providing an inconsistent rate of spread.

Fire Perimeter: The outer boundary of the fire or burned area.

Spotting: This is the creation of small fires in advance of the main fire. Embers (brands) blown by convection currents/wind may ignite vegetation that has been preheated by the main fire. Spotting presents a significant hazard as these fires can rapidly develop, potentially trapping fire fighters on the Fire line.

Fire line: An area of active fire fighting activity

Notes:

(Slide 48)

Anchor Point: A secure point from which fire suppression activity should commence. Typical anchor points are roads, tracks, ponds and streams.

Green area: This is an area of unburned fuels adjacent to the fire. This is a hazard area, the severity of the risk being dictated by the type of vegetation, moisture content etc.

Black area: This is an area in which fire has consumed the fuel. The black area is relatively safe (as opposed to the green area) although hot spots, smouldering snags (trees etc) and potentially unstable ground may all be present.

Safety zone: An area identified that will provide refuge from the fire with minimal risk of injury.

Control line: Control lines include any constructed or natural barrier (known as firebreaks) or treated fire perimeter (e.g. foam blanket)

Rural/ Urban Interface: An area where the built environment meets an area of vegetation.

Torching: Where a surface fire ignites the foliage of a tree or bush and this becomes rapidly engulfed in fire. This may lead to crowning.

Crowning: The advance of a fire from tree top to tree top, burning independently of the surface fire.

Surface Fire: Burns in grasses and shrubs and will often move rapidly, completely consuming the fuel load.

Ground Fire: Burns in organic soils such as peat and includes root systems and natural litter. Slow, intense burning that may be very deep seated.

SECTION 8

Task analysis Waiting for flow chart

SECTION 9 Equipment

- Main pumping appliances
- Off road capable fire fighting vehicles
- Water Carrier
- HVP and associated equipment
- Lightweight portable pump
- Incident Command Unit (ICU)
- BA Entry Control Board
- Bulk hose supplies (70 & 45mm)
- Appropriate branches
- CAFs foam capacity
- Beaters
- Flexible backpacks
- Breathing Apparatus,
- Dust masks,
- Main scheme Radio/MDT,
- Incident Ground Radio communications,
- Lighting
- Small gear and Turning over tools,
- Welfare resources
- Transport vehicle (with off road capability)

- Aerial photography and fire fighting capability (where available)

SECTION 10 Assessment

Q1. What factors contribute to the development of a small fire to a high intensity fire

- a. Delays in firefighting whilst waiting for specialist off road capacity
- b. Incorrect weight of attack
- c. Incorrect firefighting appliances in the initial PDA
- d. Unrestricted fuel source allows rapid increase in intensity
- e. Adopting the wrong fire fighting strategy
- f. All of the above

Q2. What are the two basic different methods of attack adopted for wildfire suppression

- a. Head & flanked attack
- b. Tandem and single attack
- c. Direct & Indirect attack

Q3. What is heat stroke

- a. An elevated body temperature due to failed thermoregulation. When the body produces or absorbs more heat than it can dissipate
- b. The heat-regulating mechanisms of the body eventually become overwhelmed and unable to effectively deal with the heat, causing the body temperature to climb uncontrollably
- c. Over exposure to direct UV sunlight resulting in headaches and nausea

Q4. What is it called when two vehicles work together on a fire flank to establish effective fire knockdown and the second appliance follows to extinguish whilst controlling the speed of progress

- a. Twinned attacked
- b. Paired Attack
- c. Unit Attack
- d. Tandem Attack

Q5. It is critical that a incident briefing is carried to all operational crew before they are deployed to the fire ground

- a. True
- b. False

Q6. With regards to aspect which slopes will experience higher temperatures, lower humidity and fuel moisture content.

- a. Pathfinders , Edge cutters
- b. Diggers, Tail Crew
- c. Pathfinders , Edge cutters, diggers
- d. Pathfinders, Edge cutters, diggers, tail crew

Q7. What is a incident command risk consideration when fuel pipelines are running underground at a wildfire incident?

- a. Not knowing what fuel is being transported
- b. Risk of machinery rupturing the pipe when cutting fire breaks
- c. Water runoff causing erosion and exposing the pipeline

Q8 FRS incident commanders should be immediately considering incorporating land managers within the incident command structure when developing operation response.

- a. True
- b. False

Q9. What are the main advantages of having crews merge and form a larger working crew at wildfire incidents?

1. Fewer crews - raising the number of people in each team can significantly reduce the total number of crews committed onto the fire ground.

2. A crew supervisor is more able to concentrate on the Lookout role within the LACES protocol. They are then able to monitor fire behaviour and issues related to team safety.
 3. A small team is unlikely to have the capacity to meet the minimum requirements of LACES. If each team requires a supervisory officer then up to 25% of the total work force may be required to perform this management role. It will be difficult to maintain control over so many teams, or even establish effective communications.
 4. Due to the lower numbers of crews the communication process is simplified and commanders are better able establish and maintain contact with all crews throughout the incident.
 5. Tactical lookouts will be responsible for fewer teams and will have to communicate with fewer crew lookouts.
 6. Less radio traffic and a less complex communication system facilitating a more efficient transfer of information within the ICS.
 7. Fewer briefings required allowing for a better information exchange.
 8. Crews have the capacity to be more resilient.
 9. Crews are more effective, a larger team can employ a more effective system of work utilising a number of tactics at once that benefits all team members.
 10. Crews can remain active for longer and address many of their own welfare issues.
- a. 1,2,3,5,6,7
 - b. 2,3,4,5,6,7
 - c. 2,3,4,5,8,9
 - d. 4,5,6,7,9,10
 - e. All of the above

SECTION 11 Applicable national occupational standards

Unit FF4,	Element 4.1	Wildfire Awareness
Unit FF4,	Element 4.3	Wildfire Awareness
Unit FF2,	Element 2.2	Wildfire Awareness
Unit FF9,	Driving	
Unit WM7	Wildfire behaviour & planning	
Unit EFSM2	Wildfire behaviour & planning	
Unit EFSM2	Incident command etc (Silver)	

SECTION 12 Relevant references

Management of Health & Safety at Work Regulations 1999

Manual Handling Operations Regulations 1992

Wildland Firefighting for Structural Firefighters 4th Edition

Manual of Firemanship Part 6B : Practical Firemanship II.

A Guide to Operational Risk Assessment Fire Service Guide Volume 3.

GRA 3.4 Fighting Fires in Rural Areas

RA 3.5 Fighting Fires in farms:

Technical Bulletin 1/1978 Hazards from Overhead Power Lines Home Office
London: HMSO August 1978.

Fire Service Manual Volume 2 Chapters 2 and 4, HMSO 1998

“Dear Chief Officer” letter 6/1992 and DFM 5/1992: Rural Firefighting, Use of
Appliances

Northumberland Fire and Rescue Service – Advanced Wildfire Training Course

IRMP Steering Group Integrated Risk Management Planning: Policy
Guidance. Wildfire. Department of Communities and Local Government.

National Operational Guidance for Wildfires (2016)

National Operational Guidance for Incident Command (2016)

Document Control					
F18.1 Wildfire B (Wildfire Tactics & Incident Command)					
Version	Date	Author	Role	Status	Changes
V0.1	08/09/12	M.Oakley	EDPG	Created	N/a
V0.2				Revised	